

**DOOSAN**

# Powered by Innovation

Doosan Infracore  
2019 Integrated Report





## Doosan Infracore 2019 Integrated Report

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### About This Report

**Reporting Purpose** Doosan Infracore strives to embody corporate social responsibility (CSR) in its overall corporate management. To this end, the company publishes an integrated report to disclose its financial and non-financial performance results generated through the interaction of diverse CSR factors, based on which corporate values are created. This is Doosan Infracore's eighth Integrated Report, and continued discussions and improvements are taking place for more effective and transparent disclosure of information.

**Reporting Process** 26 departments related to the company's strategy, R&D, production, sales, investor relations, and communications have participated in the planning of this Integrated Report in order to enable comprehensive reporting on Doosan Infracore's financial and non-financial performance as well as social and environmental values, with a particular focus on 2019 performance results and future plans of the company.

**Reporting Period** This report presents quantitative data about the company's performance during the 2019 calendar year. However, the company's qualitative activities mentioned in the report, including the composition of the BOD, include developments recorded until the end of April 2020.

**External Assurance** This report has been assured by Samjong KPMG, an independent assurance service provider, to ensure the propriety and integrity of the reporting processes as well as the accuracy and credibility of its contents. The Independent Assurance Report is attached in the Appendix section.

**Disclaimer** This report contains details of some future activities, events and situations based on the company's plans and estimations of future financial outcomes, which may turn out to be inaccurate in the event of changes in the global business landscape. The plans and estimations draw upon the best information available at the time of completion of this report, with due consideration given to future business environments as well as the company's elaborate business strategies. Doosan Infracore, therefore, would like to remind its stakeholders that this report contains some predictions that may be affected significantly due to the risks, uncertainties and other factors involved in the company's global operations.

### Reporting Method



#### Printed Material

This report is published in Korean, English and Chinese to communicate better with our global stakeholders



#### PDF

This report is available in PDF format which can be downloaded at [www.doosaninfracore.com](http://www.doosaninfracore.com)

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# Doosan Group

The oldest and one of the fastest growing in Korea

## 2019 Financial Highlights

(Unit: KRW million; based on consolidated financial statements)

Sales 18,535,738

Operating Income 1,261,860

Total Assets 29,169,747

Total Equity 6,819,539

## Doosan Credo – Our Aspirations and Core Values

The Doosan Credo is what has inherited, refined and stipulated Doosan's management philosophy and business creed for more than 120 years. The Doosan Credo consists of nine core values that form the basis for all decisions made and actions taken at Doosan, and through which Doosan achieves its ultimate goal. The Doosan Credo is accomplished through Doosan's aspiration and core values.

### Core Values

All of us at Doosan practice the nine core values of the Doosan Credo every day. To create "Proud Global Doosan," Doosan employees around the world practice the nine core values of the Doosan Credo in all places where they operate. These values guide the way we do business, the way we treat each other, and the way we work with all of our partners. The nine core values of the Doosan Credo are as follows:

People	Cultivating People	Integrity and Transparency
Inhwa	Customers	World-class Technology and Innovation
Profit	Social Responsibility	Safety and Environment



More information on the Doosan Credo and our core values is available at <https://www.doosan.com/en/intro/credo>

**Doosan, Our Name** Doosan – a combined word of “doo (a measuring unit of grains)” and “san (mountain)” – means “little grains of sand that together make a mountain.” Doosan now aims to achieve higher goals based on its 124-year management philosophy and business credo.

**Doosan Fulfills Basic Human Needs** Doosan came into being as a front runner of its times in 1896 when the founding Chairman Seung-Jik Park opened Korea's first Western-style shop, soon followed by another first, locally-produced cosmetics. In the 1950s, Doosan engaged in international trade and established OB Beer, emerging as a business group. In the 1960s, it entered construction, food and beverage, machinery, media, and culture business. In the following decades, Doosan further expanded into the business of offering clean water, energy, infrastructure, buildings and other things that are essential to daily life and progress.

**Doosan Has No Fear of Change** In the year that marked the 100th anniversary of its founding, Doosan incorporated multiple subsidiaries into the holding company and implemented advanced processes and systems as a second launch of its journey to the next 100 years. Thereafter, through a series of mergers and acquisitions, Doosan has transformed into a global company competitive in infrastructure support business.

**Doosan Expands Its Global Footprint** Doosan competes and thrives both at home and abroad. From power plants supplying electricity in India to desalination plants piping fresh water into millions of people in the Middle East; as well as from construction equipment building bases for life to fuel cells and energy storage devices soaring in demand, Doosan is improving the quality of human life through technology.

**Doosan Prepares for the Future** Doosan will stay focused on developing such core technologies as collaborative robots, portable fuel cells, and unmanned automation for construction equipment, thus improving business fundamentals. From clean water and electricity to cutting-edge solutions to turning great ideas into a reality, Doosan aims to create a world of opportunity where all peoples unlock their full potential. That is the idea we have when we say we are building your tomorrow today.

### Aspiration

**Doosan aims to become a “Proud Global Doosan.”** “Proud Doosan” means that all stakeholders feel proud of being engaged with Doosan. To employees, it means being member of Doosan that instills pride in them; to customers, being proud consumers of Doosan that offers high-quality products and services; and to shareholders, being investors of Doosan that delivers just and high returns.

### Affiliates

Doosan is making efforts to improve the foundation for life. Doosan can be found in various fields, ranging from the entire infrastructure support business that includes industrial facilities, machinery, equipment and construction, to the consumer goods business.

Doosan Corporation	Auxiliary Organizations	Infrastructure Support Business	Consumer & Service Business
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More information on the subsidiaries of Doosan Group is available at <https://www.doosan.com/en/intro/affiliates>

# Doosan Infracore

A world-leading company in infrastructure solutions based on world-class competitiveness

## 2019 Financial Highlights

(Unit: KRW million; based on consolidated financial statements)

Sales 8,185,840

Operating Income 840,397

Total Assets 11,338,593

Total Equity 4,267,552

## Company Profile

Doosan Infracore was founded in 1937 as Chosun Machine Works, the first large-scale machine manufacturing factory in Korea. Through continuous growth for more than 80 years, it has become the nation's top machine manufacturing company. Its product line-up includes construction equipment, engines, a variety of attachments, and utility equipment. Based on its world-class competitiveness, Doosan Infracore is moving forward to grow into a global leader in the infrastructure solutions.

Company Name	Doosan Infracore Co., Ltd.
Year Founded	1937
CEO	Sohn, Dong Youn
Main Business Areas	Production and sales of construction equipment and engines
Employees	4,603 (Including overseas worksites; as of December 31, 2019)

## Business Overview

### Construction Equipment

The Construction Equipment Business Area has supplied high quality medium and large heavy equipment to industrial sites since 1977, contributing to the development of the global infrastructure industry. The Construction Equipment Business Area has prestigious global brands, such as Doosan, Bobcat, and Geith, with product line-up ranging from compact to medium and large construction equipment. It has production bases in Korea, North America, China, and Europe. It provides world-class products in construction equipment and attachments, portable air compressors, lighting systems, and portable power equipment.

Excavator	Wheel Loader
ADT	Attachment
Special Equipment	

### Engine

Established in 1958, the Engine Business Area produced the first diesel engine in Korea and has continued to expand its business portfolio. It supplies diesel and gas engines for buses and trucks, power generators and ships, as well as various industrial engines across the world. Based on its product line-up that meets increasingly stringent world-wide environmental regulations, the Engine Business Area is emerging fast as the world's top-tier engine manufacturer. It has been enhancing its global competitiveness by attracting new customers for existing products and exploring new markets and new business opportunities.

Generator Engine	Off-Highway Engine
On-Highway (Automotive) Engine	Marine Diesel Engine
Parts & Service	

## Brand

Doosan Infracore's brand represents Doosan's proud history and remarkable growth, and receives worldwide recognition.



For more information on Doosan Infracore's brand, visit our website at [www.doosaninfracore.com](http://www.doosaninfracore.com) or scan this QR code with a smartphone



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## CEO Message



### I thank you sincerely for your interest and encouragement.

As a member of the global community, Doosan Infracore is faithfully carrying out our roles and responsibilities. We are growing as a proud global company with the ardent support of customers, shareholders, suppliers, employees, local communities, and other stakeholders.

The driving force of this growth is clearly stated in the corporate motto, “Powered by Innovation.” The motto captures the importance of the innovation drive we have been pushing forward, signifies our resolution to sow the seeds of innovation across the field of operations, and emphasizes our determination to nurture business possibilities based on the driving force stemming from our tireless pursuit of innovation. We make continuous efforts to improve how we work and what we produce to provide customers with optimal solutions, we move forward towards our vision, “Global Leader in Infrastructure Solutions.”

#### Outlook and Plans for 2020

In 2019, despite a global economic downturn, Doosan Infracore posted sales of KRW 8,185.8 billion, a 5.9% increase year-on-year, and an operating income of KRW 840.4 billion, that shows a stable performance relative to the performance of 2018.

The year 2020 looks to be a year of extreme uncertainty as the confluence of the continuing global economic downturn and the COVID-19 pandemic more likely spawn unprecedented variables. The more uncertain looks the path ahead the greater focuses on fundamentals. Doosan Infracore will therefore implement three key strategies – strengthening fundamentals, diversifying product and regional portfolios, and developing future growth drivers – in order to continue our innovation drive and seize on new opportunities.

#### Strengthening fundamentals

We will improve upon fundamentals to stay competitive and profitable even in the event of drastic market fluctuations. We will sharpen our competitive edge in pricing, product quality, and customer service by optimizing resource allocations, curtailing costs, and improving other components of our value chain, in the process delivering a higher level of customer value. Also, by harnessing massive amounts of data and information being generated as a by-product, we will create the basis for big data-based decision making and apply it to our business activities.

#### Diversifying product and regional portfolios

We will expand our construction equipment product line-up, restructure distribution channels, and strengthen sales in the global market. We will increase our overseas market share by equipping wheel loaders and new products with Stage V engines, In North American and emerging markets, we will channel resources into sales of large-sized equipment and development of large-scale dealers. In China, we will maintain our market position with introduction of special equipment, low-end wheel and crawler excavators, against local competition. In developing new markets, we will leverage our digital platform with the aim of providing total solutions to customers. As for engine business, we will pursue stable revenue growth by ramping up after-sale services and solution business while increasing external sales through expansion of the new product line-up and improvement of cost competitiveness.

#### Developing future growth drivers

Unmanned and automation technologies are the key concept of futuristic technologies Doosan Infracore is developing. In November 2019, we successfully demonstrated Concept-X, an all-purpose control solution packed with unmanned and automation technologies. In May 2020, we launched XiteCloud, a smart solution that significantly increases productivity at construction sites. XiteCloud is considered a prelude to commercialization of Concept-X. It processes and analyzes such various data as those from floor plans as well as generated by drones and other devices, thus enabling the establishment of optimal plans and the execution of efficient construction. Going forward, we will continue to maintain the growth momentum we have built over the years by improving and commercializing technological advances of ours, and securing electric excavator, hybrid powertrain, and other eco-friendly technologies.

#### Making relentless efforts to improve social sustainability

In addition to improving product quality and cost competitiveness, Doosan Infracore faithfully practices ethical management and actively promotes transparent and continuous dialogues with our stakeholders under strong corporate governance and sound risk management. We are also building a win-win partnership with suppliers to grow together. We are supporting future generations and local communities, while taking an active part in responding to climate change and preserving the environment. Through these and other efforts, Doosan Infracore is taking the lead in increasing the sustainability of our society and ushering in a better future for all stakeholders.

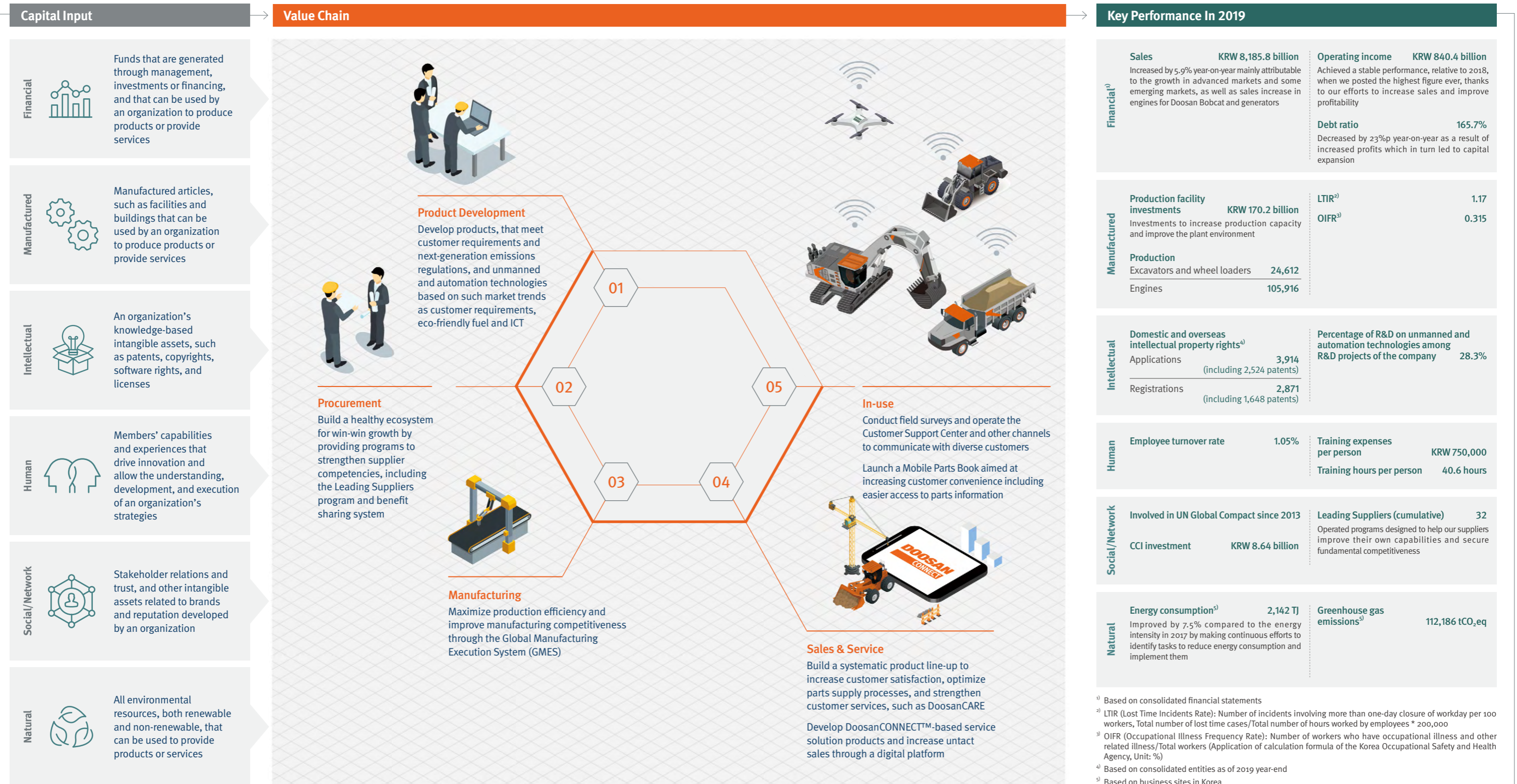
I ask for your continued interest and support for Doosan Infracore, as we advance into a global company of which all stakeholders are proud in a world where we help realize the dreams of humankind.

**Sohn, Dong Youn**

Chief Executive Officer  
Doosan Infracore Co., Ltd.

# Our Business Model

Doosan Infracore strives to maximize its corporate value by effectively investing its financial and non-financial resources in its value chain. We actively address social and environmental issues related to our business operations, while pursuing our vision of becoming a “Global Leader in Infrastructure Solutions” as a means to ensure sustainable growth and contribute to social development.



<sup>1)</sup> Based on consolidated financial statements  
<sup>2)</sup> LTIR (Lost Time Incidents Rate): Number of incidents involving more than one-day closure of workday per 100 workers, Total number of lost time cases/Total number of hours worked by employees \* 200,000  
<sup>3)</sup> OIFR (Occupational Illness Frequency Rate): Number of workers who have occupational illness and other related illness/Total workers (Application of calculation formula of the Korea Occupational Safety and Health Agency, Unit: %)  
<sup>4)</sup> Based on consolidated entities as of 2019 year-end  
<sup>5)</sup> Based on business sites in Korea

# Performance Review & Outlook

## 2019 Performance Summary



**Successful demonstration of Concept-X**  
Boryeong Proving Ground in 2019



**1.7-ton mini excavator**  
Winner of the 2020 Red Dot Design Award in the product design category



**87.3%**  
Percentage of premium eco-friendly or eco-friendly products



**Doosan Sustainable Value Framework**  
Established integrated mid- to long-term financial and non-financial goals



**9 consecutive years**  
Agreed on collective bargaining agreements without dispute



**2019 National Sharing Grand Awards**  
Received the Prime Minister's Commendation in the donation category



**10 consecutive years**  
Listed in the machine and electric equipment categories of DJSI Korea



**A**  
Rated Class A in the ESG Evaluation by the Korea Corporate Governance Service



**2018 Integrated Report**  
Received Honors at the 2019 ARC Awards

Sales

**8,185.8**  
KRW billion

Operating Income

**840.4**  
KRW billion

Net Income

**395.7**  
KRW billion

## Performance Overview

Since 2016, the global construction machinery market has been growing with global economic recovery and increasing demands for repurchases. The market growth in 2019 can be attributed to robust commercial real estate and public construction sectors in North America, increased housing and infrastructure investments in Europe, and a government-led expansion of infrastructure investment in China. The market expects solutions business to play a bigger role as a response to diverse, segmented customers' trends. Accelerated digitalization across global construction sites encourages the opportunity to expand new digital-based business. Meanwhile, the global engine market also has grown since 2016 on the back of China's booming construction equipment market and on a stable demand for gas engines from the oil & gas market fueled by a recovering oil price. Going forward, the market is expected to grow further on the account of such positive factors as market entry opportunities that are expected to increase as the exhaust emission standards of many nations are set to transition into a higher phase; strong growth momentum in the high-power large-size engine sector; and rising demands for engines in Southeast Asia and other emerging markets.

Amid such market developments, Doosan Infracore had its business base re-established in 2015 and 2016 in a bid to improve business growth potential and stability, and has made continuous efforts to solidify its business base by reorganizing its channel structure, improving product competitiveness, and enhancing service capacity and quality. The company also sought to diversify business by acquiring business rights to sell heavy equipment in advanced markets, preparing new product lines, developing large-order customers, launching D2o Capital, and conducting other forward-looking business. Moreover, Doosan Infracore achieved sales increase by launching DoosanCONNECT™, "Concept-X," electric excavator development and other next-generation projects, and by continuing other efforts to make a new leap forward.

In addition to financial performance, Doosan Infracore is enhancing value for both stakeholders and society. The company sets the direction for CSR activities to conduct based on its CSR strategy, and with the CSR Committee taking a central role, it shares the directives company-wide, and builds up its collective ability to execute them accordingly. It also aligns its activities as a company with the United Nations Sustainable Development Goals (SDGs) to ensure a sustainable future for society and the company. Moreover, in order to measure the social value of business activities it conducts, Doosan Infracore makes proactive efforts, such as analyzing the social value of Concept-X, a new solution to productivity improvement at construction sites based on the KPMG's "True Value" methodology.

## Financial Performance

### 1. Business Performance

Despite uncertainties shrouding the global economy, the sales performance of Doosan Infracore in 2019 increased 5.9% year-on-year to KRW 8,185.8 billion, surpassing the KRW 8 trillion mark for the first time, based on the current business portfolio (including construction equipment and engines, excluding machine tools included in 2011 when the company posted record high sales). The record performance is attributable to the robust growth of all advanced and some emerging markets and to increased sales of Doosan Bobcat and generator engine operations. Operating income decreased by KRW 7.7 billion to KRW 840.4 billion, while net income increased by KRW 1.5 billion to KRW 395.7 billion.

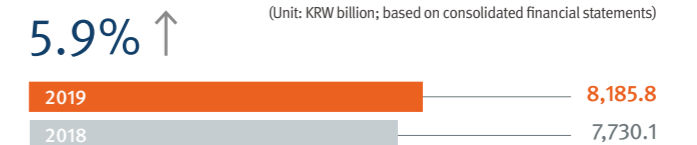
### Sales Records

(Unit: KRW million; based on consolidated financial statements)

	2017	2018	2019
Sales	6,567,897	7,730,108	8,185,840
Cost of sales	5,024,999	5,936,246	6,273,219
Gross profit	1,542,898	1,793,862	1,912,621
Selling and administrative expenses	882,129	945,734	1,072,224
Operating income	660,769	848,127	840,397
Other non-operating income	64,153	36,084	13,936
Other non-operating expenses	72,932	63,697	63,837
Net income before income tax	489,627	616,426	603,009
Income tax expense	192,984	222,257	207,311
Net income	296,643	394,170	395,698

### Sales

(Unit: KRW billion; based on consolidated financial statements)



### Net income



## 2. Financial Status

As of the end of 2019, Doosan Infracore's total assets amounted to KRW 11,338.6 billion, up KRW 309.4 billion increase from the previous year, total liabilities to KRW 7,071.0 billion, KRW 137.3 billion decrease, and total equity to KRW 4,267.6 billion, KRW 446.7 billion increase.

### Financial Conditions

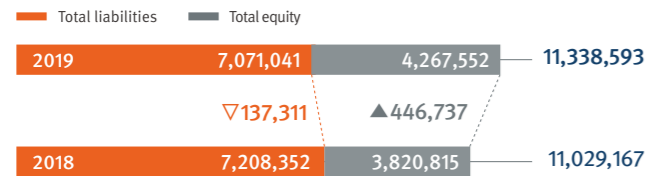
(Unit: KRW million; based on consolidated financial statements)

	2017	2018	2019
Current assets	3,767,434	4,426,822	4,304,912
Non-current assets	6,508,656	6,602,345	7,033,681
<b>Total assets</b>	<b>10,276,090</b>	<b>11,029,167</b>	<b>11,338,593</b>
Current liabilities	3,695,646	3,778,574	4,484,420
Non-current liabilities	3,407,283	3,429,778	2,586,621
<b>Total liabilities</b>	<b>7,102,929</b>	<b>7,208,352</b>	<b>7,071,041</b>
<b>Total equity</b>	<b>3,173,161</b>	<b>3,820,815</b>	<b>4,267,552</b>

Total assets

(Unit: KRW million)

2.8% ↑



## 3. Performance by Business

**3.1. Construction Equipment** In 2019, the global construction machinery market grew from 2018. North America, the second largest global market, continued to grow despite a slowing housing construction sector, spurred by healthy non-housing and public construction sectors as well as by steady energy demands. In Europe, while Brexit uncertainties sapped the UK market, rising housing demands and growing infrastructure investments in Eastern and Southern Europe pushed the continental market up. The Chinese market also grew on a state-fueled increase in infrastructure investments and on rising demands for equipment replacements following tightening environmental regulations. In contrast, emerging markets decreased in size in most regions except the CIS and South America, due to a contraction of trade caused by US-China trade disputes and incessant unrests in the Middle East.

In 2019, Doosan Infracore's Construction Equipment BG improved its profitability on the strength of progressing efforts at securing cost competitiveness, and increasing sales of high value-added parts and special equipment. In addition to financial results, it launched "Smart Maintenance," a service solution product, to boost dealers' service competitiveness and thus to increase customer value, and continued quality innovation activities to enhance the customer perception of its products and services. It also published the Mobile

Parts Book to help its customers better maintain their equipment using genuine Doosan parts, and in November 2019, demonstrated Concept-X, a comprehensive next-generation construction site control solution, at the Boryeong Proving Ground to customers and other stakeholders.

In 2019, despite declining demands following US-China trade disputes, the Construction Equipment BG maintained its sales performance at KRW 3,148.4 billion, a 3.3% year-on-year decrease, and KRW 281.0 billion in operating income, comparable to 2018's figure. The stable income performance can be attributable to the steady growth of advanced markets and some emerging markets.

### Construction Equipment

(Unit: KRW million)

	2017	2018	2019
Sales	2,683,478	3,254,939	3,148,433
Operating income	190,417	283,417	281,029

**3.2 Engine** The year 2019 was marked by escalating global trade conflicts and weakening investment sentiments, which in turn combined to suppress commodity prices, to heighten FX volatility, to increase labor costs, and to add weight to other burdens on corporations. Also, business competition further intensified as Chinese companies continued their growth and aggressive pricing strategies.

Faced with these and other business challenges, Doosan Infracore's Engine BG implemented the strategy of increasing the proportion of external sales for more stable profit flows and made noteworthy achievements – it discovered new customers for Stage V engines, which meet the new European exhaust emissions standards; extended a gas engine supply contract with PSI, a top-tier gas generator in North America; and completed the construction of production facilities of Lovol Doosan Engine Company Joint Venture (LDEC JV) in China. It also successfully developed and launched engines that meet strict emissions standards by focusing on electronic engines and post-processing equipment in response to tougher exhaust emission and other standards in North America, Europe, China, Asia and Middle East. In preparation for an expansion of the alternative fuel market, it set up additional gas engine production lines, and in response to future powertrain technologies, launched a 48V mild hybrid powertrain prototype. With these developments, it aims to satisfy the needs of its diverse customer segments in the mid to long run.

In 2019, Doosan Infracore's Engine BG posted sales of KRW 578.1 billion, a year-on-year increase of 8.6%, attributable to the growth of small construction equipment markets across the globe and an increase in the production of generator engines. Its operating income, however, decreased by 22.1% to KRW 82.4 billion due to a one-time cost increase and product mix changes.

## Engine

(Unit: KRW million)

	2017	2018	2019
Sales	501,792	532,350	578,143
Operating income	75,837	105,660	82,353

## 4. Cash Flow & Solvency

Cash flows from operating activities in 2019 amounted to KRW 567.4 billion, KRW 270.4 billion decrease from the previous year, while cash and cash equivalents decreased by KRW 296.8 billion from KRW 1,053.0 at the beginning of the year to KRW 756.2 billion at the end of the year.

Liquidity risk rises in the event where the counterparty of a payment agreement forgoes its contractual obligation due to a liquidity issue, or where the company becomes unable to raise funds for normal operations. Doosan Infracore establishes three-month and annual fund balance plans to predict the balance of funds related to sales, investment and other financial activities, and secures and maintains an adequate level of liquidity in advance against unexpected liquidity risks.

### Cash Flow

(Unit: KRW million; based on consolidated financial statements)

	2017	2018	2019
<b>Cash flows</b>			
Cash flows from operating activities	665,691	837,778	567,418
Cash flows from investing activities	(256,289)	(312,848)	(339,375)
Cash flows from financing activities	32,267	(422,558)	(549,790)
<b>Cash and cash equivalents</b>			
Cash and cash equivalents, beginning of the year	538,578	943,481	1,053,016
Cash and cash equivalents, end of the year	943,481	1,053,016	756,173

## 5. Production Assets

Facilities and equipment in the consolidated financial statement include land, buildings, structures, machinery and assets under construction. As of the end of 2019, the company's book value of facilities and equipment stood at KRW 1,871.5 billion, an increase of KRW 88.8 billion from the previous year. In 2019, newly accumulated acquisitions and capital expenditures stood at KRW 266.1 billion, and accumulated depreciation at KRW 146.8 billion.

## 6. Intellectual Assets

Doosan Infracore is expanding R&D investment with the aim of securing product competitiveness and laying a solid foundation for long-term growth. Doosan Infracore's R&D Division consists of three units – heavy product development, which undertakes research into the company's key products, such as excavators and wheel loaders; engine product development, which focuses on meeting emissions and fuel efficiency regulations; and the Institute of Technology, which is in charge of product design, high-strength metal development, and virtual verification/analysis for improved hardness. All these R&D activities are aimed to create a distinct technological advantage for the company, and to establish an advanced engineering process.

Based on non-consolidated financial statements, Doosan Infracore's R&D expenses in 2019 increased KRW 14.2 billion year-on-year and reached KRW 149.3 billion, equivalent to 4.8% of total sales. As of the end of 2019, the number of intellectual property rights applications made in Korea and overseas by consolidated entities had reached 3,914, and the number registered totaled 2,871.

## Non-Financial Performance

### 1. Social Performance

**1.1. Customers** Doosan Infracore makes continuous efforts to improve customer satisfaction. To this end, the company is developing specialty equipment, operating Customization Plants that assemble machinery to custom orders; expanding the line-up of genuine and economy parts; optimizing global parts supply networks centered around Parts Distribution Centers (PDCs); and developing and mass-producing European Stage V and other engines to next-generation emission specifications. It is also bolstering market competitiveness by accelerating the pace of our technological innovation and improving fundamental quality. In addition, it has expanded the DoosanCONNECT™ service internationally, which enables global customers to better manage their construction projects by keeping them updated on the location and status of their equipment, including engines and parts.

To support customers' convenient and efficient equipment operations, the company has developed and launched "Smart Maintenance," a preemptive maintenance service made possible by the information of equipment operational status collected through DoosanCONNECT™. Doosan Infracore improves customer value by providing product information, educating customers on equipment maintenance and other types of customer support content through social media and other digital platforms as well as by operating customer communication channels.

**1.2 Employees** Doosan Infracore implements human rights risk management systems to protect the human rights of employees and other stakeholders. Its wide-ranging activities include distributing manuals on prevention of human rights risks, operating a human rights protection center, educating employees on human rights issues, and instituting the Women's Council. It also conducts online surveys and addresses human rights issues in and around its operations in order to increase human rights awareness among employees. In 2019, the company carried out activities designed to improve corporate culture and other issues identified through human rights awareness surveys, and provided a human rights education to all employees on gender equality, treatment of people with disabilities, and prevention of harassments.

**1.3 Suppliers** Doosan Infracore helps its suppliers enhance their competitiveness by running a variety of programs centered on technology development, product quality management, and financial support. The programs, including Doosan Supplier Excellence Program (DSEP) and Leading Supplier program, are aimed at helping the suppliers strengthen their fundamental competitiveness. In addition, Doosan Infracore has implemented a multi-party benefit sharing system through which its first- and second-tier suppliers work together to create and share excellence. As human rights, environment, employee safety, and other CSR issues emerged as significant subjects, the company encourages suppliers' CSR activities through systematic management. To this end, the company is sharing CSR guidelines with suppliers and establishing a process of defining and managing suppliers at high CSR risk. In 2019, it identified high CSR-risk suppliers and carried out programs to help them improve their CSR activities.

The company conducted activities assessing their safety standards and supporting their implementation of additional measures to improve the safety management performance of suppliers. Doosan Infracore aims to prevent occupational accidents through dense partnership with suppliers by offering them a Safety and Health Symbiotic Cooperation Program. The program consists of various sessions in regards to safety training, risk assessment, risk management, and technological assistance. Under this program, it assists suppliers in identifying, evaluating, and improving risk factors and supports them to adopt higher safety standards via safety banners and EHS safety guidelines.

**1.4 Local Communities** As a global corporate citizen, Doosan Infracore is engaged in various social contribution activities for local communities. Since 2012, it has been running the "Dream School" program that helps youth develop confidence in their career and future prospects. The Dream School offers activities related to career exploration and self-development to young adults under the guidance of employee volunteers and professional youth coaches. In addition, through the "Junior Engineering Class," which has been in operation since 2008, employee volunteers nurture young future scientists of local communities by sharing their own R&D experience.

For these and other social contributions, Doosan Infracore received the Prime Minister's Commendation in donation category at the 2019 National Sharing Grand Awards. Doosan Infracore will continue its community activities based on its enduring interest as a member of communities where its business has prospered.

## 2. Environmental Performance

Doosan Infracore has been complying with the laws governing carbon emissions trading since its participation in trading system in 2015. Prior to the participation, its Incheon plant was designated as a workplace with greenhouse gas and energy target management system by the government in 2010.

In its efforts to reduce energy consumption and greenhouse gas emissions, in 2018 the company launched the GHG/Energy Reduction Council that takes a central role in operating the Energy Management System (EMS) and managing its performance; establishing a mid- to long-term road map in preparation for the coming enforcement of the carbon trading system; and setting emissions reduction targets and drawing up action plans for the goals, all as part of its detailed response to climate change. In 2019, the company's greenhouse gas emissions stood at 112,186 tCO<sub>2</sub>, a 3.6% increase over the previous year.

## Outlook 2020

### 1. Financial Outlook

**1.1 Construction Equipment** As the global economic slowdown and COVID-19 are expected to dampen the demand for construction equipment, Doosan Infracore aims to achieve business growth and stability with market-specific strategies in 2020. In advanced markets, it plans to increase its market share by expanding the big-volume customer dealer base, and to expand its business by focusing on regions and products with higher possibility of market entry. In the Chinese market, it will continue such efforts as conducting profit-focused sales, improving the soundness of account receivables, launching new products, expanding the special equipment line-up, and strengthening channel competitiveness, aimed at managing risks associated with the market's characteristics. In emerging markets, with a focus on improving profitability and stabilizing account receivables, it will strengthen channel competitiveness and bolster sales of large-sized models in areas with higher growth potential in response to the prospects of weakening demands.

In addition, Doosan Infracore will strengthen fundamentals and thus generate a stable profit even in a volatile market situation. To this end, it will sharpen the competitive edge of costs, change the way of working, and maximize work efficiency through digital transformation of the whole business process across the internal and external value chains. It will pursue growth through expansion of product line-ups and diversification of parts and other business, while channeling resources and energy into the foundation of its market presence in advanced markets. To develop future growth drivers, the company will further upgrade such core technologies as those related to the unmanned operation of construction equipment that it developed last year through the Concept-X project, thus taking a step further toward securing a competitive edge.

**1.2 Engine** The Engine BG will maintain its growth momentum, despite market uncertainties in 2020, by attracting large-order customers for Stage V engines, launching LDEC JV's production in China, and expanding the line-up of large electric engines for ships and generators. In addition, it will further enhance customer satisfaction by strengthening the parts business and service networks; boost price competitiveness by improving productivities and optimizing the cost structure; and increase sales and build a virtuous cycle structure in the mid-to-long run by seizing on new business opportunities in the upstream and downstream of its value chains.

### 2. Non-Financial Outlook

At the 2020 Davos Forum held in Switzerland, leaders of the world shared their ideas and opinions on topics including climate change, the environment, and sustainable and comprehensive business models under the theme, "Stakeholders for a Cohesive and Sustainable World." As the forum theme implies, stakeholders will be connected faster and in more complicated patterns as trends of the Fourth Industrial Revolution unfold, which will make how companies communicate and cooperate with stakeholders even more important.

Doosan Infracore conducts annual materiality analysis and external ESG evaluations to identify stakeholder interests and needs, and based on their findings, the company devises annual CSR tasks and implements appropriate measures in an effective manner through collaboration among relevant departments. Doosan Infracore has launched eight new tasks as the strategic CSR tasks for 2020. The tasks include establishing management systems and strengthening monitoring to raise employee awareness of human rights, focusing on decarbonization and developing alternative fuel products, and helping leading suppliers bolster their competitiveness by building smart factories.

Keen on the close correlation between corporate and social values, Doosan Infracore has been measuring and disclosing social values generated in the course of operations in its Integrated Report by using the KPMG's "True Value" methodology since 2017. This year, the company analyzed the social values of Concept-X, an unmanned automated control system of equipment at construction sites, which was successfully demonstrated in 2019. (P. 54-55) Going forward, Doosan Infracore seeks to fully internalize CSR by reviewing the progress of all CSR activities, offering support for proper operation, and conducting performance management, with the aim of achieving sustainable growth.



# OUR APPROACH

Doosan Infracore has assessed megatrends of the coming decade from poli-economic, technological, social, and environmental perspectives in order to identify critical sustainability issues.

## GLOBAL MEGATREND

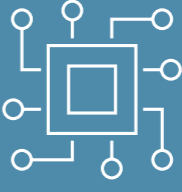
Increasing uncertainty in the global economy  
Asia becoming more competitive  
Expanding scope of company stakeholders

Poli-economic



Growing AI and IoT-based connectivity  
Accelerating digital transformation of manufacturing

Technological




Social

Decreasing working age populations due to aging society and falling birth rates  
Increasing urbanization and mega cities  
Emerging millennials and Generation Z



Environmental

Growing signs of climate change  
Increasing threats to sustainability of resource use

# Industry Impact

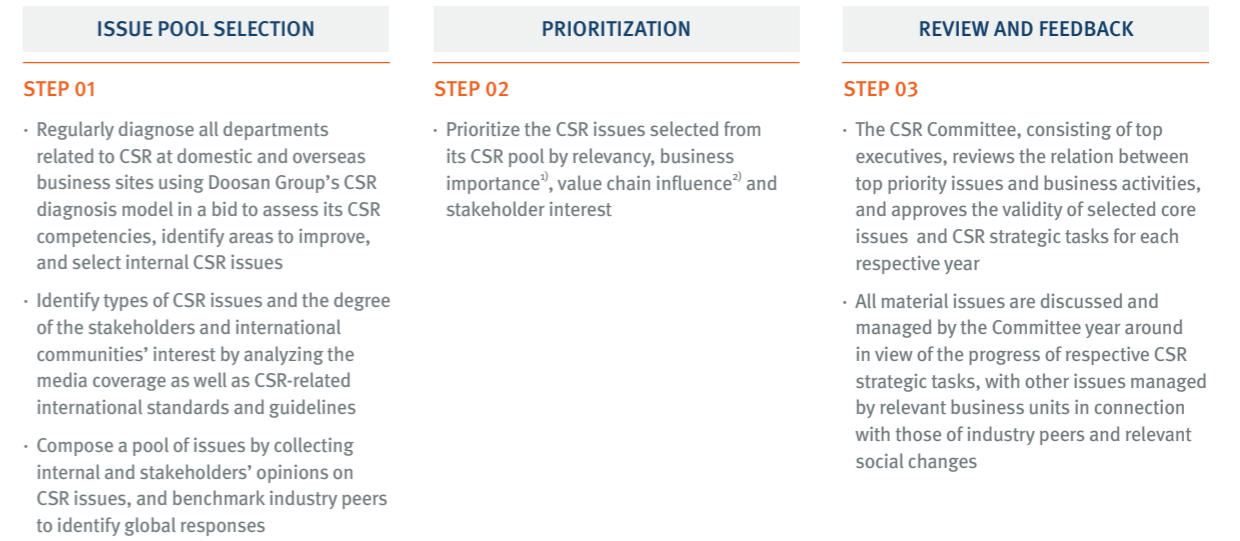
Global Megatrend

Industry Impact



# Materiality Analysis

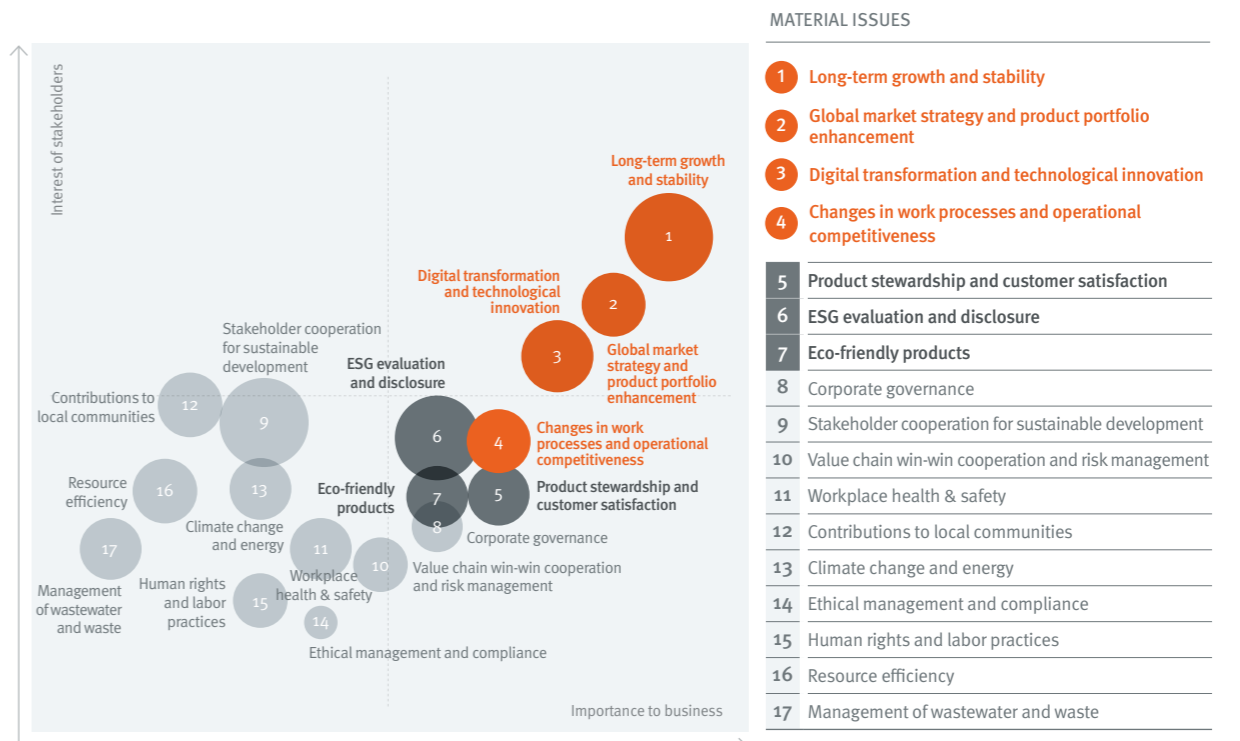
Materiality Analysis Process



<sup>1)</sup> Business importance: The company assess the importance of each issue in terms of profit, costs, reputation and compliance in the course of business against the backdrop of its mid-to long-term strategies and business plans and major industry trends.  
<sup>2)</sup> Value chain influence: The company assess each issue in term of socio-economic and environmental impacts on its value chains and of relative importance.

Results of Materiality Assessment

Out of 17 material issues selected in line of megatrends and their industry impact, seven material issues that are relatively high in stakeholder interest and business impact are detailed in the Material Issues section (P. 16-17). Also reported are key information on business strategies, products and technologies in the Our Strategy section as well as information on activities and achievements related to CSR strategic tasks in the Our Responsibility and CSR Facts & Figures sections.



\* Each circle represents an issue, and the size of each circle represents the issue's level of influence in value chain.

# Material Issues

In detailing the seven material issues found to be high in business impact and stakeholder interest, Doosan Infracore examines each issue's potential risks and opportunities associated with afore-mentioned external factors such as megatrends and industry impacts, and discloses the strategic tasks it has implemented as a response and subsequent outcomes.

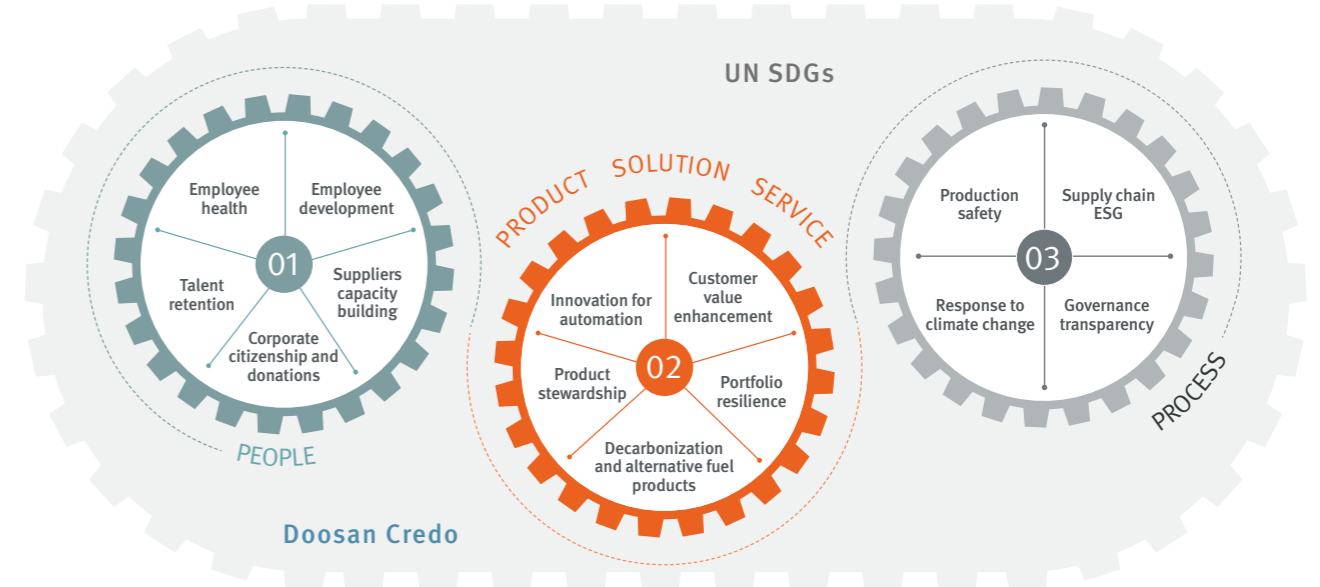
Issues	Potential risks & opportunities	2019 performance	Future directions	Page
<p><b>1</b> Long-term growth and stability</p> <p>A company must ceaselessly rebalance the business portfolio to external changes and secure new growth drivers in order to maintain a business foundation stable enough even in times of high uncertainty.</p>	<ul style="list-style-type: none"> <li>Global industry is expected to suffer and the economy to stagnate due to COVID-19 and other effects</li> <li>The construction market may grow at lower rates as investment and development slow down</li> <li>Over-reliance on specific markets or product lines may lead to weaken financial performance</li> </ul>	<ul style="list-style-type: none"> <li>Sales in North American, European and other advanced markets grew by 6.9% year-on-year in proportion to total sales</li> <li>Diversified product portfolios to include special equipment and others, and secured largely scaled line-up of engines</li> <li>Launched D2o Capital, a venture capital firm, in Silicon Valley in the U.S.</li> <li>Opened the company's third Part Distribution Center (PDC) in Seattle, the U.S., strengthening the parts distribution network</li> </ul>	<p>Doosan Infracore plans to focus on diversifying product portfolios in existing markets and breaking into new markets with great potential, while striving to minimize the chance of incurring a drop in sales due to business fluctuations. It continues to bolster its presence in regions with high growth potential in emerging markets and advanced markets, such as North America and Europe.</p>	<p>P. 22-35 <b>OUR STRATEGY</b> Growth and Soundness</p>
<p><b>2</b> Global market strategy and product portfolio enhancement</p> <p>For a global manufacturing company to increase the ability to influence markets, it is required to produce products that can satisfy each market's regulatory standards and demand, to offer high quality services, and to have efficient channels.</p>	<ul style="list-style-type: none"> <li>Attempts to develop products, increase investment and improve service quality, in order to satisfy diverse market expectations, lead to strengthen fundamental business competitiveness</li> </ul>	<ul style="list-style-type: none"> <li>Implemented a value-selling strategy focusing on offering products together with consulting and services</li> <li>Completed the construction of the Boryeong Proving Ground, Korea's largest proving ground, for testing the durability of construction equipment</li> <li>Launched the Mobile Parts Book, an app that contains information of all Doosan Infracore equipment parts</li> </ul>	<p>Doosan Infracore will secure fundamental corporate competitiveness, ranging from product quality to channels and services, with the goal of maximizing customer value and increasing its presence.</p>	<p>P. 36-49 <b>OUR STRATEGY</b> Product &amp; Market</p>
<p><b>3</b> Digital transformation and technological innovation</p> <p>Innovative technologies of the Industry 4.0 are changing the future of the construction equipment industry. AI enables automated cognitive and decision-making abilities, while 5G and IoT have increased connectivity and mobility. These technological innovations will markedly improve the construction industry's productivity and safety.</p>	<ul style="list-style-type: none"> <li>The construction equipment industry's adoption of innovative technologies has created the opportunity to go beyond a manufacturer and become a provider of integrated construction site solutions</li> <li>Unmanned automated construction equipment increases efficiency of manufacturing process and creates social values related to safety and the environment</li> </ul>	<ul style="list-style-type: none"> <li>Announced the company's new slogan, "Powered by Innovation"</li> <li>Successfully demonstrated the Concept-X, an integrated construction site control solution</li> <li>DoosanCONNECT™ named "Innovative Solution of the Year" by BuiltWorlds, a professional North American infrastructure and construction community</li> <li>Introduced Concept-X at CES 2020</li> </ul>	<p>Doosan Infracore plans to commercialize Concept-X, an integrated construction site control solution that includes unmanned automated equipment, by 2025. By leveraging its leading technological advantages, it will change its business model from manufacturing to providing comprehensive construction site solutions.</p>	<p>P. 50-59 <b>OUR STRATEGY</b> Innovation &amp; Digitalization</p>
<p><b>4</b> Changes in work processes and operational competitiveness</p> <p>As the growth of the economically active global population is forecast to turn downward in 2022, labor shortage is to be a common concern for all industries. In response, global companies are moving forward with AI and data-based operation innovation to improve productivity.</p>	<ul style="list-style-type: none"> <li>Prepare for the era of labor shortage and develop the operational agility to respond to change by increasing operational efficiency through data-based decision-making and operational innovation</li> <li>Contribute to enhancing customer value through digital-based marketing and sales</li> </ul>	<ul style="list-style-type: none"> <li>Formed strategic partnership with Palantir, a big data company of the U.S., and moved forward with digital-based operation and decision-making optimization (opened DI360)</li> <li>Established the Global Manufacturing Execution System (GMES) platform, strengthening operations and data collection</li> </ul>	<p>Doosan Infracore is strengthening the ability in managing and using data across all of its operations, to secure innovative technology-based operational excellence, based on which, it seeks to maximize productivity and efficiency, and to internalize innovativeness as part of its DNA.</p>	<p>P. 50-59 <b>OUR STRATEGY</b> Innovation &amp; Digitalization</p>
<p><b>5</b> Product stewardship and customer satisfaction</p> <p>Strict quality management, proactive service and reflection of customer opinions are the basis for continued customer value innovation. Providing distinctive customer value is integral to establishing a sound market presence and reputation.</p>	<ul style="list-style-type: none"> <li>Use digital technology to create innovative opportunities for enhancing customer experiences</li> <li>Overcome geographical limits and thus increase customer satisfaction by preempting potential issues through remote monitoring of the status of products</li> </ul>	<ul style="list-style-type: none"> <li>Registered data in the statistical process control system for managing 332 inspection items of 86 suppliers to strengthen quality management</li> <li>Began to provide Smart Maintenance service using DoosanCONNECT™, and strengthened remote monitoring of equipment status and preventive maintenance</li> </ul>	<p>Doosan Infracore provides distinctive customer value in a way to develop a driving force that will solidify its sustainable growth in the global market. It will continue to innovate customer experiences and to provide responsible customer service.</p>	<p>P. 36-49 <b>OUR STRATEGY</b> Product &amp; Market</p>
<p><b>6</b> ESG evaluation and disclosure</p> <p>In the mid- to long run, a company should enhance its corporate value in the direction of satisfying various stakeholder needs. In addition, it should engage in business activities that increase social and environmental value, and transparently disclose outcomes as well as future opportunities and risks.</p>	<ul style="list-style-type: none"> <li>A company can communicate with investors and consumers on its non-financial corporate value and ESG status by disclosing information of the social/ environmental impacts of its business and other activities</li> <li>A company's ESG capability contributes to its resilience to change in the business environment</li> </ul>	<ul style="list-style-type: none"> <li>Listed in the machine and electric equipment categories of DJSI Korea</li> <li>Rated Class A in the ESG Evaluation by the Korea Corporate Governance Service</li> <li>2018 Integrated Report received Honors at the 2019 ARC Awards</li> <li>2018 Integrated Report ranked fourth in the top 100 list at the 2019 Spotlight Awards organized by the League of American Communications Professionals (LACP)</li> </ul>	<p>Starting from the 2017 Integrated Report, Doosan Infracore has been measuring and disclosing the monetary value of the social and environmental value of its operations. It will expand the scope of information disclosures, measure social value by product, and share it as the key value of products with potential consumers.</p>	<p>P. 60-106 <b>OUR RESPONSIBILITY</b></p>
<p><b>7</b> Eco-friendly products</p> <p>Newly emerging consumer classes are highly sensitive to product environmental impacts due to the public's increasing interest in climate change and a paradigm shift in consumer behavior. Thus, a company should strive to reduce the environmental impact of its products right from the development phase of the product life cycle.</p>	<ul style="list-style-type: none"> <li>Emission regulations are increasingly stringent across the globe, making it all the more important to invest in new technologies and products that meet the regulations</li> </ul>	<ul style="list-style-type: none"> <li>Launched the DX350LC-7, a 36-ton excavator which satisfies the Stage V, the latest in European emissions standards</li> <li>Launched a G2 engine which complies with the Stage V</li> <li>Unveiled a "Hybrid Powertrain" with an electric motor and battery attached, at POWERGEN International 2019</li> <li>Unveiled a proto-type electric excavator at CONEXPO 2020</li> </ul>	<p>Doosan Infracore seeks to strengthen its market position by proactively investing in and securing eco-friendly technologies as a new approach from a market perspective to respond to climate change risks and to comply with emissions standards. This will contribute to the spread of business activities that add social value to the financial value.</p>	<p>P. 18-19 Doosan Infracore Sustainable Value Framework  P. 50-59 <b>OUR STRATEGY</b> Innovation &amp; Digitalization</p>

# Doosan Infracore Sustainable Value Framework

In conducting business, Doosan Infracore pursues sustainable growth that generates not only financial but also social and environmental values. In 2019, the company launched "Sustainable Value Framework," describing its mid- to long-term ESG strategies and objectives, as a way to manage financial and non-financial performance in an integrated manner. Based on Doosan Credo and UN Sustainable Development Goals (SDGs), it analyzed major external indices of corporate sustainability, including SASB Standards<sup>1)</sup>, MSCI ESG Ratings<sup>2)</sup> and SAM Corporate Sustainability Assessment (CSA)<sup>3)</sup>, and results of materiality assessments of the past three years. Based on subsequent findings, the company derived a framework consisting of 3 areas and 14 indices, which has been approved by the CSR Committee which comprises top executives.

The Sustainable Value Framework will be managed as a key performance index in accordance with the mid- to long-term strategic tasks. Believing that the integrated management of mid- to long-term financial and non-financial performance will contribute to the basis of sustainable growth, Doosan Infracore will continue to disclose such performance results through 2025.

<sup>1)</sup> SASB Standards: Industry-specific material issue and standard reporting index established by the US Sustainability Accounting Standards Board (SASB) to promote a comprehensive understanding of the sustainability of corporations  
<sup>2)</sup> MSCI ESG Ratings: Index established by Morgan Stanley Capital International (MSCI) for evaluating corporate performance in the environmental, social and governance (ESG) areas  
<sup>3)</sup> SAM Corporate Sustainability Assessment: Corporate sustainability assessment methodology used by S&P Global and SAM to assess corporations' economic, environmental and social risks and opportunities, and related strategies



	Index	2025 Goal	Baseline(2018)	2019 Performance	Commitment	Page	UN SDGs	
<b>01 PEOPLE</b> Activities that provide clean environment, technology and capability to stakeholders	Employee health	OIFR <sup>1)</sup>	Reduce occupational injury and illness incidence rates, and take preventive actions on an ongoing basis	0.147	0.315	Promote employee health and welfare through continuous occupational illness management	P. 82	
	Employee development	Annual training hours and expenses per employee	Conduct efficient training activities for employee competency development	31.7 hours (KRW 663,000)	40.6 hours (KRW 750,000)	Promote organizational and individual growth by supporting employees' development and nurturing their job skills	P. 96-99	
	Suppliers capacity building	Cumulative No. of Doosan Supplier Excellence Program (DSEP) <sup>2)</sup> participants	Increase the number of DSEP participants to 93% more than the 2018 figure by 2025	27 companies	32 companies	Establish the basis for joint growth by providing training and consulting for supplier competency development	P. 85-86	
	Talent retention	Turnover rate	Retain more talent with a focus on turnover-rate retention	1.29%	1.05%	Offer quality jobs to local talent and great workplace to employees	P. 94	
	Corporate citizenship and donations	CCI investment and CCI investment per sales	Conduct responsible and sustainable community support activities on an ongoing basis	KRW 7.73 billion (0.25 %)	KRW 8.64 billion (0.28%)	Contribute to establishing a sustainable local community through partnership and support as a responsible corporate citizen	P. 103-106	
<b>02 PRODUCT SOLUTION SERVICE</b> Activities that innovate products, solutions and services for sustainable growth	Innovation for automation	Ratio of projects related to unmanned-automation technology to all research projects	Continually develop and advance unmanned automation technologies that will lead the innovation of the construction equipment sector	16.4%	28.3%	Lead industrial innovation by enhancing construction industry site efficiency and safety using unmanned automated technologies	P. 52-56	
	Customer value enhancement	Smart Maintenance Managed Hours <sup>3)</sup>	Increase the managed operation hours of smart maintenance equipment to 20 times of the 2019 figures by 2025	201,862 hours	201,862 hours	Increase the customer base of smart maintenance services helping customers efficiently and stably use Doosan products	P. 47-48	
	Portfolio resilience	New business-related activities	Secure sustainable growth drivers through open innovation, investment, new business development, and partnership	N/A	N/A	Contribute to the industry's sustainable development through open innovation, M&A, strategic alliance, new business development and partnership	P. 35, p.56	
	Product stewardship	Sales of remanufactured parts	Increase remanufactured parts sales to 200% of the 2018 figure by 2025	KRW 490 million	KRW 770 million	Contribute to responsible production and consumption by applying sustainability standards to the production, sales, consumption and discard phases	P. 89	
	Decarbonization and alternative fuel products	No. of CO <sub>2</sub> reduction research projects Rate of electro-hydraulic applied models <sup>4)</sup>	Continually increase research for carbon emission reduction technology Increase electro-hydraulic application models to 36%p higher than the 2018 figure by 2025	33 projects 3.8%	45 projects 5.8%	Contribute to easing climate change impacts by securing carbon emission reduction technologies and leading the development of relevant products	P. 39-40, P. 56-57	
<b>03 PROCESS</b> Activities that increase positive impacts within the value chain for sustainable development	Production safety	LTIR <sup>5)</sup>	Reduce the accident rate to about 50% of the 2019 figure by 2025	0.97	1.17	Promote employee health and welfare at industrial sites through active accident management	P. 80-82	
	Supply chain ESG	No. of companies subject to supplier ESG evaluation <sup>6)</sup>	Continually increase ESG evaluation for suppliers	116 companies		Support suppliers in strengthening ESG capabilities to prevent relevant risks and build the foundation for sustainable joint growth	P. 86	
	Response to climate change	Reduce carbon emissions in production <sup>7)</sup>	Reduce total GHG emissions to 11% and improve emission intensity to 33% more than the 2018 figure by 2025	108,244 tCO <sub>2</sub> eq 0.035 tCO <sub>2</sub> eq/KRW million	112,186 tCO <sub>2</sub> eq 0.036 tCO <sub>2</sub> eq/KRW million	Contribute to easing climate change impacts by integrating carbon emission target management into company strategies and plans	P. 77-78	
	Governance transparency	Ratio of outside directors and BOD attendance rate	Maintain BOD independence above legal requirements and actively operate the BOD	4/7 persons (57.1%) 85.7%	4/7 persons (57.1%) 92.9%	Enhance long-term corporate and shareholder value by building a basis for sound and transparent governance	P. 67-68	

<sup>1)</sup> OIFR (Occupational Illness Frequency Rate): Number of workers who have occupational illness and other related illness/Total workers (Application of calculation formula of the Korea Occupational Safety and Health Agency, Unit: %)  
<sup>2)</sup> Doosan Infracore's supplier support program  
<sup>3)</sup> Refer to cumulative operation hours of equipment within the smart maintenance contract period. The 2019 performance includes the performance of emerging markets and Europe. Future service product development and expansion may lead to a change in calculation criteria (program was launched in 2019 and therefore the 2019 performance is set as the baseline).

<sup>4)</sup> Total number of models is based on mass-produced models as of the end of each year (including domestic and overseas, and derived models). The application criteria may be adjusted to future changes in the model calculation method. The disclosed goal has the number of mass produced models in 2018 as the parameter. Annual performance in the future will have the respective year's mass-produced models as the parameter.  
<sup>5)</sup> LTIR (Lost Time Incidents Rate): Number of incidents involving more than one-day closure of workday per 100 workers, Total number of lost time cases/Total number of hours worked by employees \* 200,000  
<sup>6)</sup> Supplier ESG inspection is conducted every other year. Thus, the Year 2024 goal is reflected as the Year 2025 goal.  
<sup>7)</sup> Regarding reducing carbon emissions and improving emission intensity during production, some figures are subject to change, as defined goals are to undergo an additional review.

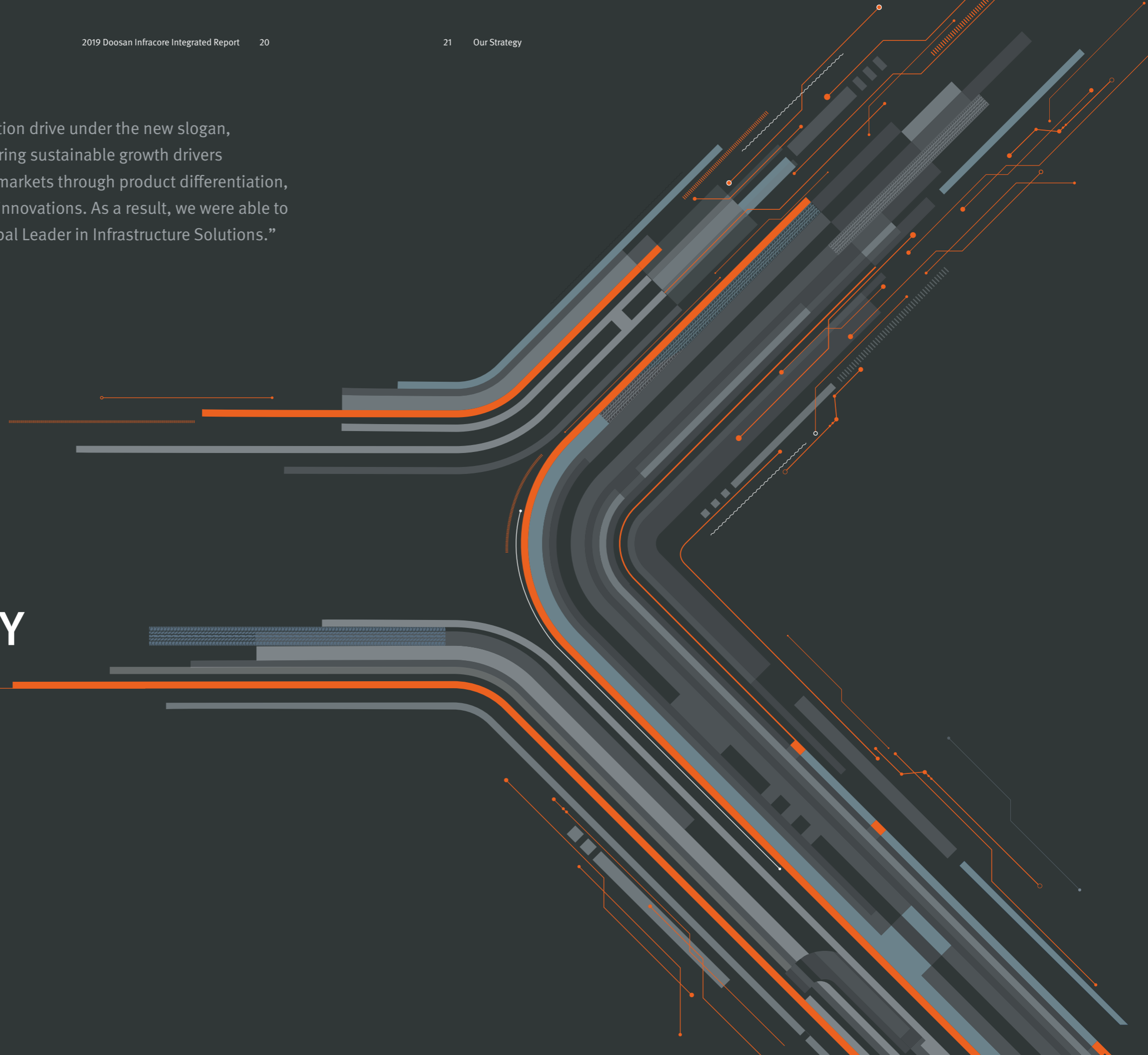
In 2019, Doosan Infracore expedited its innovation drive under the new slogan, “Powered by Innovation.” We focused on nurturing sustainable growth drivers by balancing growth and stability, diversifying markets through product differentiation, and implementing digital transformations and innovations. As a result, we were able to take a step closer to achieving our vision, “Global Leader in Infrastructure Solutions.”

# OUR STRATEGY

22  
Growth & Soundness

36  
Product & Market

50  
Innovation & Digitalization



# GROWTH & SOUNDNESS

Doosan Infracore is striving to build stable, long-term growth momentum by accurately assessing the confluence of external environments and making measured preparations for change to stay ahead of the curve.

Expanding  
Customers and  
Markets

01

Strengthening  
Product Portfolio

02

Diversifying  
Business Portfolio

03





## Expanding Customers and Markets

01



### Growing Competitive in Advanced Markets

The construction equipment industry is unique in that it undergoes the cycle of ups and downs in a regular interval, and remains vulnerable to the global economy, government policy, infrastructure investment, and other macro factors. Even amid such factors of volatility, North American and European construction equipment markets have grown on the back of rising energy demands and increasing infrastructure investments. However, with the spread of a COVID-19 which triggered slowdown in the economies, the markets are faced with growing uncertainties.

Doosan Infracore focuses on securing diverse sales sources to establish a stable revenue generation foundation, while steadily increasing its presence in advanced markets which are relatively more stable. As part of this effort, on January 1, 2018, it took over the construction equipment operations of Doosan Bobcat in advanced markets and has since been managing the business. The company has adopted a proactive business strategy in order to enhance market competitiveness, and is also strengthening the sales network by developing mid- to large-sized dealers and improving market coverage, thus enhancing channel capabilities. In North America, it is strengthening sales competitiveness by expanding its dealer base, implementing customer-tailored programs, and improving service responsiveness. In Europe, it is improving customer responsiveness by helping new dealers keep their business stable and allocating more authority to sales departments. In addition, in order to respond to customers' needs, the company operates Customization Plants that assemble customized, semi-finished products sourced from Korea; and to improve customer satisfaction, it is optimizing parts distributions through the Parts Distribution Center (PDC). Thanks to increasing construction equipment demands in advanced markets and a subsequent rise in European market share, Doosan Infracore continued its robust sales performance in 2019, recording a year-on-year increase of 6.9% to KRW 812.4 billion in advanced markets.

In 2019, Doosan Infracore strived to strengthen sales channels, the most important factor in ensuring market competitiveness. To this end, it engaged in key account marketing and secured large outperformed dealers based on DoosanCONNECT™, a digital solution for advanced construction equipment management. In particular, the authority of European sales departments was expanded, and a system was put in place that enables an internal analysis of performance and profitability, and thus helps sales managers make decisions more promptly and efficiently. As a result of implementing such field-centered sales strategies, a record sales performance was achieved since the establishment of the European subsidiary as contracts were secured to supply 100 wheel loaders and 80 excavators to CEMEX and Beauloc, respectively. In addition, 14-ton excavators and wheel excavators, the company's main products, are increasing their market presence in major European markets, including the UK, Belgium, the Netherlands, Luxemburg and Northern Europe, both competing for the top two spots in their respective market.

**Expanding AM Business**

Doosan Infracore has been expanding its after market (AM) business with an aim to build a revenue structure that can stay stable in the face of a slowing market. In 2019, it focused on such tasks as optimizing the global parts distribution network through the PDC; strengthening AM sales capabilities by fostering dealers in AM service; developing solutions based on the lifetime cycle of equipment; and expanding online communication channels to reflect more customer voices on customer service. As a result, 2019 sales improved by 2% year-on-year to KRW 246.3 billion (excluding special equipment and attachment performance).

In order to enhance its parts distribution capabilities, the company operates ten PDCs in eight countries – Korea, China, the U.S., the UK, Germany, Singapore, Brazil, and United Arab Emirates – keeping in stock a total of over 400,000 parts. The Seattle PDC, opened in April 2019 as an addition to the first two PDCs in Atlanta and Miami in the U.S., has some 12,000 parts available in its 5,300m<sup>2</sup> warehouse, covering the western part of the U.S. and Canada, while the Atlanta PDC serves the East coast and the Midwest regions, and

the Miami PDC covers Latin America. As such, Doosan Infracore makes continuous efforts to improve its PDC operation efficiency and responsiveness to parts demands, and thus increases customer satisfaction. Going forward, it will continue to expand and operate its global PDC network in an efficient manner with the goal of getting customers the right parts anytime and anywhere across the globe.

For more systematic and effective parts distributions, Doosan Infracore integrated its Service Parts Planning (SPP), a system in which each region's PDC individually anticipates parts demands and separately manages parts inventory, into a global planning system where headquarters centralizes planning and managing inventory. In addition to making continuous efforts to strengthen parts distribution capabilities, the company is implementing various measures to improve parts demand management. For example, the company operates Manufacturer Managed Inventory (MMI) through which headquarters anticipates parts demands based on dealers' actual sales data. MMI then recommends relevant parts to respective dealers instead of using previous demand analysis based

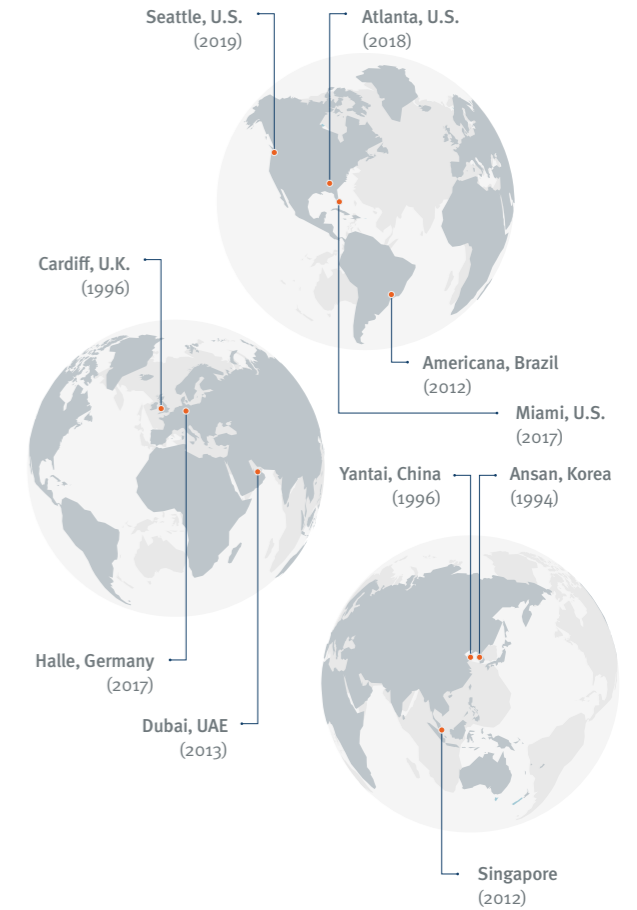


on parts order from dealers. In order to analyze a mounting data of parts consumption and to more accurately and quickly forecast parts demands, it is using a big data visualization program that enables an accurate analysis of the movements, locations, end-user consumption of parts on a real-time basis. The adoption of global planning and MMI, leveraging retail sales information, in 2019 had the effect of increasing the parts supply rate by 2.6% and reducing inventory costs by KRW 9 billion, both compared to the 2017 figures. Going forward, Doosan Infracore will expand the MMI operations by steadily building the environment for MMI at dealers across the globe, and through training aimed at strengthening skills for efficient operations.

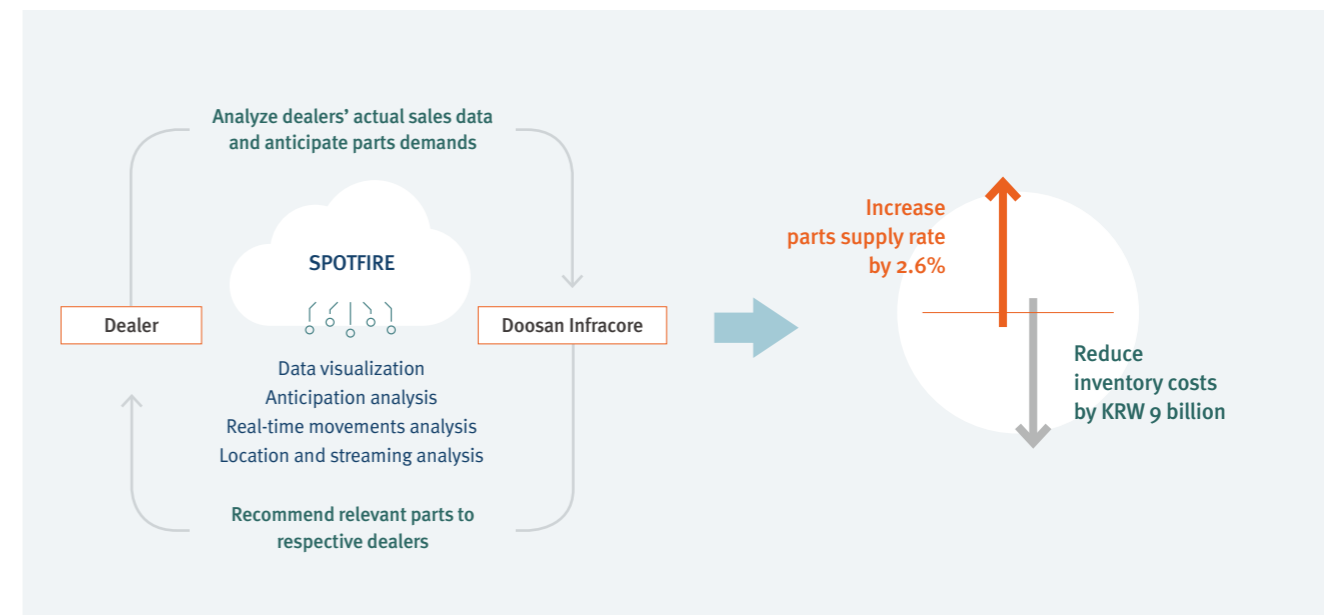
Consistent collaboration with dealers is crucial to increasing AM sales and profits and to improving customer service. Based on Doosan Infracore's unique training approach, the company provides Parts & Service Sales Representatives (PSSRs) with training on AM sales and service, including effective sales skills, the features of genuine parts and the benefits of using them, guidance on operation of DoosanCONNECT™, and equipment maintenance. The company also practices strategy by applying it to sales operation. PSSRs are Doosan Infracore's AM experts and consultants who generate parts and service sales, and play an important role in cultivating sales opportunities by keeping customers well informed of all issues, including parts replacement cycles.

**PDC Network**

(As of December 2019)



**Manufacturer Managed Inventory Operation Model**





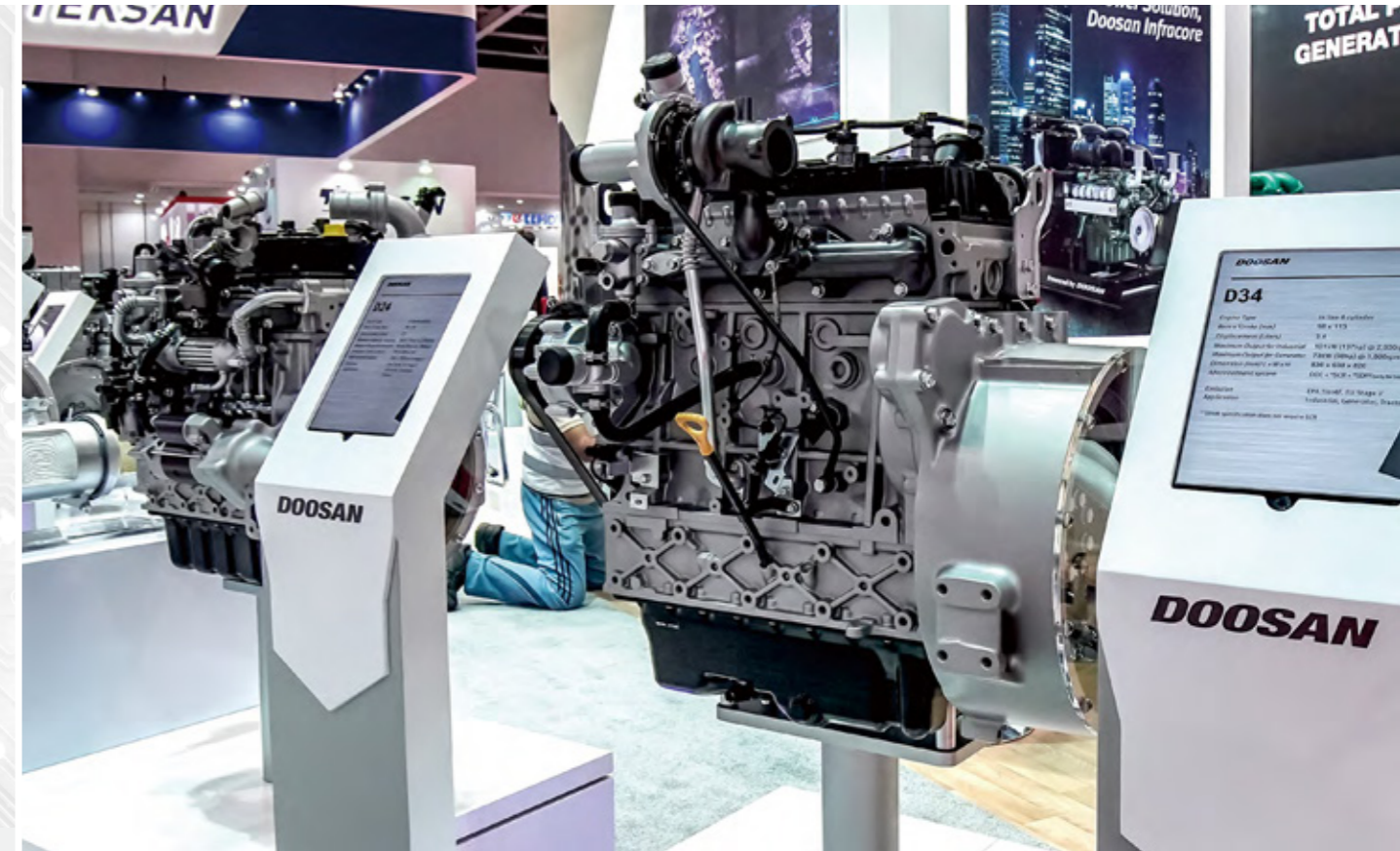
Doosan Infracore is focusing on service solutions and e-commerce in order to further generate market opportunities for parts and services. As part of this effort, the company launched the “Smart Maintenance,” a solution offering parts and maintenance services based on DoosanCONNECT™ in 2019. In addition, it plans to expand sales of out-of-warranty parts by offering more advanced services that center on analyzing equipment lifetime cycles and by proactively providing parts and services that are required in each cycle. The company also develops the foundation for e-commerce by adding a “cart” function. This newly added function allows customers to inquire dealers about parts estimates through “Mobile Parts Book” app. The app helps end-users access to information on Doosan Parts – Doosan Infracore, therefore, expands its e-commerce operation by increasing the parts sales.

In addition to production and sales of finished vehicles, Doosan Infracore strives to diversify its business by offering top-quality parts and customer-tailored solutions based on its global network. This will enable the company to steadily increase sales and build a mid- to long-term virtuous cycle in the face of uncertainties in the construction equipment market.

### Increasing External Sales of Engines

Recently, the global engine market has been growing on increasing sales of construction equipment owing to a recovering construction business in North America and Europe, on a growing shale gas industry, and on increasing demands for power generator engines fueled by rising electricity consumptions mainly in emerging countries. Reflective of this market growth, total sales of Doosan Infracore’s engine business grew by 8.4% year-on-year to KRW 1,156.1 billion, powered mostly by robust sales of generator engines.

Doosan Infracore is seeking to diversify its customer base in order to better respond to change in the global engine market and to ensure stable sales even in a slowing market. The company increases external sales through business expansion into automobile, ship, and power generation sectors, and it engages in business diversification and development of technologies relevant to upstream and downstream engine, hybrid powertrain, electrification and other business responses to future changes. In particular, it is developing new products, such as a compact G2 Stage V-standard engine, that meet next-generation emissions standards in a bid to secure long-term supply contracts. The company is also focusing on attracting large captive customers such as Lovol Doosan Engine Company Joint Venture (LDEC JV).



Doosan Infracore had signed a contract with Germany’s KION in June 2017 which stipulates supply of 67,000 compact G2 engines by 2028, and three more contracts with global companies, including China’s Baoli and Italy’s ARBOS, in 2018 involving supply of a total of 43,000 engines. Accordingly, Doosan Infracore will supply to Baoli, a leading forklift company in China, some 13,000 compact G2 Stage V engines by 2025, which will be used to power the buyer’s main export models. Doosan Infracore has signed a letter of intent (LOI) with ARBOS, a tractor manufacturer in Italy, and will develop and supply approximately 27,000 units of 1.8- to 3.4-liter G2 diesel engines for agricultural machinery in the course of six years starting in 2020. The signing of the LOI has given Doosan Infracore an opportunity to add an agricultural engine line to its engine line-up as well as to expand its market presence in Europe. By increasing a strategic partnership with global brands, Doosan Infracore is steadily strengthening its presence in the engine market and stably increasing external sales.

Having established LDEC in November 2017 with Lovol, a China’s largest agricultural machinery company, Doosan Infracore broke ground in March 2018 for a production plant in China. The joint venture will complement Doosan Infracore’s market development and diversification strategies, allowing it to target both advanced and emerging markets with high-quality engines produced in Korea and affordable products manufactured in China. Also, sourcing and other synergistic opportunities, now made available thanks to Lovol’s local business networks, are expected to further enhance the competitive advantages of its engine business. Scheduled to be completed in June 2020, the LDEC engine plant will comprise research facilities, including a prototype shop and a lab for measuring the quality of parts, and production facilities, such as engine block processing and engine assembly lines, that reflect Doosan Infracore’s engine production know-how. Its annual production capacity will be expanded to 100,000 units. The engines to be produced include G2 engines (D18, D24, D34) optimized to the characteristics of the local market, and will be equipped to Lovol’s agricultural machinery and construction equipment. The D34-class engine, in particular, will reach China’s Stage IV emissions standards. Doosan Infracore will continue its proactive support for LDEC seeking to enter emerging markets as well as the Chinese market for industrial and generator engines and to achieve the optimal business performance.

In October 2019, Doosan Infracore successfully extended a contract to supply generator natural gas engines with Power Solutions International (PSI), the US-based manufacturer specializing in power generator engines that Doosan Infracore had been doing business with since 2008. In accordance with the contract, Doosan Infracore will supply 8.1-liter to 22-liter generator natural gas engines through 2023. After tuning the Doosan Infracore’s engines to the emissions standards of the North American engine market, PSI offers them mostly to major power generator companies as well as oil and gas businesses. The extension of the supply contract with the US engine leader is a solid endorsement of the outstanding quality of Doosan Infracore’s engines as well as a boost to its commitment to growing together with partners through creation of win-win synergies.

## Strengthening Product Portfolio

02

### Launching Region-specific Equipment

The compact equipment market thrives when construction increases in urban areas and other places with limited space. In particular, the Korean market for mini excavators of 5-ton or less grew at an annual average of 15% from 2014 to 2018. In 2019, some 3,000 units of such excavators were sold, accounting for 29% of the excavator market. In July, Doosan Infracore launched the DX17Z-5, an excavator developed specifically for the 1.7-ton market, which accounts for over 40% of the domestic mini excavator market and is expected to grow further.

The DX17Z-5 excels in excavation power, rotation speed and operation angle, making itself optimal for projects in confined spaces or indoors. Its minimum width, with the track contracted, is a mere 950 mm (the smallest in its class), making it very useful in places with limited space. The track can be expanded up to 1,360 mm (the largest-in-class) which gives it a firm footing for jobs requiring stability. The DX17Z-5 is equipped with front LED lamps, cylinder protection covers surrounding the operating compartment, thereby enhancing its sense appeal. A footrest useful for working downward, a detachable two-pole-supported canopy, and other standard features increase work convenience.

In addition to the DX35Z-5, a 3.5-ton excavator unveiled in 2017, and the DX17Z-5, successfully launched in 2019, Doosan Infracore will steadily develop products to various needs of Korean customers and strengthen its position in the mini excavator market. Also, it will further improve the responsiveness of its customer service and expand its share of the mini excavator market, which was dominated by imports, by leveraging its service network, the largest in Korea, with 37 branches and more than 100 service personnel across the nation.

China's construction equipment market began to show signs of recovery in the second half of 2016, and continues its growth pace on the strength of increasing demands for excavators and mine developments fueled by increasing state-led infrastructure investments and rising commodity prices. In response to market demands for large-sized equipment, Doosan Infracore released three new models as a follow-up to the previous four models – DX380LC-9C, DX420LC-9C and DX500/520-9C. The DX360LC-9C, with improved fuel efficiency, is ideal for rental customers with large-scale engineering construction or for rocky mountain projects. The DX450LC-9C was developed to 50-ton breaker market demands; and the DX490LC-9C, a well-balanced performer in productivity, fuel efficiency and price, is designed to reduce entry barriers for 50-ton equipment renters. In response to growing mid- to large-sized equipment renters, Doosan Infracore released the DX200-9C in January 2020, of which high fuel efficiency makes it ideal for businesses specialized in rental construction equipment, thereby responding to increasingly segmented customer applications in the mid- to large-sized market.



In addition to new models, Doosan Infracore focuses on product improvements by reflecting voices of customers (VOC). In response to customer opinions that work radius should be expanded for the DX130LC-9C, which is used mainly for farming village construction/development or fish farm management, the company extended the boom length. It has also improved its key-product DX215-9C's boom speed, in consideration of customers that mainly engage in 90-degree rotation loading work at construction sites, and thus shortened working time. The bucket size of the DX230LC-9C and DX260LC-9C models has increased in line with demand for higher productivity at small- to mid-sized engineering construction sites.

### Increasing Customized Special Equipment

Doosan Infracore is developing new markets with a wide array of special equipment solutions customized to various challenging conditions as well as usage needs at worksites with the goal of improving work productivity and creating a safer work environment. Based on findings of its ongoing, thorough analysis of customer needs, the company has introduced a variety of special equipment product lines, including material handler, amphibious excavator, demolition and log loader, thus diversifying its product portfolio. As a result, special equipment sales rose by 10% year-on-year to KRW 82.1 billion in 2019.

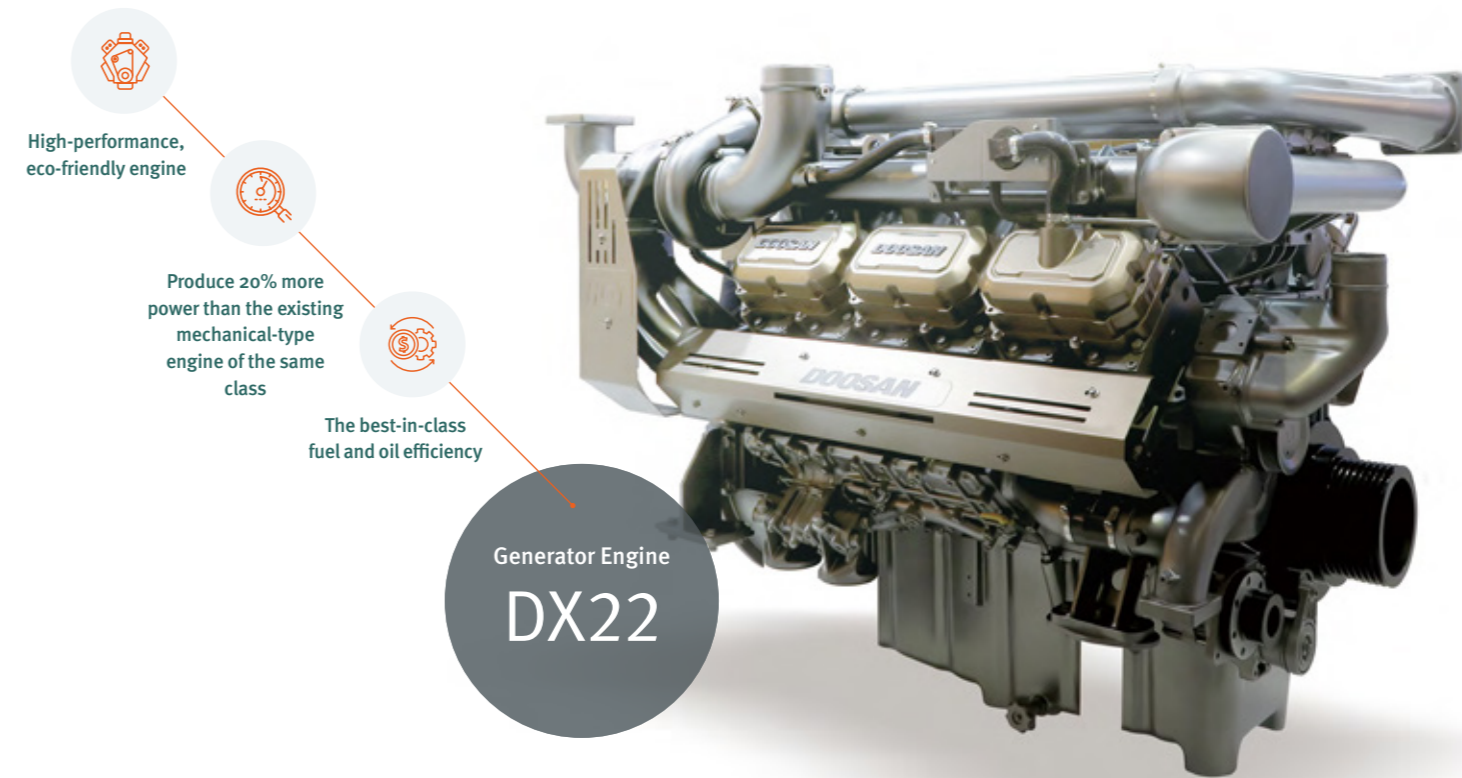
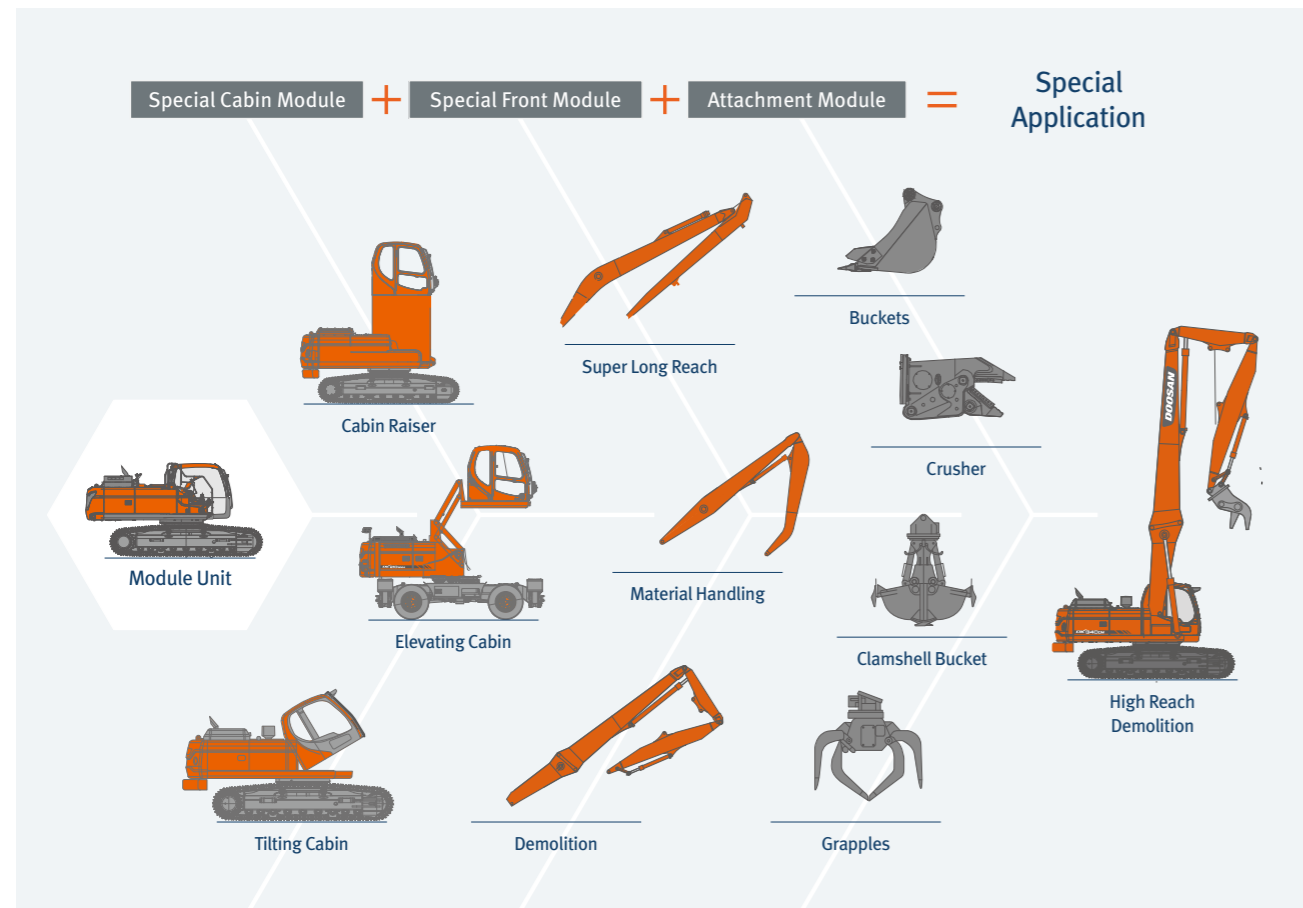
In addition, Doosan Infracore uses a modular design method that involves configuring and assembling diverse fronts, cabins, attachments, and other modules in accordance with the characteristics of the work environment, on the base part of excavators, in order to reflect customer needs faster and better. As the base machine serves as the basis for modular design, the method can maximize the usefulness of the basic equipment, enable an easy conversion or expansion of any parts of the equipment to diverse customer requests, and make equipment repair and maintenance easy. Moreover, the module assembly method enables customers to purchase special equipment at a relatively affordable price in a timely manner.

Doosan Infracore's special equipment can be seen in diverse environments, including work sites where environmental improvements are needed. Its material handler is developed for transporting or loading materials in such areas as landfills and barges for which a conventional excavator is not suitable, and is ideal for handling scrap metal, industrial waste, and recyclables. The amphibious excavator differs from the conventional one in that its lower frame is made of air tank structure, which enables it to work afloat in such

environments as lakes, streams, marshes and other areas whose ground surfaces would be too wet or weak to support the weight of ordinary excavators. For these and other reasons, the company has sold its amphibious excavators mostly to Southeast Asia and South American regions high in rainfall. As climate change is closely related to rising levels of rainfall so are market interests increasing in amphibious excavators. In 2019, the Department of Public Works & Highways (DPWH) of the Philippine government purchased some 10 amphibious excavators of Doosan Infracore as part of its effort to clean up the Manila Bay, which has been suffering from serious industrial pollutions, and used the special equipment to preparatory work such as dredging the polluted beaches.

Based on its wide-ranging special equipment portfolio that reflects diverse customer needs, Doosan Infracore continues to grow, offering solutions to various challenges at construction sites and pursuing market diversification. It is also strengthening the region-specific product line-up, including improving material handlers, which have high scalability, and developing new products, such as pile drivers and rotary drill rigs, popular in the Chinese market.

**Modular Design Method for Special Equipment**



**Securing Large Engine Line-up**

Doosan Infracore is building a complete line-up of generator engines, ranging from mechanical to the latest electronic engines, in line with the steady growth of the diesel and gas generator engine market. Based on the extensive line-up, it meets market demands not only in the Middle East but also in North America, Europe, and other leading markets, while also discovering new customers. After unveiling a pilot product of the DX22, a 22-liter electronic generator engine, in 2018, Doosan Infracore showcased the mass-production model at international exhibitions, including the Middle East Electricity (MEE) in March 2019 and POWERGEN International in November 2019. The DX22 is more powerful than competitors' models of the same class, and it is high-performance, eco-friendly engine that can produce 20% more power than the DV22, its mechanical-type predecessor of the same class. In addition, the DX22 boats best-in-class energy efficiency, and the improved compatibility and extended parts replacement cycles of the DX22 have led to higher customer satisfaction. With the launch of the DX22 as a start, Doosan Infracore is making all-out preparations to enter the large electric generator engine market.

In the automotive engine sector, Doosan Infracore supplies engines in compliance with the emissions standards of each of its markets, with the 6/8-liter Euro 6 diesel engines as the flagship product, released in 2017. Doosan Infracore's engines are equipped to commercial vehicles across the world, including buses and trucks,

gain value recognitions and market trust as a result of its ongoing efforts to improve quality and customer relations. In March 2020, the company released the DX12, a 11-liter Euro 6 electronic engine designed for commercial vehicles, in Korea, and Tata Daewoo Commercial Vehicle Company rolled out its "PRIMA" trucks installed with the new engine. This high-performance, eco-friendly engine has a capacity of 11.1 liters and a maximum power output of 460 horsepower, and satisfies the Euro 6 even without the exhaust gas recirculation (EGR) system. It is equipped with the common rail system, an electronic system that sprays diesel fuel at a high pressure, and the high-efficiency selective catalytic reduction (SCR)<sup>1)</sup> system that cuts the discharge of hazardous emissions. It also has best-in-class ratings in fuel efficiency and durability. The DX12 will be equipped to 25 truck models soon to be introduced by Tata Daewoo Commercial Vehicle.

Doosan Infracore will steadily extend its sales reach into the commercial vehicle market of major emerging countries by developing the DX12, with world's leading product competitiveness in such areas as fuel efficiency, durability, and post-processing technology, as a spearhead.

<sup>1)</sup> SCR: An advanced active emissions control technology system that injects a liquid reductant through a special catalyst into the exhaust stream of a diesel engine. Equipped with the system, the DX12 electronic engine has a NOx reduction rate of 98%.

## Diversifying Business Portfolio

### Strengthening Post-processing Solutions

Post-processing solutions are becoming more advanced with growing needs for exhaust gas treatment devices that can meet toughening emissions standards across the globe. Doosan Infracore has been working on new exhaust gas post-processing systems, thus successfully developing the “No-DPF Tier 4 Solution.” The No-DPF solution is based on “Ultra Low Particle Combustion (ULPC),” Doosan’s unique combustion technology for which an international patent has been obtained, and meets Tier 4 emissions standards without the need of a diesel particulate filter (DPF), and enables development of high-efficiency engines. The solution also lowers costs associated with the regenerative operation of incinerating and regular cleaning of the soot accumulating in and around the DPF, as well as concerns over DPF-related quality issues. In addition, it can be applied to equipment of diverse uses, as it delivers outstanding power output and fuel efficiency and renders engines compact compared to other engines in the same class. It also delivers high durability and reliability for it is designed to withstand extreme operating conditions. As DPF application has become a requirement

in meeting Stage V emissions standards, which have significantly strengthened regulation on particulate matter (PM), in 2017 Doosan Infracore completed the development of SCR on DPF (SDPF)<sup>1)</sup>, a technology based on the integration of SCR and DPF, in response to Euro 6 vehicle emissions standards. SDPF is an exhaust gas post-processing technology that has never been applied to the mass production of non-road engines. In developing SDPF, Doosan Infracore first derived the concept of an SDPF, that could be installed within the pre-existing engine configuration and still satisfy Stage V standards, by applying its own concept design process including catalyst simulation. And the company verified the feasibility of mass production through a swift evaluation and analysis of major post-processing performance indices. It prepares to release highly efficient SDPF products by the time when global leading companies release their products.

Doosan Infracore identifies market trends in order to better respond to next-generation emissions standards. It has also established the development strategy for ultra-high efficiency post-processing technology in accordance with product development plans, based on which it is preparing for the release of post-processing solutions and engines that maximize the value of final products.

### Identifying New Business

In the era of the Fourth Industrial Revolution, solution development is essential to generating new business opportunities in machinery manufacturing. Construction equipment business also is going beyond equipment sales and service, expanding in the direction of offering diverse solutions to productivity challenges and enhancing customer value.

Doosan Infracore is expanding into new business areas, going beyond equipment manufacturing and sales. With an eye on the future of construction sites, it is focusing especially on unmanned construction solutions (unmanned equipment and control systems) as well as on solutions based on electrification and telematics that increase productivity and reduce accidents at construction sites, and to relieve manpower shortages in an aging society. To this end, the company is developing new technologies and business in cooperation with internal and external experts in different areas, and is striving to secure competitiveness for future growth.



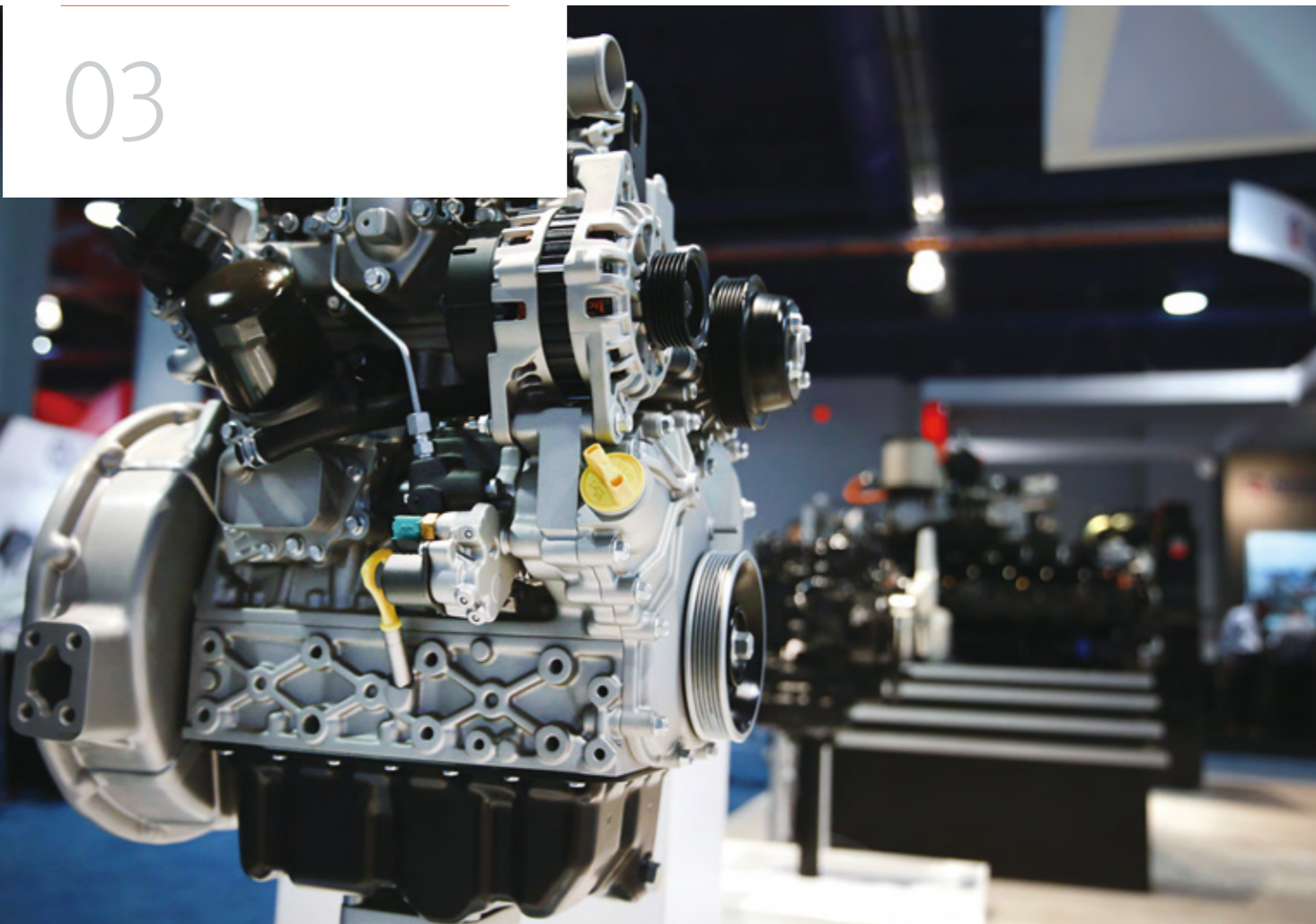
Moreover, the company is looking into ways of cooperating with various overseas start-ups, including those in Silicon Valley. A particular focus is placed on discovering start-ups with digital technologies that can complement Doosan Infracore’s projects, including autonomous driving and industrial Internet of Things (IIoT). It is also exploring various modes of cooperation, such as partnership and equity investment. To expedite the development of new business, in April 2019 Doosan Infracore established “D2o Capital,” a venture investment company, in Silicon Valley.

“Clue Insights,” the first start-up established by Doosan Infracore, participated in CES 2020, the world’s largest home appliance exhibition held in Las Vegas in January 2020, and accomplished the winning of the Honoree distinction in the “Tech for a Better World” category. Clue Insights is a spin-off of a new business launched in the form of in-house venture. It is specialized in supporting efficient equipment operations by analyzing construction equipment’s telematics information using the application “CLUE.”

With the vision of becoming a “Global Leader in Infrastructure Solutions,” Doosan Infracore will continue to grow on its global competitive advantages. At the same time, it will actively make inroads into new markets leveraging its cutting-edge technologies in order to secure new revenue sources and growth drivers, and thus advance into a “Total Solution Provider.”

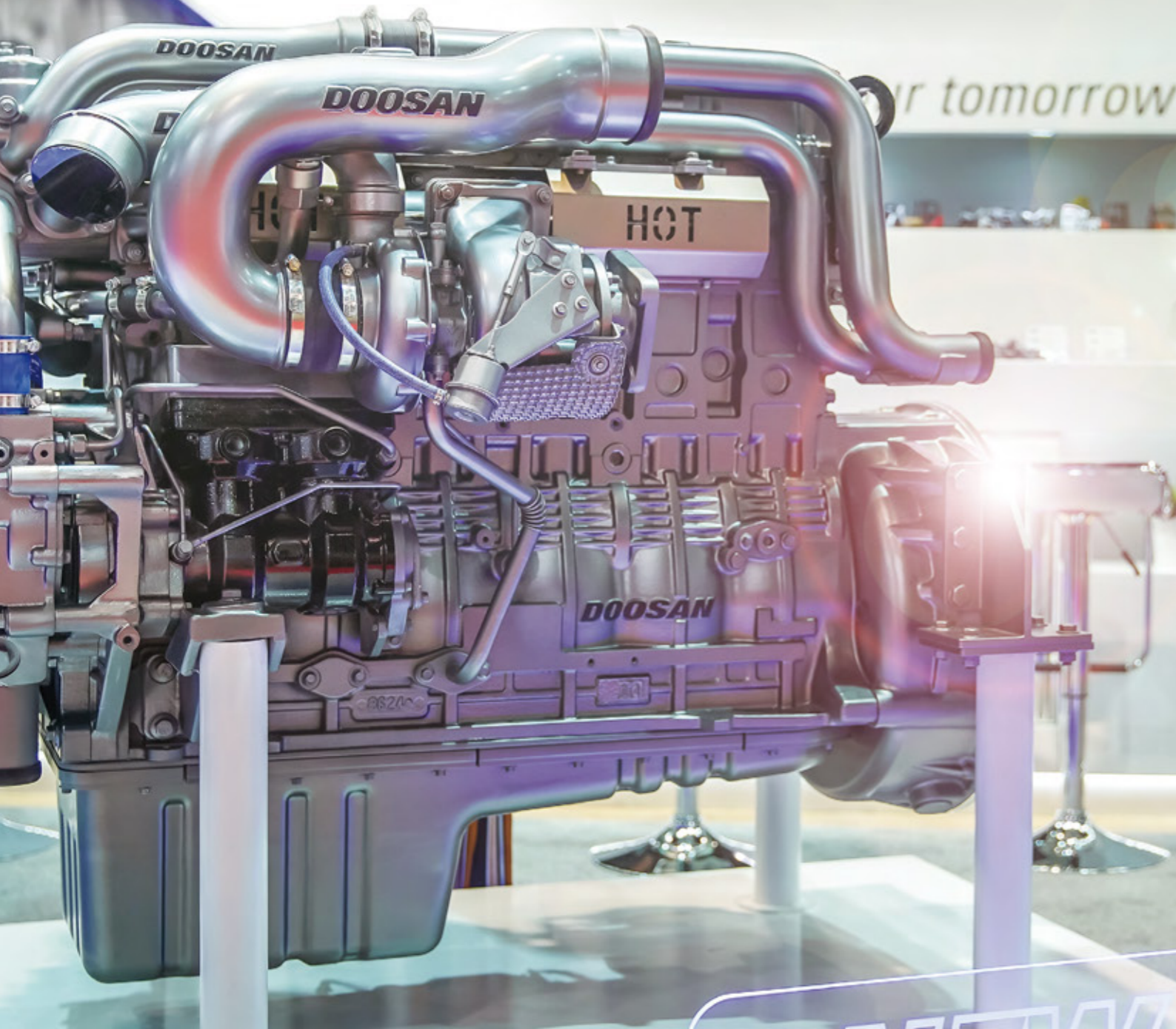
<sup>1)</sup> SDPF: A technology that considerably reduces the total volume of the catalyst by coating SCR catalyst in the DPF

03



# PRODUCT & MARKET

Doosan Infracore is not only solidifying its relationships with existing customers but also attracting new customers by making continuous efforts to improve its products and services, and to expand its communications channels for both customers and sales.



Strengthening  
Product  
Competitiveness

01

Innovating and  
Diversifying Sales  
Channels

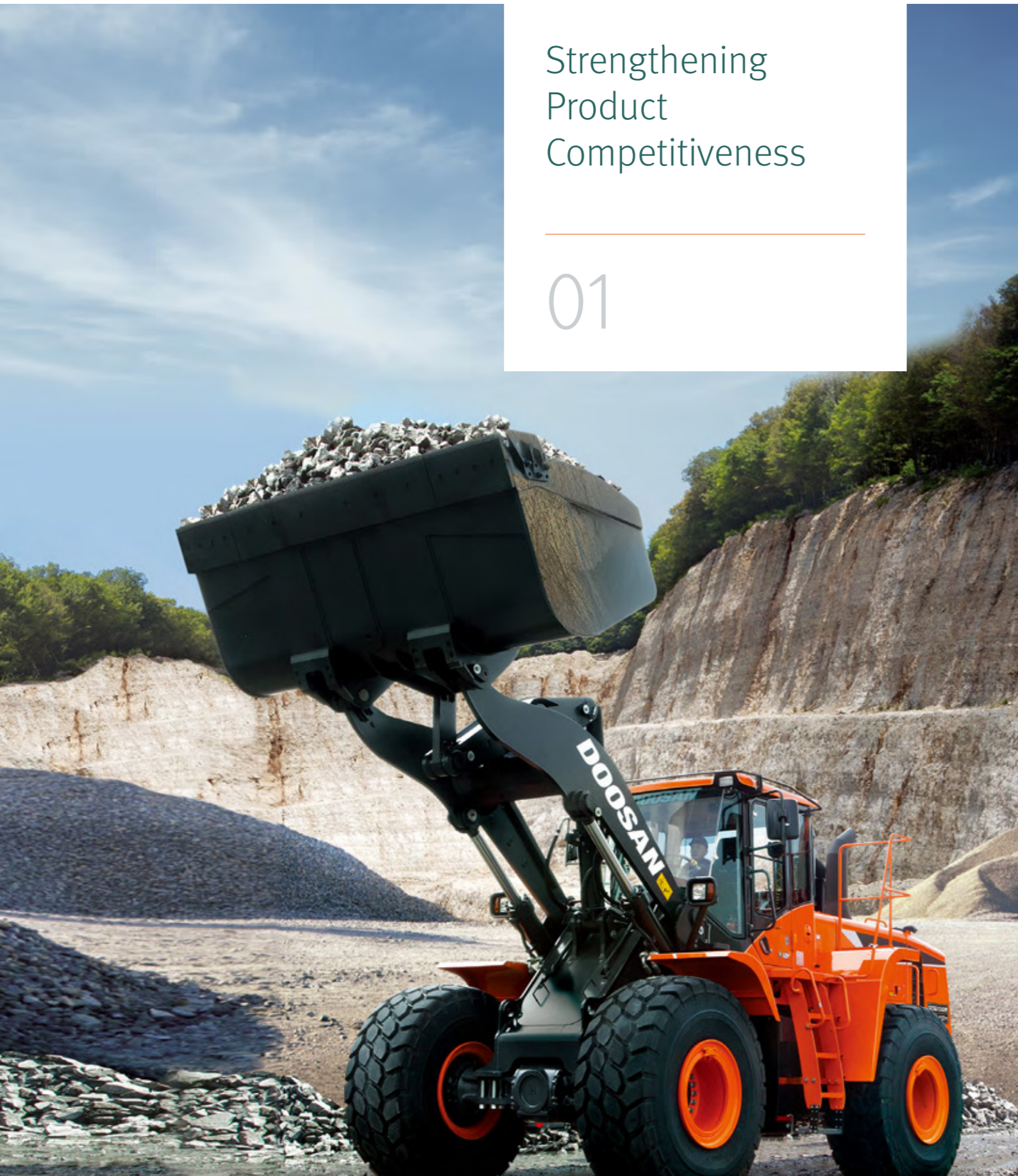
02

Enhancing Service  
Competitiveness

03

# Strengthening Product Competitiveness

01



## Advancing Product Development Capabilities

Doosan Infracore is improving the competitiveness of its products and building a foundation for sustainable growth by focusing on new technologies and advanced product development. It has established a mid- to long-term roadmap for product development which reflects market trends, including customer requirements, eco-friendly fuels and ICT, based on durability and convenience. The company has then connected this roadmap to its technology and product development and its business strategies. In addition, it put the DI Product Management System (PMS) in place to ensure the integration of customer opinions and trends in markets and technology into product development.

In addition to developing its own technology, Doosan Infracore innovates in many other ways, including collaboration with external organizations, investments in start-ups and industry-academia cooperation. It is also increasing the competitiveness of its products by reflecting changes in customer, social, environmental, and technological requirements. For example, the company developed electric excavators in line with the toughening regulations mainly in advanced markets.

In its engine business, Doosan Infracore is focusing on performance, fuel efficiency, durability and reliability, while developing products based on alternative fuels and engine electrification technology. The company is enhancing its technological capability in combustion and post-processing in order to better respond to the next-generation emissions standards, and is also expanding the scope of its alternative fuel technology to include CNG and LNG. Moreover, it builds the engines of the future by developing technologies in engine electrification, such as a hybrid powertrain. Doosan Infracore is becoming a “Total Powertrain Solution Provider” by developing advanced 48V full industrial hybrid powertrain<sup>1)</sup>, and by researching the electrification of mechanical parts and the E-Powerpack.

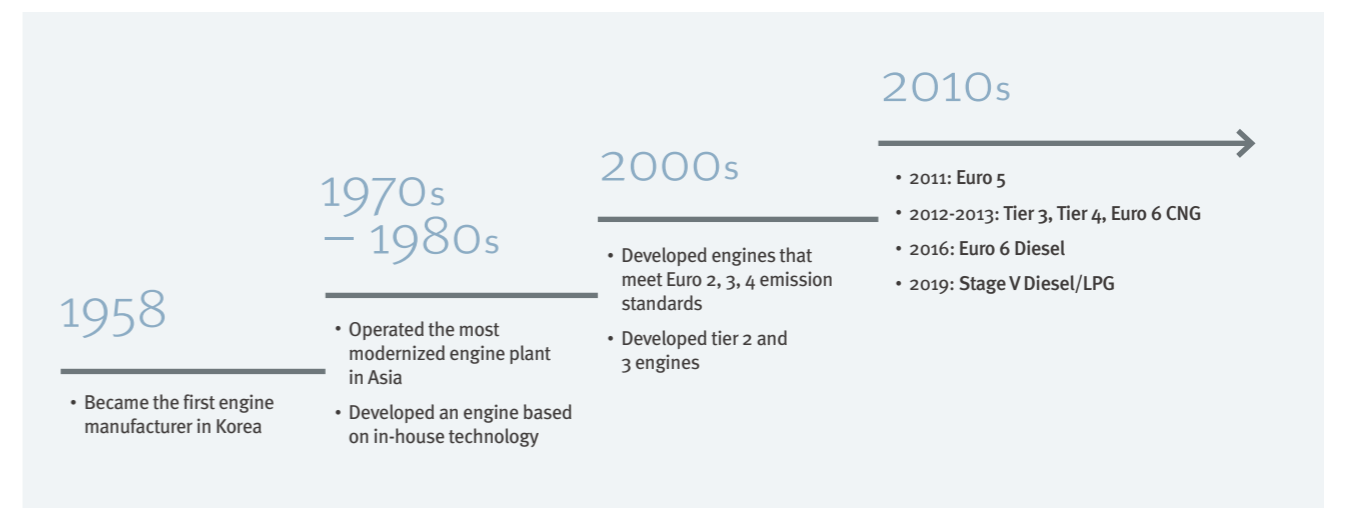
## Developing Products to Respond to Emissions Regulations

In accordance with its mid- to long-term product development roadmap, Doosan Infracore is expanding its engine line-up to include new products which meet all the latest emissions standards. This is also enabling the company to attract new global customers.

Doosan Infracore responded to the scheduled enforcement of EU Stage V<sup>2)</sup> emissions standards by developing the compact G2 Stage V pilot engine in January 2017 based on the latest combustion technologies. Mass production began at the end of 2019 after a series of thorough durability and quality tests. The compact G2 Stage V engine uses ultra-low fuel-consumption combustion (ULFC)<sup>3)</sup> technology, an upgraded version of the technology used in the earlier model of G2 engines, resulting in improved power and the lowest fuel consumption in its class. In addition, Doosan Infracore has applied SCR on DPF (SDPF), a technology based on the integration of selective catalytic reduction (SCR) and diesel particulate filter (DPF), as Stage V emissions standards are significantly stricter on particulate matter (PM). SDPF was developed in-house by Doosan Infracore, and used the company’s unique concept design process, including catalyst simulation, to enable the installation of the engine in the space allowed by the equipment, while still meeting all Stage V regulations. It also extended the filter replacement cycle that lasts for 1,000 hours, as well as offering a range of other options for increased customer convenience.

<sup>1)</sup> Hybrid powertrain: The main components for delivering different forms of power to equipment, including power generated by engines and power from batteries and motor drives  
<sup>2)</sup> Stage V: Exhaust gas regulations put into effect by the EU in 2019 to restrict PM emissions by diesel engines to a level at least 40% lower than previously  
<sup>3)</sup> ULFC: An innovative technology, patented by Doosan Infracore, that optimizes fuel combustion while increasing power

## Doosan Infracore’s History of Engine Development



In addition to making these performance improvements, Doosan Infracore undertook a range of targeted sales activities for the compact G2 Stage V engine, including setting up an exclusive customer team to provide distinctive services. As a result, it successfully signed supply contracts with global companies such as KION in Germany, Baoli in China, and ARBOS in Italy. The G2 Stage V engine matches the products of the most advanced companies in North America and Europe, enabling Doosan Infracore to make inroads into major markets based on the excellence of its products. Going forward, the company will participate in engine dealer conferences in North America and Europe as a way to share its sales strategies and plans to develop innovative, technologically advanced new products and services.

Doosan Infracore has also applied its highly efficient combustion technology to LPG and CNG gas engines. These eco-friendly alternative fuels emit 90% less PMs compared to diesel engines and almost with

no CO<sub>2</sub>, and therefore they can be used for many purposes in regions around the world. Applying eco-friendly fuel combustion technologies to diesel engines increases compatibility with those engines, while still benefitting from the unique strength, durability and reliability of diesel engines, so that they can be used for a long time without minor breakdowns. In addition, Doosan Infracore is developing CNG stoichiometric air-fuel ratio technology, thereby increasing its competitiveness in eco-friendly alternative fuel solutions, in response to growing interest of global OEMs in this technology after the implementation of Euro 6 – Europe’s latest emissions regulations for vehicles. Even stricter NOx/CH<sub>4</sub> regulations and new CO<sub>2</sub> emissions regulations are expected in Euro 7, while customers are still demanding that CNG engines deliver as much power as diesel engines. This is why Doosan Infracore is developing new stoichiometric air-fuel ratio engine technologies, including the optimization of combustion, reducing heat loads, improved high temperature materials, and multi-fuel injection and EGR ratio optimization.

**D34 Stage V Engine**

No need for regular valve clearance inspections thanks to the application of a hydraulic valve clearance adjustment device

Remove EGR<sup>1)</sup> device through high-efficiency SDPF technology

Achieve high power, high fuel efficiency through ULFC, an innovative technology patented by Doosan Infracore

No need for regular valve clearance inspections thanks to the application of an automatic belt tension adjustment device

Reduce exchange costs for such consumables as fuel filter, engine oil and oil filter, thanks to the 1,000-hour oil change cycle which is two times longer than the previous one

**Comply with Stage V exhaust gas emission regulations**

- Satisfy PN<sup>2)</sup> standards with DPF installation
- Highly efficient Cu-Zeolite SCR (95% or more) ≥ 56kW
- Exclude EGR by applying SDPF technology

**Improve performance and fuel efficiency**

- Improve combustion rate by applying the ULFC technology that has optimized the piston ball, injector nozzle, etc.
- Improve air management by optimizing valve timing and turbocharger matching
- Improve performance and reduce fuel consumption

**Increase customer convenience and decrease TCO<sup>3)</sup>**

- HLA<sup>4)</sup>: No need for the maintenance for valve clearance
- Automatic tensioning belt operation system
- 1,000-hour oil change interval

**Developing Flexible Local Production Capabilities**

Doosan Infracore operates Customization Plants, its customized assembly centers, in Europe and North America in order to better respond to customer requirements and to increase efficiency at its production facilities. Before establishing the Customization Plants, Doosan Infracore supplied 100% of its products as finished vehicles from Korea which placed limitations on changes to specifications. If existing product did not match the specifications ordered by a customer, the company had to produce a new product at its Korean plant and then ship it to the customer, resulting in long lead times and a restricted ability to reflect the needs of customers and dealers.

In order to overcome these limitations and generate greater customer value, Doosan Infracore established its first Customization Plant, the Europe Customization Plant (EuCup), in 2016 in Rotterdam, the Netherlands. Production at EuCup is based on the “semi knock-down (SKD)” partial assembly method, which involves importing the main body and the front parts, such as arms and booms, then assembling them to produce finished products which match the exact customer specifications. EuCup has significantly reduced lead times, from 16 weeks to five weeks, and has also improved sales forecasting and inventory management, leading to increased competitiveness in the European market.

Based on the success of EuCup, Doosan Infracore opened the North America Customization Plant (NaCup) in Savannah, Georgia in the U.S. in January 2020. Alongside the establishment of NaCup, the company undertook a detailed analysis of potential sales and an in-depth market survey, resulting in more accurate sales forecasting. It also calculated demand for options on each model to work out an appropriate level of inventory. As with EuCup, NaCup involves the main body being shipped as a half-finished product from Korea to NaCup, where attachments are assembled according to specific customer requirements. After the launch of NaCup, the lead time from order to shipment was reduced from 100 days to 4-6 weeks. NaCup can assemble 35 different models, and its annual production goal is more than 1,000 units. It plans to secure sufficient inventory for popular models to be delivered within ten days, which will enable stronger and more reliable sales throughout the North American market.

The Customization Plants have enabled Doosan Infracore to change its previous “make-to-order” system to “make-to-stock” based on demand forecasting for popular models, and resulted in reducing lead times substantially. The company will build an integrated global plant dashboard in 2020, through which it will assess production and inventory in all regions, and thus establish a supply system which responds quickly to customer needs, through better supply of finished vehicles and parts. Doosan Infracore will supply products faster than before and thus get closer to customers by forecasting demand by region and by month, and then preemptively acquiring the base machines, front kits, complete knock-down (CKD) materials and attachments.

**Enhancing Product Quality**

**Strengthening PDCA<sup>5)</sup>-based Process Operations** In 2018, Doosan Infracore created the Quality Management Team, dedicated to diagnosing and verifying the Quality Management System (QMS) at the corporate level in its construction equipment and engine businesses. QMS covers strategies for quality and key performance indicators, organizational management and quality awareness, and was previously based on ISO 9001:2008. The company has added various factors to its existing QMS, including the findings of its reviews of internal and external changes; improvements it has made by evaluating potential issues in the QMS; and the need to expand to areas besides production, purchase and quality. This has substantially upgraded the QMS and operational management at the company. The new QMS reflects the latest ISO 9001:2015 standards, including taking into account the requirements of a wider group of stakeholders and more advanced risk management, and it consists of common diagnosis items of organizations and specific diagnosis items on work areas by organization.

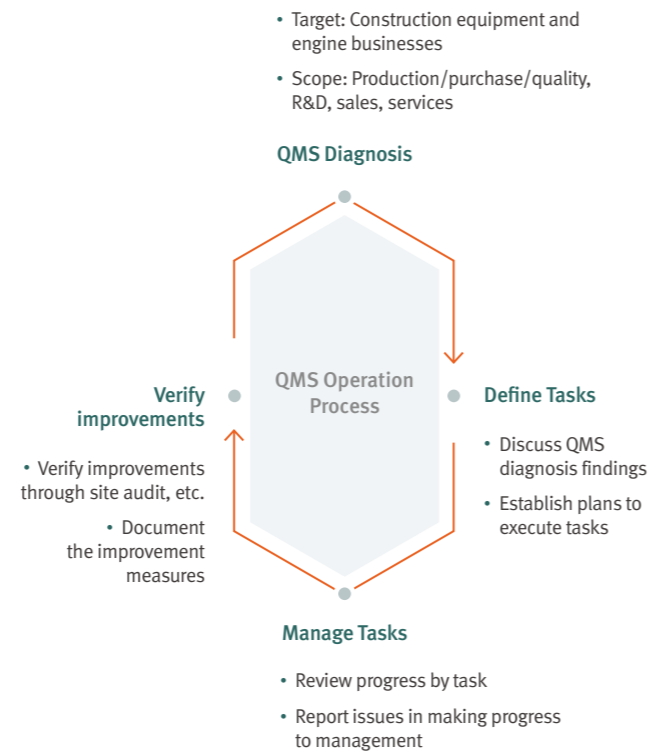
<sup>1)</sup> EGR: Exhaust gas recirculation device  
<sup>2)</sup> PN: Particle number  
<sup>3)</sup> TCO: Total cost of ownership  
<sup>4)</sup> HLA: Hydraulic lash adjustment method  
<sup>5)</sup> PDCA: A technique to achieve a goal by repeatedly executing a cycle of plan-do-check-act



In 2019, Doosan Infracore conducted a regular annual QMS diagnosis of its production/purchase/quality, R&D, sales and service units of its construction equipment and engine businesses. It has also built a corporate-wide QMS diagnosis management system which has created a virtuous cycle of identifying tasks based on the diagnosis, monitoring task execution, and verifying the improvements made. Progress monitoring is conducted every quarter, in order to strengthen execution capability, and reports are made to the CEO as a way to support the management of takes at the company level. Doosan Infracore will ensure that all departments implement its new systematic business processes and comply with QMS standards, and also that they use PDCA for further improvements.

Amid rapidly changing business environment, Doosan Infracore has an advanced risk management system in place, aimed at preemptively managing potential risks while also promptly and efficiently responding to emerging risks from an integrated perspective throughout its value chain. In 2019, the company identified the key risks for each function within its construction equipment and engine businesses, set out response strategies, and undertook preemptive risk management in relation to these strategies. It also focused on ensuring corporate-wide responses, including quarterly monitoring of risk prevention activities and reports to the CEO.

**QMS Operation Process**



Doosan Infracore built the foundations for upgrading its QMS in 2019. In 2020, it will enhance the execution of its quality management processes in order to meet customer expectations concerning quality, and will thus enhance its fundamental competitiveness. To this end, the company will expand its targets for QMS and focus on process-based business, including by improving the resolution of issues between front and back offices, and ensuring preemptive risk management even in an uncertain business environment.

**Improving Preventive Quality and Basic Quality** Doosan Infracore continues to make rapid, innovative improvements in quality which increase customer value by “observing the basics of quality,” with a focus on its plants and suppliers. As we move into the Fourth Industrial Revolution, in 2020 Doosan Infracore will use big data to forecast potential quality issues caused by customers’ working environment and operating capacities (e.g. operating hours) of their equipment. It can then undertake preventative inspections and also use telematics system for remote diagnosis, thereby implementing activities to strengthen preventive quality so that no quality issues arise with customer equipment.

Doosan Infracore is focusing on quality improvement, and is building a working environment which adheres to the basic and standards in order to substantially improve its basic quality level. Every year, the company identifies the most urgent quality issues to be addressed, aimed at increasing customer value. In 2019, it formed a cross-functional team to improve the 5-ton hoses, and then improved assembly processes and undertook regular audits at each plant, constantly focusing on whether standards were being observed in order to make improvements in basic quality. As a result, issues in basic quality fell by 10%.

**Verifying Equipment Performance and Durability** Doosan Infracore undertakes reliability tests and evaluations on all its products, including excavators and engines, to ensure their performance with full specifications and in any environment, throughout their lifespan. The Incheon Reliability Evaluation Center is equipped with the latest in testing facilities and equipment, including an environmental tolerance laboratory, a large anechoic chamber, a vibration test laboratory, a structure test laboratory, and a hydraulic test laboratory. The Center also tests and evaluates product durability and structural safety in a wide range of working environments.

Construction equipment is used in deserts, plateaus, wetlands and other harsh environments. Doosan Infracore conducts annual assessment to test durability in extreme cold temperature for its construction equipment, including excavators and wheel loaders, at the coldest time of year and in the coldest regions to check performance in extremely low temperatures in addition to testing them in its cold chamber. In 2014, Doosan Infracore became the first Korean construction equipment company that undertakes extreme cold testing, and it continues to conduct such testing every year. The company also runs vehicle performance tests in China at altitudes of at least 5,000m in order to ensure reliable performance even on high plateaus.

Moreover, in October 2019 Doosan Infracore completed the construction of the Boryeong Proving Ground at 300,000m<sup>2</sup>, the largest of its kind in Korea with the goal of implementing more systematic verification of the durability and performance of its advanced construction equipment. The Boryeong Proving Ground consists of three proving grounds which are identical to actual working environments for construction equipment, as well as a mountain driving road, which enables the simultaneous testing of up to 20 units of construction equipment. In addition, “accelerated durability specialization testing” is available so that the durability testing period can be accelerated. This facility includes various other proving grounds, such as driving, salvage and traction power, and noise testing, as well as a dome. In addition to regulatory testing, construction equipment is evaluated in environments that are as similar to actual work sites as possible. The Boryeong Proving Ground improves the performance and durability of Doosan Infracore’s construction equipment, and is thus significantly enhancing product competitiveness. The Boryeong Proving Grounds will be Doosan Infracore’s “smart construction equipment research complex,” demonstrating its cutting-edge technologies to ensure environmental and customer safety.







## Innovating and Diversifying Sales Channels

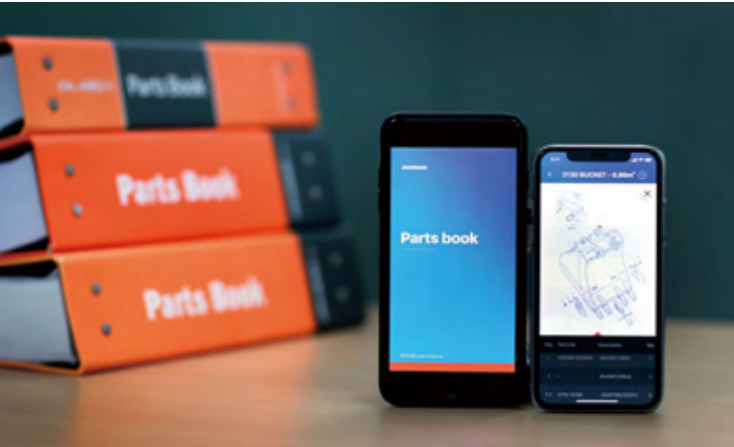
02

### Expanding Value-selling

Price competition in the construction equipment market continues to be intensified especially in emerging markets. Doosan Infracore avoids sales strategies based on low prices, but rather focuses on the distinctive value of its products. Its value-selling strategy offers such solutions as product consulting and other services, based on an in-depth understanding of customer requirements, and with a focus on delivering product value. This strategy has been successful in establishing strong relationships with customers, including attracting new customers and signing highly-profitable fleet deals. In order to implement its value-selling strategy, the company provides field training to its dealers' sales personnel, as well as various tools to increase their understanding of the equipment. Doosan Infracore also provides them education on matters that are of great interest to customers, and trains them on a wide range of product solutions which can be offered to customers.

In 2019, Doosan Infracore developed marketing materials to explain the particular advantages of Doosan Infracore products from the perspective of total cost of ownership (TCO) and productivity, increased the number of customer visits, and expanded its training of sales personnel, all in its efforts to implement its value-selling strategy. In addition, the company developed the "Doosan Equipment Sales" app to integrate data which had previously been dispersed among different sales channels. This app enables dealers to undertake value-focused sales, and thus to deliver value to customers. It also helps to imprint the expertise and quality of Doosan Infracore in the minds of customers at its sales sites. This app has already been used to present the strengths of Doosan Infracore's products to customers in emerging markets, and also to compare their productivity and TCO, which in turn has resulted in winning contracts. Doosan Infracore has further improved customer satisfaction through its "Smart Maintenance" service solution which uses DoosanCONNECT™ to provide remote monitoring to check the status of equipment and other preventative maintenance services. This led to the signing of a contract to supply nine large excavators to Dangote Cement, an affiliate of the Dangote Group, the largest conglomerate in West Africa.

In 2020, Doosan Infracore will focus on attracting key accounts by selecting potential key accounts in each region and implementing a wide range of marketing programs. The company will increase both sales and profitability by leveraging its unique value-selling strategy and expanding it to more sales sites, thereby striking the right balance between stable growth and strong profitability.



Mobile Parts Book Application

### Digital Marketing

Doosan Infracore runs a range of digital platforms to facilitate customer communications and strengthen its untact<sup>1)</sup> sales ability. The company has been advancing into the huge Chinese market since 2016 by using WeChat, the largest mobile messenger service in China, as well as other online media to provide news about products, send information on used products and parts, share other information to help customers manage their equipment, and to identify customer demand for products and thus make actual sales. The company currently has around 140,000 followers on WeChat, and this number continues to grow. Doosan Infracore began parts sales through WeChat in 2019, recording sales of at least KRW 10 billion, with more than 1,200 units sold through online marketing, including WeChat. Beginning in February 2020, the company uses social media platform marketing through TikTok and Kwai to publicize its finished products and parts, and to provide customer support including technical education about equipment maintenance through live broadcasting. During an hour-long live broadcast in March, the company received many customer inquiries about its products, and a live broadcast about equipment management was seen by 7,300 viewers.

Digital marketing promotes continued interest in the company's products and services, and enables the company to deliver value without the restrictions of time and space. Doosan Infracore will, therefore, build up its digital infrastructure so that it can continue to offer its customers total solutions through data-based digital platforms.

<sup>1)</sup> Untact: A trend terminology that is a compound word, consisting of contact and "un" which means negation. It refers to marketing where digital technology is used to provide information and sell products based on a non-face-to-face method

Even in Korea, where traditional offline sales remain dominant, online and mobile purchases are increasing steadily. Doosan Infracore is therefore overhauling its customer services and establishing new marketing channels. The company is developing a smartphone-based customer support and product system to integrate across the entire value chain, including sales, after-sales services, parts dealers, equipment buyers and users, and other customers. The system will be linked to social media to improve its value and access to customers. In addition to customer-centered services, such as location-based assistance, improved equipment maintenance, and the sharing of product information, the system will also offer new functionality, including dealer purchasing and technical support and repair connections. This will enable the company to establish the foundations for e-commerce.

In August 2019, Doosan Infracore released its "Mobile Parts Book" application to enable customers to have full access to product manuals and information on parts. Part book contains plans, parts numbers and other data for a product. Until now, Doosan Infracore provided the book, which is an average of 600 pages long for each piece of equipment, in paper form, which was inconvenient for portability and storage, for sharing and communicating, and for updating information. Doosan Infracore, therefore, developed the Mobile Parts Book app with a focus on user convenience, rapid information updates and continued follow-up. The user interface was made as simple as possible, and access to parts information was improved even in places without an internet connection, thereby maximizing usability. Updates are possible in real time, enabling customers to check the latest information on parts and compatibility immediately. With just an equipment certification number, anyone can become a member and install the Mobile Parts Book app for free, provided in eight languages. Doosan Infracore recently adopted a system through which users can ask for parts estimates and make inventory inquiries through the Mobile Parts Book app, and is also building an online platform which allows the parts order placement. The company will continue to improve the Mobile Parts Book app from a customer perspective, and help dealers and customers to more effectively use its new online platform.

With customers responding increasingly favorably to digital content, Doosan Infracore will leverage its social media channels as a useful tool through which it can share new product releases and promotions, and deliver greater customer value.

## Enhancing Service Competitiveness

03

### Providing a TMS-based Lifetime Care Program

Telematics system (TMS) combines wireless communications with the global positioning system (GPS) that enables the real-time collection and analysis of information such as the location and operational status of equipment. This in turn allows users to remotely monitor equipment on their IT devices, including where the equipment is, how much work has been completed, how it is operating, and the status of consumables and parts, including if any of them need to be replaced, thereby enabling efficient work management and support. Doosan Infracore began its telematics services in China in 2005, which was followed by the release of DoosanCONNECT™ in 2015. DoosanCONNECT™ is a TMS developed in-house by Doosan Infracore, and the company will apply TMS to all models released from 2021. As of the end of 2019, TMS had been applied to around 71,600 units of equipment, such as excavators, wheel loaders and ADTs, enabling dealers to determine if there are





any faults in the equipment, assess what parts are needed, and thus provide services in advance. The company can analyze information collected through telematics, including the location and operational status of equipment, as well as the status of major parts, and then reflect this information in production. Moreover, it can use the collected information for big data analysis.

Doosan Infracore is providing TMS-based services to help customers check and manage the operational status of their equipment with ease. “Fleet Management Report” is an analysis of data collected through the telematics service such as equipment operation and work rates, real-time fuel efficiency, and error codes. It has enabled the easy analysis of the status of products being operated by customers through the data comparison between equipment or among equipment groups. In 2019, Doosan Infracore introduced additional operating guides and consulting services in connection with the Fleet Management Report function.

“Smart Maintenance” is a distinctive service program which provides preemptive maintenance services to customers based on the operational data collected through DoosanCONNECT™. Doosan Infracore released the Smart Maintenance program in five countries – the Philippines, Myanmar, Cambodia, Malaysia and Nigeria – in 2019, and will expand it to other countries. The program consists of three sub-products – Light, Standard and Premium. The main differences between the sub-products are the degree to which detailed program contents can be adjusted for the market environment, and the ability of the dealer to put the program into practice. Doosan Infracore will develop a set of Smart Maintenance service solutions which reflect the needs and strategic direction of each region. In addition, the company is developing lifetime care solutions for a wide range of customer equipment with the goal of maximizing capture of customers outside warranty services and securing secure machine lifetime visibility. In 2020, the company will establish a roadmap for “Machine Lifetime Care” and implement it in connection with the Smart Maintenance.

Special features of Smart Maintenance



Maximized productivity



Sustainable product lifecycle



Reduced maintenance costs



Improved convenience

Expanding the DoosanCARE Program

As part of its customer-tailored support services, and to build its relationships with customers, Doosan Infracore offers the DoosanCARE program whereby service experts visit customers, irrespective of whether they have on-going issues with products or warranties, to offer consulting and training on equipment management. In addition to DoosanCARE, offered by headquarters in Korea, in 2018 Doosan Infracore began DealerCARE in emerging markets such as Indonesia and Colombia, whereby dealers provide customers with quality service as high as that of DoosanCARE.

In 2019, the company headquarters, in partnership with dealers, ran the DoosanCARE program for some 900 units of equipment in both emerging and advanced markets. Doosan Infracore has improved customer value by preventing breakdowns through training programs for users about the characteristics and maintenance of their equipment. In 2020, the company will further facilitate the DoosanCARE program through cooperation with dealers worldwide, and upgrade its marketing activities.

The DoosanCARE program also enables the company to listen directly to customer opinions, and thus to increase efficiency in equipment operations by quickly identifying any inconveniences. Doosan Infracore aims to resolve customer complaints about its products, and is continually striving to find new ways to maximize customer satisfaction by improving the DoosanCARE program.

Improving Dealer Services

Doosan Infracore makes continuous efforts to strengthen service skills of its dealers in order to increase customer satisfaction and thus sharpen a competitive edge. In particular, it runs the Doosan Partners Academy (DPA), an online training program for dealers, aimed at helping dealer service personnel to improve their expertise. The company also provides quality training based on its standardized education and training systems, including “Hands-on Training” through which experts from headquarters use equipment that is used at actual worksites to train dealer service personnel on how to identify and deal with the most common causes of customer complaints.

In 2019, Doosan Infracore expanded its dealer service evaluation and training systems to ensure that customer service is at the same high level around the world. The company analyzed its best dealers across the globe, used them to define dealer service capabilities, and thus set out operational standards and evaluation criteria for dealers. In addition, the company has established systems for global dealer service training and directions for personnel development with the goal of expanding the base for stable services. As part of this effort, Doosan Infracore is fostering officially certified lecturers by the company through the Train the Trainer (TTT) program, and is

also increasing the number of lecturers who have received intermediate-level certificates by providing more opportunities for dealer service personnel to receive trainings.

Doosan Infracore strives to increase training opportunities and improve accessibility, as well as to carry out systematic and continuous service training. To this end, it established Service Training Centers in Colombia in 2018, and in Mexico, Singapore and Ghana in 2019. The level of previous training methodology, through which trainers visited individual dealers, differ according to the level of trainers. Also, compared to the resources invested, such as training personnel and budget, training quality and efficiency were unreliable. Doosan Infracore, therefore, established its Service Training Centers in major global bases, and on the back of significant support from headquarters, the Training Centers were set up with the equipment, training tools and materials needed to enable them to hold comprehensive “Hands-on Training.” After the opening of the Colombia Training Center, the company provided an engine service training program to dealer service personnel from South America in July 2019. The trainees learned about the fundamentals of the engines, and received practical training on skills such as removing, repairing and re-installing broken engine parts.

In July 2019, Doosan Infracore held the global final of the Doosan Service Contest, also known as “Doosan’s Got Talent.” First held in 2014 to motivate service personnel, Doosan’s Got Talent 2019 was the second such event. Service technicians from dealers across the globe took part in the contest, competing to display their service skills and sharing experiences. Preliminary contests were held locally in 2018, with participation by 120 service personnel affiliated with dealers from 30 emerging markets, including China. The final was held at headquarters in Korea, with participants tested on their professional knowledge and their ability to inspect equipment and undertake performance checks. They also had to demonstrate their skills in the “Troubleshooting Test” during which they were required to diagnose the cause of a problem that had been randomly created by the judges on an actual piece of equipment, and then to resolve it. Doosan’s Got Talent has given participants the opportunity to increase their service skills and to share know-how with professional technicians from around the world, and is helping the company by training service experts in each region to maximize customer satisfaction.

# INNOVATION & DIGITALIZATION

Doosan Infracore is focused on diverse products and innovative solutions that will bring about fundamental changes to the global construction industry in the Fourth Industrial Revolution era. We are also moving forward with a digital transformation not only how to work but also how to think of.



Securing Future  
Technologies

01

Operational  
Innovation  
based on Digital  
Transformation

02





control the excavator as if the worker was at the actual worksite. Also the company introduced 3D machine guidance which precisely measures movements of the excavator in three-dimensional data using attached sensors and sends the data to the station; leveling which requires advanced work skills; and machine control such as E-fence, a safety function that stops the equipment from moving outside the pre-defined work area.

Based on its long years of experiences in developing future technologies, Doosan Infracore successfully demonstrated the Concept-X, a solution to address challenges of an unmanned automated construction site, in November 2019 at the Boryeong Proving Ground. The Concept-X demonstration event was attended by around 200 people, including politicians as well as staff members of companies, organizations and academia related to the development of Concept-X, who were able to glimpse the future of construction sites. The X-center, a control center of the Concept-X, creates a 3D map of the worksite based on measurements sent by a drone flying over the worksite, and sends operation commands to excavators or wheel loaders installed with unmanned operation technologies. The X-center monitors and manages measurement data and work progress of the unmanned equipment. There had been cases where unmanned operations of equipment were featured. However, Doosan Infracore is the first to demonstrate the entire process, from worksite survey to equipment operations, using unmanned automation technologies.

By using the digital data of construction sites, the Concept-X 1) improves productivity based on digital data generated by the unmanned operations of equipment and the remote management of unmanned construction sites; 2) prevents accidents using a sensor-based perception system; 3) minimizes equipment breakdowns through preemptive response based on AI-generated prognostics. The X-center, a brain of Concept-X, is a comprehensive control system that enables the integrated monitoring and management of worksites, including creating digital data of the worksite, establishing a plan based on analysis results, and delivering operation commands to the equipment. After scanning the worksite and measuring the topography of the worksite by using a drone, the system creates a 3D topographical map, establishes a work plan based on 3D building information modeling (BIM) comparisons, analyzes the worksite data, and then sends operation commands to unmanned automation technology-equipped machinery. The development of the X-center has enabled Doosan Infracore to secure technological capabilities related not only to the operation of individual unmanned equipment but also to solutions of the comprehensive control of unmanned construction sites.

## Securing Future Technologies

01

Doosan Infracore makes continuous efforts to develop and commercialize future technologies, such as unmanned operation, automation, and electrification. To publicize its vision of future technologies, the company participated in CES 2020, its first participation in the International Consumer Electronics Show (CES) held in Las Vegas, the U.S. in January 2020. It showcased new technologies and business models in an era where boundaries are fast disappearing between manufacturing and IT.

### Concept-X, Solution to the Future of Construction Sites

The global construction industry accounts for at least 10% of global GDP, growing every year on the strength of the steady growth of housing and infrastructure construction. Despite such growth, the industry is low in productivity and high in accident rate relative to other industries mainly because of the nature of its business which requires a great number of equipment and skilled workers as well as

inevitable wait time and idle time. For the construction industry to grow at a steady pace, it is essential to increase productivity, improve safety, and develop eco-friendly technology. In order to tackle these challenges at construction sites around the world and to add new value, Doosan Infracore has been carrying out “Concept-X,” a project that combines IT and AI technologies to create technologies for the construction site of the future, since 2017.

Doosan Infracore unveiled its tele operation technology and successfully demonstrated the industry’s first 5G<sup>1)</sup>-based system of remote-controlling machinery across borders at the Bauma China 2018 and Bauma Germany 2019. At the Bauma Germany in particular, the company succeeded in operating an excavator located 8,537 km away, using a remote-control station displaying video images of the job site, taken by cameras installed on the excavator, and live-streamed through an ultra-low latency<sup>2)</sup> network. This tele operation enabled the worker to remotely look at the real-time videos and

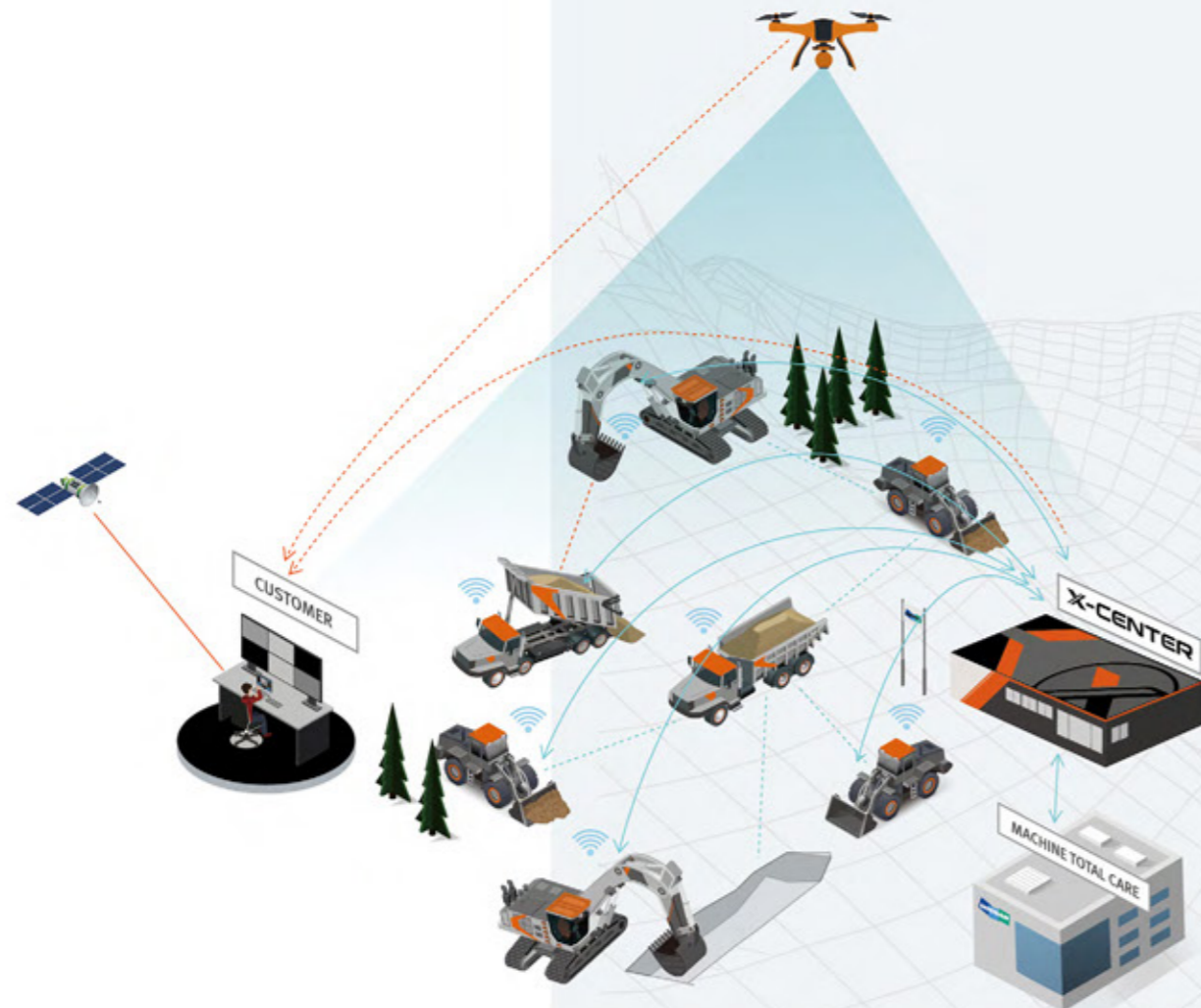
<sup>1)</sup> 5G: A network service that can transmit up to 100 times more data and 20 times faster than LTE, enabling hyper-connected, ultra-high-speed and ultralow-latency services

<sup>2)</sup> Ultra-low latency: Terminology for an extremely short end-to-end delivery time in machine-type communication

In the Concept-X demonstration, Doosan Infracore showcased operations representative of types of work expected of excavators and wheel loaders equipped with unmanned automation technologies. The unmanned excavator in the demonstration carried out leveling, trenching and loading of excavated soil, while the unmanned wheel loader loaded the soil onto a nearby dump truck or transported the soil quite distant from the worksite. As the operations of excavators and wheel loaders depend on the worksite, the company will continue to research possible functionalities of unmanned equipment. Improved safety is another important consideration in the application of unmanned automation technologies. Doosan Infracore, therefore, is focusing on developing technology related to control algorithms that enable real-time monitoring of the operation areas of unmanned equipment, including those along the paths of travel, for detection of unexpected intrusions of other equipment or personnel into the areas, and an immediate cessation of the operation of the equipment whenever necessary.

## Value of Concept-X at Future Construction Sites

Doosan Infracore conducted research on changes and value that it could bring to future construction sites after successfully completing the Concept-X demonstration in 2019. Using KPMG’s “True Value” methodology, the company calculated and analyzed the effects of improvements in economic, social, and environmental value that will result from the adoption of solutions to the unmanned automation of construction sites, and would like to share its findings with stakeholders.



### Total economic, social and environmental value before/after Concept-X

Concept-X includes the X-center technology that controls unmanned equipment, such as excavators and wheel loaders, at an unmanned worksite. To determine the social value of adopting Concept-X, Doosan Infracore has devised indices, including reduction of work hours, reduction in worksite environmental impact, equipment and personnel allocation, and safety and fuel efficiency improvements. The hypothetical construction environment where Concept-X was applied is found to be 36% higher in terms of economic, social, environmental benefit relative to conventional construction sites. Doosan Infracore will continually measure, manage and publicize the true total cost of ownership (TCO) of Concept-X solutions following technological improvements, and lead the social value creation of Doosan Infracore business.

In terms of economic value, the X-center solution, including drone-based 3D mapping and measurement technology, reduces construction time and costs by up to around 20% with an increased consistency in measurement. Moreover, unmanned automated construction sites require two-thirds fewer onsite personnel, such as work supervisors and construction equipment operators. Total construction time also decreases by 32.9%, contributing to reduce construction costs.

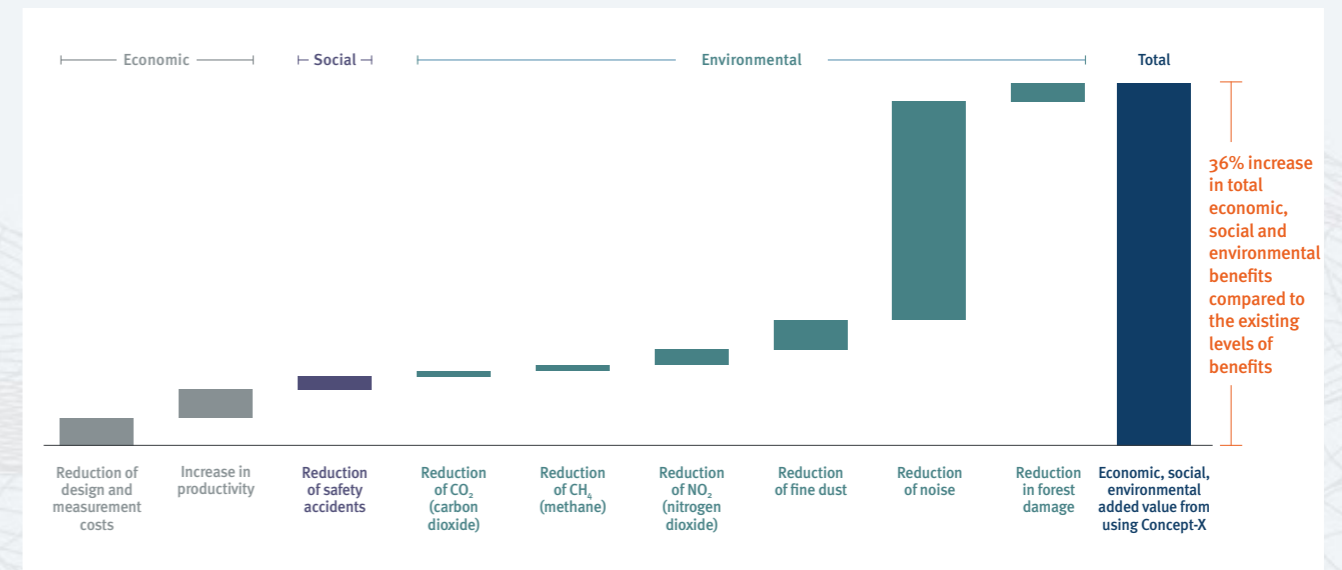
In social aspects, it has been found that the adoption of Concept-X creates meaningful value in improving safety issues. This impact is drawn by the forecast or detected breakdowns of equipment through PHM; unmanned equipment improves work efficiency in dangerous areas; and the fewer personnel at construction sites, the lower the accident rate will be.

Environmentally, the leading anticipated effect is reduced fuel consumption and greenhouse gas emissions as a result of improved fuel efficiency, as well as noise reductions from shorter construction periods. In addition, the total estimated construction hours saved will have a positive effect on reducing environmental pollution, such as air pollutants, fine dust and damage to forests in areas near construction sites.

More detailed information on the benefits of Concept-X adoptions can be found in a separately-issued report titled, “Concept-X True Value Report.”



Report on “Concept-X True Value Report”



- As for a hypothetical construction environment in which it could evaluate the potential benefits of Concept-X, Doosan Infracore chose a specific construction project, among recent large-scale construction projects in Korea, of which costs and environmental impact data were possible to calculate. The company then calculated the value that the adoption of the Concept-X would generate in such environment in comparison with the existing construction site.
- Concept-X solutions, following the November 2019 initial demonstration, are undergoing the process of refinement toward the goal of commercialization by 2025. The performance capability and specifications of individual equipment lines are being continually upgraded. In cases where any of the economic, social and environmental value of Concept-X solutions cannot be determined, the company used figures defined in the following order: 1) latest measurements of value, 2) estimates of value upon commercialization of solutions, 3) effects of unmanned construction equipment solutions researched by outside parties, and in cases of multiple data, the most conservative figures to be used.
- The monetization of social and environmental value reflects the amount of quantitative input data generated by equipment and construction sites, multiplied by the monetary value of each data assigned to the latest global research materials, in accordance with the KPMG True Value methodology. The monetary values are set according to the rate of price fluctuation of the base country at the time of the research, using exchange rates at the end of 2019.
- Calculation results are not complete but explicit data derived to establish the direction for social impact management and value creation based on several assumptions. Also, as the monetary values, which reflect the current approach, can be additionally supplemented or adjusted to findings of new research in the future, impact valuation figures for the same years may change going forward. Therefore, this information may not be considered as part of financial disclosure.

Unexpected equipment breakdowns at unmanned construction sites, where fleet operations will become the norm, can lead to economic losses and other risks. Prognostics and health management (PHM) is a solution to such potential problems – it enables unmanned automated equipment to self-diagnose its status and to identify potential sources of breakdowns, thereby ensuring seamless operation. The PHM technology uses big data analysis, deep learning and AI technology, based on the history of equipment usage data. Doosan Infracore’s future unmanned automated equipment can self-diagnose its operating status and detect signs of a potential breakdown in time for maintenance to take place, and thus minimizes downtime, offering a longer guarantee of equipment soundness, which in turn leads to the increased worksite efficiency and productivity.

Doosan Infracore plans to unveil solutions by phase prior to commercialization of Concept-X. As a first step for commercialization, it released XiteCloud<sup>1)</sup> in May 2020. XiteCloud is a smart solution to earthwork management at construction site, and it connects 3D drone measurements, earthwork amount calculations and construction layouts to an exclusive cloud platform<sup>2)</sup> through which it devises work plans for optimal efficiency at the worksite. Bringing together diverse and dispersed types of work, such as measurement, topography analysis, equipment operations and construction management, and managing them on a single platform can reduce costs and work time while also improving work accuracy, which leads to improved productivity at the construction site. XiteCloud enables a precision analysis of mounting amounts of data being generated in each stage of construction, and can reduce time needed for construction measurement and calculation of earthwork amounts from a traditional two-week period to a day or two. Going forward, Doosan Infracore will extend the usage of XiteCloud to large-scale construction equipment operations by leveraging 5G technology and telematics, and it will steadily advance into overseas markets.

Doosan Infracore pursued open innovation through internal and external collaboration, industry-academia cooperation and start-up investment, aimed to secure a distinctive competitive edge. The company as a total solution provider will continue to combine various internal and external ideas, and generate the marketability and profitability of advanced technologies accumulated through Concept-X, and thus will create innovative, distinctive customer value. In addition, it will present a new future for the construction industry by enhancing worksite productivity, safety and eco-friendliness.

**Electrification**

**Electric Excavators** At the CONEXPO 2020, held in Las Vegas in the U.S. in March 2020, Doosan Infracore unveiled a pilot product of DX17Z-5, a 1.7-ton mini electric excavator. The DX17Z-5 electric excavator is powered exclusively by a battery pack stored within, and the battery supplies power to an electric motor that activates the hydraulic systems. DX17Z-5 is the first electric excavator developed in response to the opinions of customers who operate an excavator for hours in a confined space. DX17Z-5 is eco-friendly for it does not emit harmful gases, such as exhaust gas, and is suitable for working indoors (closed space) or in an urban area where eco-friendly operation is required. The company plans to commercialize DX17Z-5 in 2022.

**Hybrid Powertrain** As a result of stricter GHG emissions standards across the global automotive market, “de-dieselization” is gaining momentum. The progress of electric engines in the automotive industry is also being accelerated, and the development of hybrid engines for industrial uses is at full speed. Doosan Infracore has been looking into developing various types of hybrid powertrains since 2017. A hybrid powertrain has an internal combustion engine and an electric motor powered by a battery pack installed on the machine or equipment. The electric motor is used when a little energy is needed (discharging), and an internal combustion engine is used when a lot of energy is required (charging).



<sup>1)</sup> XiteCloud: www.xitecloud.io  
<sup>2)</sup> Cloud platform: A system that allows real-time processing and analysis of large amounts of data through an Internet-connected server

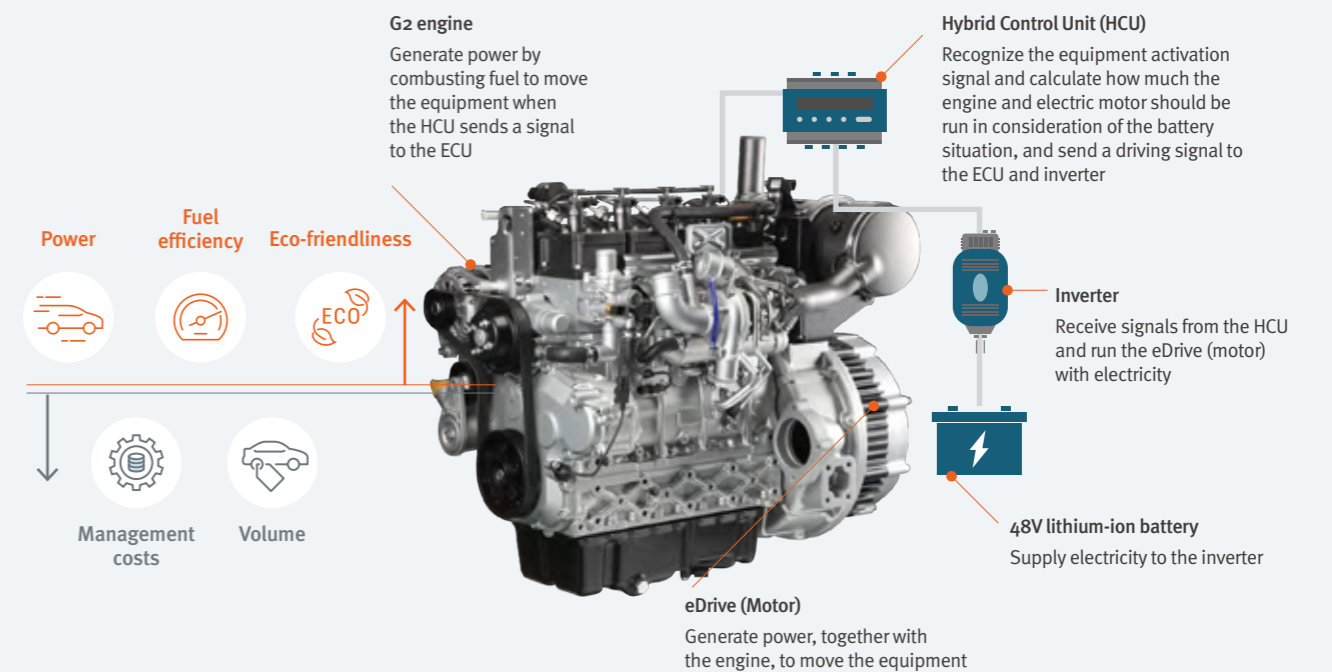
Having found the potential of “48V mild hybrid powertrain,” Doosan Infracore commenced a full-scale technological development in July 2018. The mild hybrid powertrain is a combination of internal combustion and electrification systems in which a 48V electric motor is attached to an engine as an auxiliary power source. The electric motor is used in low-efficiency sections, thereby increasing energy efficiency and power while reducing CO<sub>2</sub> emissions. As a result of establishing such a unique powertrain concept and improving the specifications, the company has developed a “Doosan Intelligent Hybrid Powertrain,” the company’s first mild hybrid powertrain that has an electric motor directly connected to the engine, and successfully started up a prototype in August 2019.

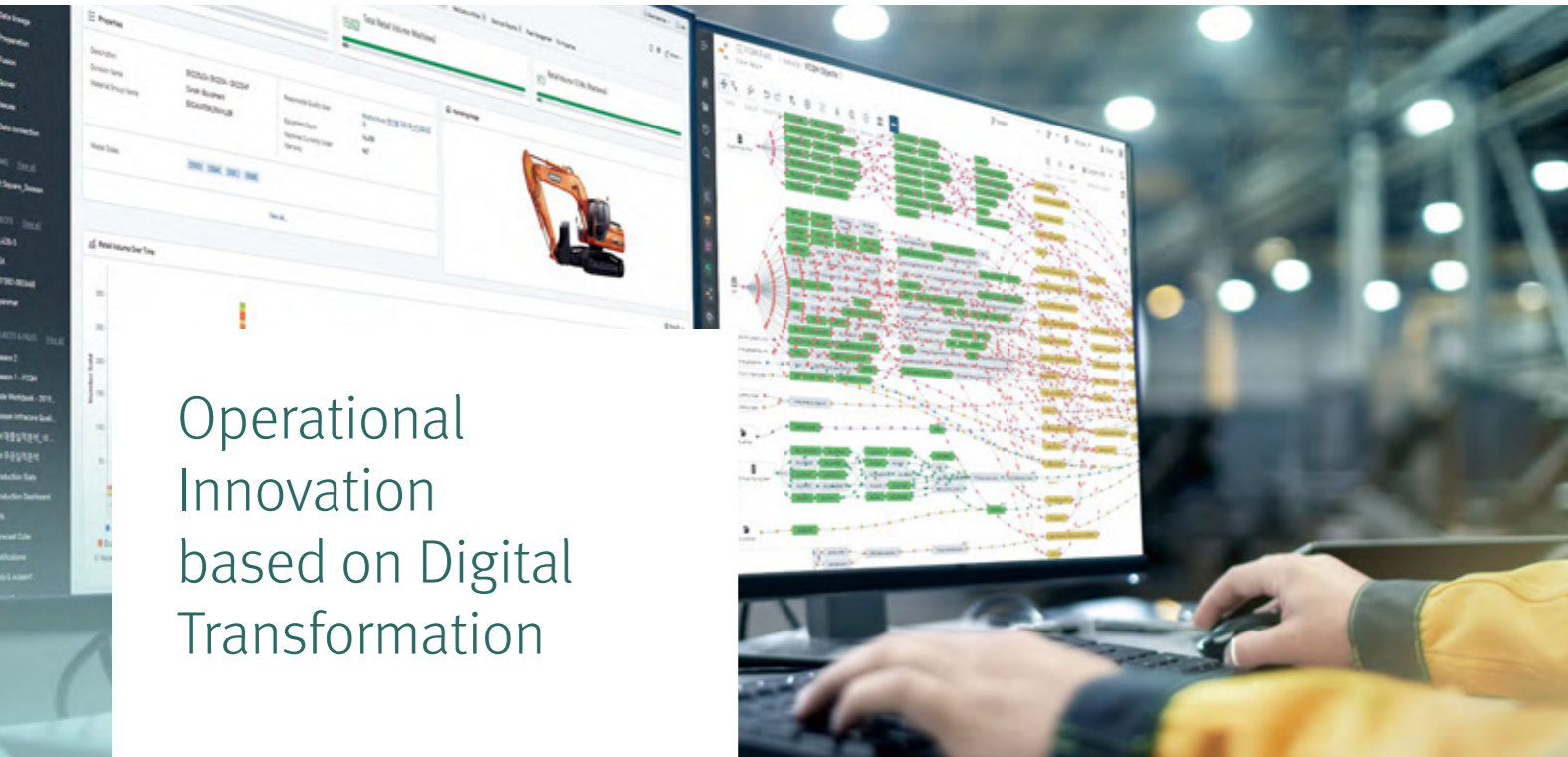
Doosan Intelligent Hybrid Powertrain is a technology that combines an electric motor, hybrid control unit (HCU), inverter and 48V battery pack with the G2 engine for higher performance and efficiency. The company’s first hybrid powertrain is a combination of a 2-liter 75-horsepower D24 engine and a 25-horsepower electric motor, which is equivalent to a 3-liter 100-horsepower engine. Unlike 2-liter engines, 3-liter engines are required to use a urea solution to

reduce air pollutant emissions. However, the D24 engine does not require such a solution. Going forward, Doosan Infracore will apply a hybrid powertrain technology for mid- to large-sized equipment that integrates the same eDrive module (eMotor, inverter, HCU, battery) to its D34 engine, in order to secure a 4-liter line-up. Combining a 25-horsepower electric motor with a 135-horsepower, D34 engine will evolve into a 160-horsepower powertrain. In addition, it enables engine downsizing for it does not need the selective catalyst reduction (SCR), a pollutant reducing device, while the use of an electric motor helps reduce fuel consumption and improve acceleration.

With the Doosan Intelligent Hybrid Powertrain as a start, Doosan Infracore will secure optimal engine and motor control technologies, and develop vehicles and equipment on which the mild hybrid powertrain can be installed, thereby improving the business value of the powertrain. In addition, through R&D of hybrid powertrains and electrification of mechanical parts, the company will grow into a total power solution provider offering not only first-rate engines but the latest in hybrid and electrification technology as well.

**Major Elements and Functions of the Doosan Intelligent Hybrid Powertrain**





# Operational Innovation based on Digital Transformation

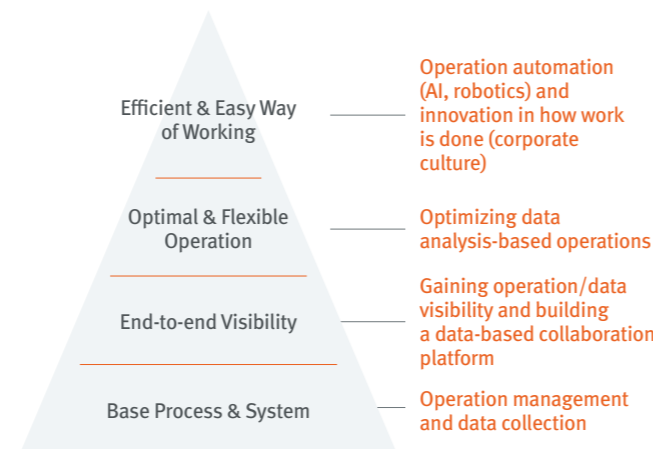
## 02

Digital technology is spreading rapidly through all industries, setting off innovation. Riding the wave of digital technology, companies are responding to external changes by moving forward with a digital transformation of their own centered on new value creation and operation efficiency enhancement through expansion of data collection, strengthening of data connection and analysis, and improving of data visibility. Having sought to improve operating efficiency through the adoption of diverse IT systems, Doosan Infracore is implementing a mid- to long-term digital transformation by strengthening collection and connection as well as increasing visibility of all data being generated throughout the whole value chain, from R&D, production, quality control, sales, post-sales and AM parts business to customer service. In particular, it aims to become a more efficient company through operational innovation, and thus is focusing on carrying out operation management and data collection (Base Process & System), gaining data visibility and building a data-based collaboration platform (End-to-end Visibility), optimizing data analysis-based operations (Optimal & Flexible Operation), and changing the work process (Efficient & Easy Way of Working) across all of its business.

Doosan Infracore recently developed the Global Manufacturing Execution System (GMES), a project launched in 2018, and applied it to the Incheon construction equipment plant in August 2019, in order to enhance production efficiency through establishment of an up-to-date operation system and data collection. GMES enables use of information related to the logistics flow and quality of production

materials on a single platform by integrating production and process plans and execution data. The system is an integrated solution applicable to all Doosan Infracore's worksites around the world, for it can integrate not only key functions of manufacturing and production but specialized functions of all plants as well. The establishment of GMES is significant that it has enabled diverse production innovations, such as gaining production visibility categorized by business and region, optimizing production scheduling, digitalizing work orders and inspections, developing the Real-time Location System (RTLS), efficient responses non-operation/error messages,

### Direction for Operational Innovation Based on Digital Transformation



obtaining facility visibility, and real-time process controls. Beginning with the 2019 GMES application to the Incheon construction equipment plant, Doosan Infracore plans to apply GMES to the G2 engine and Gunsan construction equipment plants in 2020, and to extend the application to mid- to large-sized engine plants and overseas worksites by 2021. Its goals are to maximize production operation efficiency using GMES, to enhance its manufacturing abilities to a global top-tier level by reducing production defects and slashing costs, raising quality and innovating customer service, and to build smart, intelligent factories.

In its efforts to expedite digital transformation, Doosan Infracore formed a strategic partnership in April 2019 with Palantir, a US-based unicorn start-up<sup>1)</sup> offering a big data platform for use in diverse fields, including government, finance and manufacturing, and providing support for corporate productivity and quality enhancement as well as risk management.

Together with Palantir, Doosan Infracore built "DI360," a data-based collaboration platform, in February 2020. The establishment of DI360 has enabled Doosan Infracore to obtain data visibility throughout the value chain and to strengthen inter-department communications, which resulted in increased management efficiencies. As a big data-based collaboration platform that organically connects and analyzes the data of numerous business systems, DI360 has significantly reduced inefficiencies in searching for and collecting data from each system by production, sales, quality, and other categories. For example, when an equipment model is searched through the DI360 search window, information on diverse subjects pops up, such as basic equipment, production volume, quality, major sales regions and dealers, and sales history by period. In addition, quick data-based decision-making can be done through creation and analysis of individual analysis reports on specific data. Doosan Infracore plans to add new fields, such as R&D and AM, into the DI360 in addition to supply chain management (SCM) and field claim & quality management (FCQM), which are currently in operation, while also expanding the scope of its usage to include overseas subsidiaries and the engine business by 2024. On the strengths of the DI360 platform, complex data integration and management have become easier, making employees have more time to focus on high value-adding work. It also gave rise to expectations that a data-based work culture will take root and generate greater additional value across the value chain.

Doosan Infracore is implementing diverse operational innovations in the areas of logistics, parts supply, field claim and SCM with the goal of achieving operational efficiency and optimization based on data analysis. To this end, the company has been focusing on corporate-wide logistics innovation since 2019, with the goal of securing overall visibility and optimizing logistics operations from suppliers to dealers. Corporate-wide logistics innovation and improvement tasks include: 1) obtaining logistics visibility, such as material procurement

### Effects of DI360

<b>Data integration</b> Integrated data management within a single platform	<b>Data management</b> Data-based decision-making system built through cross-board application of uniform standards and the gaining of integrated data visibility	<b>Data analysis</b> Improved work efficiency thanks to the construction of a platform enabling large data search and analysis	<b>Collaboration</b> Data analysis knowledge and know-how systemized to be shared by all users

and product shipment, by developing sea and land cargo tracking systems; 2) devising ways of optimizing logistics infrastructure to evolving purchase strategies, production of new models, and mid- to long-term changes in production lines; 3) building an integrated procurement and transport system to lessen internal congestion and achieve on-time delivery, and reducing logistics costs; 4) improving work productivity by adopting a digital technology-based picking method and enhancing logistics quality by preventing input error-base non-operation. In accordance with these tasks, Doosan Infracore has established a master plan and is implementing it by phase.

For operation automation and innovation in how work is done, in 2019 Doosan Infracore applied a trial basis robotics process automation (RPA), a technology for automating repetitive and standardized procedures, to 12 business processes, such as application for certificates of origin, supply list handling, and vendor account registration. The pilot operation of RPA is expected to reduce work hours involving the 12 processes by up to 10,060 hours a year, which will not only translate into a substantial increase in employee efficiency but also improve employees' work-life balance. The company will build a digital work environment that is converged with diverse digital technologies, such as RPA and AI Chatbot, in order to further increase work productivity and the flexibility of employment conditions, ease the increased workload caused by time constrictions, and pursue other work innovation. In addition, Doosan Infracore adopted "Office 365," a public cloud-based work platform, in 2018 to improve office productivity and support employee communication collaborations. The adoption has contributed to changing the way of internal and external collaboration, adopting the 52-hour workweek system, and facilitating remote working and telecommuting that are proven crucial to its ability to conduct business undisturbed through the COVID-19 pandemic in 2020.

Going forward, Doosan Infracore will transform into an innovative company that applies digital technology across the whole value chain, thereby creating new value for stakeholders and markets and seizing business opportunities, based on its mid- to long-term business plan.

<sup>1)</sup> Unicorn start-up: A start-up assessed to have the corporate value of at least USD 1 billion



Doosan Infracore fulfills our corporate social responsibility (CSR) so as to ensure the sustainable development of the company and local communities. CSR is an integral part of our management activities for sustainable growth. Therefore, we are moving towards achieving the goal of “Global CSR Leading Company” based on our CSR system, consistent strategy, and the commitment of all employees.



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# CSR Management System

## CSR Promotion System

Doosan Infracore conducts its corporate social responsibility (CSR) activities, in cooperation with its business sites around the world, led by the CSR Part and CSR Committee at its headquarters in Korea. The CSR Part, as a coordinator responsible for promoting the company's overall CSR initiatives, is in charge of establishing CSR strategies, identifying stakeholder issues and needs, diagnosing CSR levels at domestic and overseas business sites, identifying strategic CSR tasks, monitoring CSR activities, and responding to external evaluations.

The CSR Committee is the top decision-making body, not only leading the company's sustainable growth and socially responsible activities, but also having responsibilities to find out risks and opportunities in line with ongoing changes in CSR issues, make decisions about CSR strategies and policies, identify CSR tasks and review progress. Doosan Infracore runs one CSR Committee at the company headquarters in Korea and another in China. The headquarters' CSR Committee, under the direct control of the CEO, comprises five subcommittees – Human Rights and Labor Practices, Environment, Fair Operations, Customer Values and Local Communities subcommittees – and is held three times per year. Led by BG (Business Group) heads and division heads, the subcommittees are flexibly organized and operated according to strategic CSR tasks, thereby improving efficiency in decision-making and administrative processes. Once the CSR Committee makes decisions about major issues, including identification, operation and process of CSR strategic tasks, the CSR Working Group, draws up and implements specific action plans. Established in 2017, the CSR Committee in China is led by the regional director, who serves as its chairperson, with the sector leaders serving as heads of its five subcommittees. The committee is held three times per year to discuss CSR tasks, process review and approval, and performance management, among other matters.

## CSR Organization



<sup>1)</sup> HRM: Human Resource Management, <sup>2)</sup> HRD: Human Resource Development, <sup>3)</sup> EHS: Environment, Health & Safety

## CSR Strategies and Strategic Tasks

Doosan Group is striving to internalize CSR in its corporate management, meet its stakeholders' requirements, and grow into a Global CSR Leading Company. Annually, Doosan Infracore integrates the outcomes of the materiality test and external ESG evaluation and company-wide CSR diagnosis to derive and identify our CSR strategic tasks.

In 2019, the company upgrades its existing CSR strategic tasks while also identifying a series of new tasks, including the establishment of a sustainable value framework and indicators; the demonstration of Concept-X and the development of a new business model; and the development of prerequisite technologies for hybrid powertrain. With the CSR Committee taking the lead, all relevant departments of the company worked in unison to execute the tasks. At the first CSR Committee held in 2020, eight tasks were selected as the strategic CSR tasks for 2020: focusing on decarbonization and developing alternative fuel products, improving preventive quality and strengthening global governance, helping leading suppliers bolster their competitiveness by building smart factories, and setting CSR directions and increasing employee awareness.

Doosan Infracore has developed a sustainable value framework composed of 14 indicators based on its sustainability issues, social value, corporate competitiveness and strategic tasks, to link the company's mid- to long-term strategies with its CSR directions, and then set targets and management plans for each index by 2025. The company will continue to establish the direction and manage its performance based on the sustainable value framework with the goal of achieving sustainable growth. The details of Doosan Infracore sustainable value framework are provided on pages 18-19.

## Doosan Group CSR Value Structure



<sup>1)</sup> Based on the announcement of the World Economic Forum (Davos Forum)

## CSR Strategic Tasks by Year

	2018	2019	2020
<b>CSR Governance</b>	<ul style="list-style-type: none"> <li>Provide support to disclose CSR information of overseas worksites</li> </ul>	<ul style="list-style-type: none"> <li>Establish a Sustainable Value Framework and identify indicators</li> </ul>	<ul style="list-style-type: none"> <li>Set CSR directions and increase employee awareness</li> </ul>
<b>Human Rights/ Labor</b>	<ul style="list-style-type: none"> <li>Build a management system and strengthen monitoring system to enhance the human rights mindset: Develop a due diligence tool for the monitoring of human rights risks</li> </ul>	<ul style="list-style-type: none"> <li>Establish management system and strengthen a monitoring system to promote human rights: Conduct advanced human rights education for relevant departments and provide human rights consultation for each organization</li> </ul>	<ul style="list-style-type: none"> <li>Establish management system and strengthen a monitoring system to promote human rights: Strengthen human rights management system</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>Establish a GHG emissions reduction target and an action plan</li> </ul>	<ul style="list-style-type: none"> <li>Reduce GHG emissions</li> </ul>	<ul style="list-style-type: none"> <li>Establish a mid- to long-term roadmap for the reduction of GHG emissions</li> </ul>
<b>Fair Operations</b>	<ul style="list-style-type: none"> <li>Strengthen CSR management system of supply chain: Define core suppliers and identify suppliers with high CSR risks, and establish a management process</li> </ul>	<ul style="list-style-type: none"> <li>Strengthen CSR management system of supply chain: Identify suppliers with high CSR risks, and support improvement activities</li> </ul>	<ul style="list-style-type: none"> <li>Help leading suppliers bolster their competitiveness by building smart factories</li> </ul>
<b>Customer Value</b>	<ul style="list-style-type: none"> <li>Respond to REACH/RoHS 2 and set up an operation system</li> <li>One task relating to next-generation emission control regulations</li> <li>One task relating to develop new technologies to secure future competitiveness</li> <li>One task relating to improve the quality of products and services</li> </ul>	<ul style="list-style-type: none"> <li>Expand service solutions: Diversify service products, customize local services, and increase the number of countries where the services are available</li> <li>Innovation: Demonstrate the Concept-X and develop a new business model</li> <li>Create prerequisite technologies for hybrid powertrain</li> <li>Manage the pre-qualification of new products: Enhance quality management ahead of the mass-production of new products that meet EU Stage V and China's Stage IV emissions standards</li> </ul>	<ul style="list-style-type: none"> <li>Focus on decarbonization and develop alternative fuel products</li> <li>Develop Unmanned automation technology</li> <li>Develop the 48V mild hybrid powertrain</li> <li>Improve preventive quality and strengthen global governance</li> </ul>

# Stakeholder Engagement

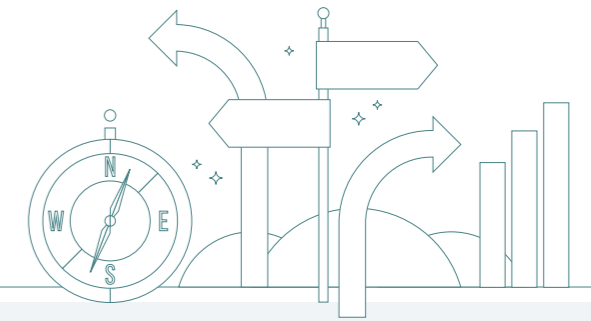
## Definition of Stakeholders

Doosan Infracore discloses our key management issues, performance results and future directions through our integrated reports, disclosure materials, websites, annual general meeting (AGM) and BOD meetings, while continuing to collect and listen to stakeholder opinions through a wide range of communication channels. For more systematic stakeholder engagement and communication, Doosan Infracore defines our major stakeholders, identifies and addresses their interests and issues, and discloses our activities and outcomes through various communication channels.

### Communication Channels and Responses for Stakeholders

	Communication Channels	Major Issues	Responses
Shareholders/ Investors	<ul style="list-style-type: none"> <li>Annual general meeting (AGM)</li> <li>Disclosure materials</li> <li>Investor relations (IR) information on the company website</li> <li>Conferences</li> <li>IR meetings</li> </ul>	<ul style="list-style-type: none"> <li>Profitability and a dividend policy</li> <li>Strengthen disclosures</li> <li>Sound corporate governance</li> <li>Business opportunity and risk management</li> </ul>	<ul style="list-style-type: none"> <li>Share the company's mid- to long-term business directions</li> <li>Make earnings announcements and provide IR materials</li> <li>Hold analyst meetings</li> </ul>
Customers	<ul style="list-style-type: none"> <li>Field surveys</li> <li>Voice of Customers (VOCs)</li> <li>Call centers</li> <li>Joint workshops</li> <li>Integrated customer management systems</li> </ul>	<ul style="list-style-type: none"> <li>Prompt customer complaint handling and feedback</li> <li>Make improvement to product quality, performance, safety, and convenience</li> <li>Strict customer data privacy policy</li> <li>R&amp;D investment and the improvement of technological capabilities</li> <li>Differentiated customer service</li> <li>Develop eco-friendly, high efficiency products</li> </ul>	<ul style="list-style-type: none"> <li>Product presentation through exhibitions and dealer meetings</li> <li>Tasks aiming for eco-friendly products</li> <li>Incorporate VOCs into products through the New Product Development (NPD) process</li> <li>Enhance customer accessibility by providing dealers with online information and strengthening dealer management system</li> <li>Increase customer satisfaction through the Happy Call and dealer service training</li> </ul>
Employees	<ul style="list-style-type: none"> <li>Labor-Management Council</li> <li>Grievance handling system</li> <li>Intranet</li> <li>Doosan Credo surveys</li> <li>Dialogue with the executives</li> </ul>	<ul style="list-style-type: none"> <li>Fair evaluation and compensation</li> <li>Education and competence development</li> <li>Work-life balance</li> <li>Positive labor relations</li> <li>Active communication within the company</li> </ul>	<ul style="list-style-type: none"> <li>Implement the Doosan Credo</li> <li>Human resources development based on the Functional Competency (FC) system</li> <li>Operate the Women's Council</li> <li>Publish a human rights risk prevention manual and provide education on human rights</li> </ul>
Suppliers	<ul style="list-style-type: none"> <li>Supplier Council</li> <li>Supplier education</li> <li>Consulting, technical support for suppliers</li> </ul>	<ul style="list-style-type: none"> <li>Share more information with suppliers</li> <li>Expand support to improve suppliers' capabilities through financial, technology, education, environment, and ethical management support</li> <li>Strengthen fair trade</li> </ul>	<ul style="list-style-type: none"> <li>Foster Leading Suppliers</li> <li>Financial support for suppliers</li> <li>Operate the Shared Growth Hotline</li> <li>Share CSR guidelines with suppliers</li> </ul>
Local Communities (the environment, NGOs, etc.)	<ul style="list-style-type: none"> <li>Meetings with residents</li> <li>Workshops for working-level staff in charge of corporate community involvement (CCI)</li> <li>Sisterhood relationship with island regions</li> </ul>	<ul style="list-style-type: none"> <li>Eco-friendly products and production processes</li> <li>Improve worksite and surrounding environments, and prevent pollution</li> <li>Establish environmental management system</li> <li>Communicate with local communities</li> <li>Facilitate economic development of local communities</li> </ul>	<ul style="list-style-type: none"> <li>Operate Dream School</li> <li>The Doosan Day of Community Service</li> <li>Conduct CCI activities for local communities</li> </ul>
Central/Local Governments	<ul style="list-style-type: none"> <li>Participate in national projects</li> <li>Operate joint programs</li> </ul>	<ul style="list-style-type: none"> <li>Comply with laws and regulations</li> <li>Public-private partnership</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory monitoring and internal compliance</li> <li>Suggest improvement measures through participation in related organizations' activities</li> <li>Participate in the government's public policy projects</li> </ul>
Media	<ul style="list-style-type: none"> <li>Press releases</li> <li>Press conferences</li> <li>Regular meetings</li> <li>Business site visits (field trips)</li> </ul>	<ul style="list-style-type: none"> <li>Prompt and accurate information sharing</li> </ul>	<ul style="list-style-type: none"> <li>Issue press releases in a timely manner</li> <li>Press reporters' news coverage</li> <li>Find feature items and provide them to the media</li> </ul>

# Governance



## OUR APPROACH

Doosan Infracore strives to enhance transparency in its decision-making process and protect the rights of shareholders and various other stakeholders. To this end, the company has developed an independent governance structure under the principle of checks and balance.

Doosan Infracore has built a healthy and transparent governance structure by ensuring the independence and expertise of its Board of Directors (BOD), centered on independent outside directors, and by establishing an internal decision-making system led by the committees within the BOD. We transparently disclose a variety of information related to corporate governance, including the composition of the BOD and the Board's major resolutions, through our website and a series of corporate reports.

## SUSTAINABLE VALUE FRAMEWORK

### Progress | Governance transparency

Doosan Infracore maintains our BOD composition above legal standards and is active in the Board operations, to build a foundation for a healthy and transparent governance structure and to increase our corporate value as well as shareholder value. To this end, the company is managing the number of outside directors in composing its BOD and their attendance at the Board meeting.

Percentage of outside directors (Unit: %)

57.1	57.1	N/A
2018	2019	Goal for 2025

BOD meeting attendance rate of outside directors (Unit: %)

85.7	92.9	N/A
2018	2019	Goal for 2025

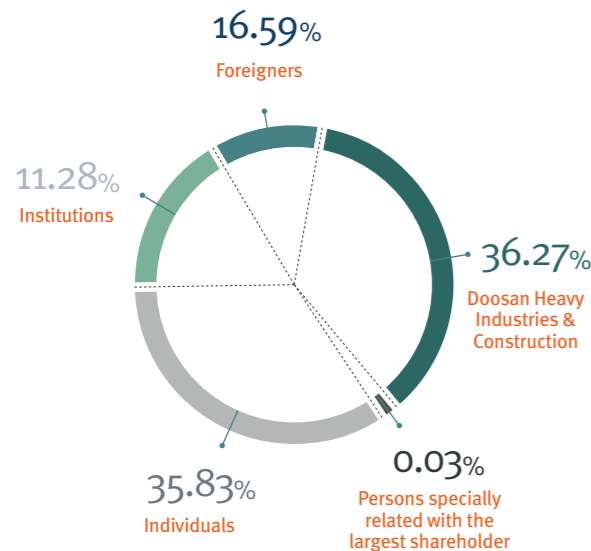
# Corporate Governance

## Composition of Shareholders and Equity

Doosan Infracore is one of major affiliates of Doosan Group, with 35 consolidated subsidiaries (based on business reports) being operated across the globe. As of the end of 2019, the number of shares issued stood at 208,161,279, of which the largest shareholder, Doosan Heavy Industries & Construction, owned a 36.27% stake.

### Ownership Structure

(As of December 31, 2019; Based on number of shares issued)



### Shareholders with 5% or More Shares

(As of December 31, 2019)

Shareholder	Ownership (%)
Doosan Heavy Industries & Construction	36.27
National Pension Service	6.21
BlackRock Fund Advisors	5.00

## Shareholder and Investor Communication

**Communication Channels** Doosan Infracore actively seeks out the expectations and demands of its shareholders, investors, customers, and other stakeholders when making key decisions. The company strives to attract investments in the global market by earning recognition for its genuine values in terms of growth potential and technological prowess. Therefore we establish an investor-friendly investor relations (IR) strategy and carry out shareholder-friendly communication. In addition, the company holds company briefings and securities investment conferences, and also invites institutional investors to its worksites to offer them diverse and reliable information.

**Protection of Minority Shareholders** Doosan Infracore has adopted and operates a paper ballot, an electronic voting system, and an electronic proxy solicitation system to protect the voting rights of its minority shareholders. When sending out notices of its annual general meeting (AGM), the company encloses paper ballots so that shareholders can exercise their voting rights if absent. Their votes are valid under the condition that they arrive at the company one day prior to the date of an AGM.

## Disclosure of Corporate Information

Doosan Infracore complies with all applicable legal disclosure requirements. The company also strives to disclose information in a balanced manner, concerning its financial and non-financial activities, through the voluntary disclosure of the company's compliance program (CP) status and CSR activities.

Status of Disclosure Activities	
<ul style="list-style-type: none"> <li><b>Financial</b></li> </ul>	Disclosure of provisional statistics on sales performance; Quarterly and biannual reports and statements of affairs; Disclosures relevant to AGM and special shareholder meetings; Disclosure of changes in the shareholding structure; and Disclosure on the Online Provision of Enterprises Information (OPNI) system operated by the Korea Fair Trade Commission, etc.
<ul style="list-style-type: none"> <li><b>Non-financial</b></li> </ul>	Status of CP operations; Disclosure of CSR activities including integrated reports; and Disclosure of information through company presentations, etc.

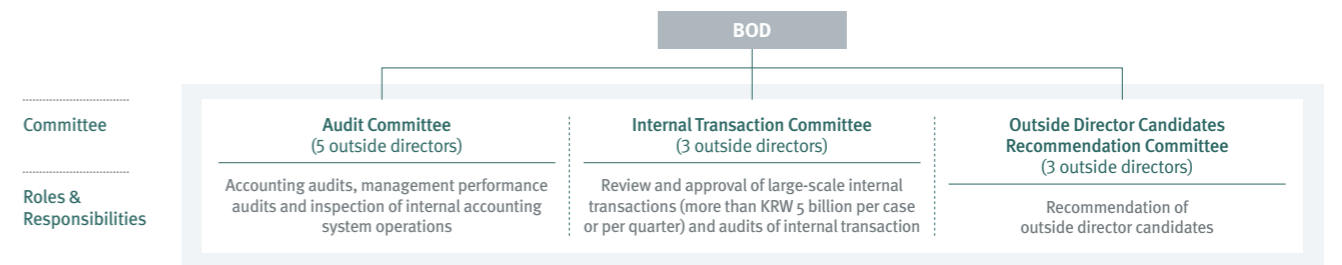
## Operation of an Independent BOD

**Composition and Operations of the BOD** The Board of Directors, as the company's highest decision-making body, has been delegated the right to make decisions related to corporate management from shareholders in accordance with the relevant laws and the company's Articles of Incorporation. It is also in charge of checks and balances for the company's transparent management through its independent decision-making practices regarding the company's long-term growth and major management issues. The BOD of Doosan Infracore is composed of three internal and five outside directors who were transparently appointed through an AGM held in March 24, 2020. (three internal and four outside directors before March 24, 2020) The Outside Director Candidates Recommendation Committee recommends outside director candidates who are suitable for establishing a transparent governance structure and enhancing the

BOD's expertise. Outside directors are appointed in consideration of their ownership of the company's shares, potential conflicts of interest, careers with the company's competitors, diversity and stakeholder representativeness. As of the end of December 2019, the average tenure of the Board members is 3.46 years.

There are three committees under the BOD which are entirely composed of outside directors – the Audit Committee, which is responsible for guaranteeing the transparency and independence of audit procedures; the Internal Transaction Committee, which is designed to improve the transparency of corporate management through the establishment of CP; and the Outside Director Candidates Recommendation Committee, which has the authority to recommend outside directors.

### Intra-organizational Decision-making System



### Composition of BOD

(As of March 24, 2020)

Position	Name	Expertise	Roles	Major career	Date of appointment	Reappointment
<b>Internal Director</b>	Park, Yong Maan	Management, policy	Chairman of the BOD Overseeing the general management of the company	Chairman of the BOD of Doosan Infracore, Chairman of the Korea Chamber of Commerce and Industry (Current) Chairman of Doosan Group (Former)	Mar. 27, 2019 (Initial appointment: 2016)	1
<b>Internal Directors (CEO)</b>	Sohn, Dong Youn	Technology, industry	Overseeing the general management of the company	President and CEO of Doosan Infracore (Current) Head of the Technology Division, Doosan Infracore (Former)	Mar. 28, 2018 (Initial appointment: 2015)	1
	Go, Seok Bum	Finance, accounting	Overseeing the financial affairs of the company	CFO of Doosan Infracore (Current) Treasurer of Doosan Infracore (Former)	Mar. 28, 2018	-
<b>Outside Directors</b>	Han, Seung Soo	Policy, economy	Chair of the Outside Director Candidates Recommendation Committee, Member of the Audit Committee	Chairman of the Yuhan Foundation (Current) Prime Minister (Former)	Mar. 28, 2018 (Initial appointment: 2015)	1
	Yoon, Jeung Hyun	Finance, policy	Chair of the Audit Committee, Member of the Internal Transaction Committee, Member of the Outside Director Candidates Recommendation Committee	Director of the Yoon Economic Research Institute (Current) 2nd Minister of Strategy and Finance (Former)	Mar. 28, 2018 (Initial appointment: 2015)	1
	Yoon, Sung Soo	Finance, accounting	Member of the Audit Committee, Member of the Internal Transaction Committee	Professor of Korea University Business School (Current) Assistant Professor of Graduate School of Business, UCLA (Former)	Mar. 28, 2018	-
	Lim, Sung Kyoon	Economy, tax	Member of the Audit Committee, Member of the Outside Director Candidates Recommendation	Chairman of Dasol Tax Accounting Corp. (Current) Director of Gwangju Regional Tax Office (Former)	Mar. 24, 2020	-
	Lee, Deuk Hong	Law, policy	Member of the Audit Committee, Member of the Internal Transaction Committee	Representative Lawyer of Law Firm Dambak (Current) Chief Prosecutor of the Seoul High Prosecutors' Office (Former)	Mar. 24, 2020	-

\* The tenure of a director is by the end of AGM for the third fiscal year after his/her appointment.

\* Outside Director Jung Byung Moon was resigned on March 24, 2020 upon the expiration of a term; and Lim Sung Kyoon and Lee Deuk Hong were newly appointed as outside directors on March 24, 2020.

\* As of March 24, 2020, the BOD of Doosan Infracore is composed of three internal and five outside directors.

**BOD Activities in 2019** All directors are allowed to participate remotely in the BOD meetings via telecommunication devices capable of transmitting audio and video data. Directors shall not delegate their authority to a proxy. Directors with a vested interest in a particular agenda item are prohibited from voting on it so as to maintain transparency in the decision-making process. In 2019, the BOD held eight meetings during which deliberations and resolutions were made on a total of 27 agenda items, including the company’s business performance, an inspection of internal accounting system operations, and the operation of CP and plans for 2019, and donation approvals. The average attendance rate of the directors in 2019 was 92.9%.

**BOD Evaluation and Remuneration** The remuneration of internal and outside directors is determined within the limits approved by the AGM. The internal directors are paid according to a performance-based compensation system that links their compensation to their management performance. Directors receive performance

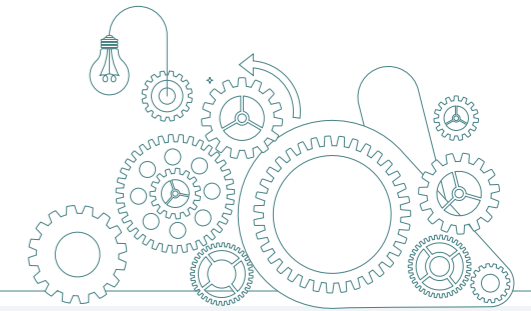
bonus based on the management performance of their respective organization and their basic annual salaries are determined by their job position. The outside directors’ performance evaluation is based on their attendance at the BOD and committee meetings, industry expertise, level of contribution and performance at the Board meetings. To ensure their independence from the management and controlling shareholders, members of the Audit Committee receive remuneration only as directors and are prohibited from receiving any other types of compensation.

The total amount of approved pay for directors and auditors in 2019 was KRW 15 billion, of which KRW 6,175 million was actually paid, with the average compensation per person standing at KRW 882 million. The actual payment amount was calculated based on the pay for three registered directors and four members of the Audit Committee who were paid from January to December 2019.

**Board Meetings Held in 2019**

Order	Date	Agenda items	Approval	Number of attendees	
				Internal directors (3 in total)	Outside directors (4 in total)
1	Feb. 12	Report on the operation status of the internal accounting system in 2018	-		
		Report on the CP operation performance in 2018 and operation plan for 2019	-		
		Report on the 2018 business performance	-	1	3
		Approval of 2018 financial statements and business report	Passed		
		Approval of 2019 management plan	Passed		
2	Mar. 08	Report on the inspection of internal accounting system operations in 2018	-		
		Report on the 2018 audit	-		
		Approval of convening of the 19th AGM and purpose of the meeting	Passed	3	4
3	Mar. 27	Matters on adopting the electronic voting system	Passed		
		Matters on the appointment of the chairman of the BOD and the convening authority holder	Passed		
		Matters on the appointment of compliance officer and a self-compliance manager for fair trade	Passed		
		Matters on the partial amendment of the operating regulations of the Audit Committee	Passed	3	4
4	Apr. 15	Matters on the partial amendment of internal accounting management regulations	Passed		
		Approval of the signing of a contract for the transfer of shares of DVC Co., Ltd. and the provision of DVC shares as collateral	Passed	3	4
5	Apr. 24	Approval of the establishment of a new subsidiary in the U.S.	Passed		
		Report on the business performance for the first quarter of 2019	-	3	4
6	Jul. 22	Approval of transaction with the affiliate	Passed		
		Report on the business performance for the first half of 2019	-		
		Approval of the establishment of a new overseas subsidiary	Passed	3	4
7	Oct. 30	Approval of delegating the debenture issue to the CEO	Passed		
		Report on the business performance for the third quarter of 2019	-		
		Matters on the issuance of foreign guarantee bonds	Passed	3	4
		Matters on the GDR delisting	Passed		
8	Dec. 10	Matters on delegating the debenture issue to the CEO	Passed		
		Approval of self-dealing transaction with Doosan Heavy Industries & Construction	Passed		
		Approval of self-dealing transaction with Doosan Engineering & Construction	Passed	2	4
		Approval of donations for 2020	Passed		

# Integrity & Risk Management



**OUR APPROACH**

Doosan Infracore has set the Code of Conduct for all our employees to follow so that we can enhance our corporate competitiveness and fulfill our corporate social responsibilities through “Inhwa,” meaning harmony between people, a customer-centric management philosophy, transparency, and innovation.

Doosan Infracore practices transparency in its management through various and immediate disclosure of company information to its stakeholders. It goes beyond simple compliance to implement truly ethical management as the basis for all decisions taken within the organization. A strict system of internal controls enables the company to run the business transparently, while it secures the safety of management environment through preemptive risk management.

## Ethical Management

**Ethical Management Policies**

All employees at Doosan Infracore are required to adhere to the Code of Conduct, and third parties such as suppliers are strongly recommended to comply with the guide of principles. Doosan Infracore’s employees are responsible for ensuring that they have a full understanding of all related laws and internal regulations, including the Code of Conduct. It has also connected the company-wide operation system with the ERP, e-procurement, evaluation of internal control, and fair trade compliance systems to improve the transparency and efficiency of its business activities. The Audit Team is in charge of auditing ethical management of the company, while the Internal Control Team develops the internal control system and evaluates its operations.

**Completion rate of ethical management training in 2019**



**Communicating and Promoting Ethical Management**

We disclose the Code of Conduct on our website and operate a cyber reporting center that can be accessed easily by our internal and external stakeholders. To prevent recurrence of Code of Conduct violations, the company clearly identifies the process and cause of issues that arise during the work process, and shares a white paper. Moreover, to maintain a transparent ethical management system, Doosan Infracore urges new employees to sign a written oath pledging their compliance with the Code of Conduct. We also require new suppliers to submit a written oath pledging not to engage in unethical business practices. The company requires each of team leaders, part leaders, and higher level managers, as well as its executives to write and submit a statement of interests form on an annual basis, with an aim to remind them of the strict compliance standards. In 2019, all respondents required to submit the statement complied with the obligation. In addition, to encourage our suppliers to practice ethical management, the CEO sends a letter, while the company conducts ethical education for them at general supplier meetings.

Training on the Code of Conduct is designed to raise employees’ awareness of ethical business practices and control the ethical risks involved in their business transactions in advance. Doosan Infracore provides the training to all employees, and notifies them of major ethical management issues by posting the details on the bulletin board of each business site. The company expanded the scope of its online training to include managers of its Chinese subsidiary in 2017 in addition to managers at its domestic business sites, and has been continuing to do so.

**Establishment of Fair Trade Practices**

Doosan Infracore adopted the Compliance Program (CP) in 2002 to ensure transparent business operations and fair competition. To build a culture of fair trade and horizontal transactions meeting global standards, the company discloses the CEO’s declaration on compliance and four major pledges<sup>1)</sup> the website.

The company has upgraded “Sanctions Process for Employee Violations of Fair Trade Laws and Regulations” by revising the regulations concerning the fair trade compliance program. We have also developed STDM (Subcontracting partners Technical Data request Management System), an integrated data management system protecting suppliers’ technical data, meeting legal requirements about subcontract (requests for technical data, data management system, etc.) and improving user convenience. STDM is an integrated system which enables one-stop processing, from the preparation of technical data requests by suppliers to internal approvals and the handling of technical data. With STDM, Doosan Infracore has been able to prevent the occurrence of any problems related to subcontracting caused by unpublished or incomplete issuance. In addition, the company continuously monitors the compliance with subcontracting laws in areas such as the imposition of price cuts and cancellations, and also ensures the compliance with work processes related to technical data. Moreover, it regularly undertakes employee training on subcontracting law to prevent violations of laws and regulations related to fair trade, and deal with any violations promptly. In 2019, the company operated seven training courses, including the basics of subcontracting (in the first half), obligations concerning the cancellation of subcontracting orders and the inspection (5 times), and basic R&D subcontracting (in the second half). It also offered company-wide training on purchasing, quality, and materials.

**Compliance with the Anti-graft Law**

In Korea, the “Improper Solicitation and Graft Act,” also known as the anti-graft law, went into effect on September 28, 2016. Intended to prevent public officials’ corruption, the Act applies to employees and their spouses of all public institutions, including constitutional agencies, central administrative agencies, and local governments, schools, and media outlets. The Act forbids improper solicitations to public officials and other relevant persons, and prohibits them from accepting financial or other advantages. Doosan Infracore has been carrying out various activities to raise awareness among employees, such as providing education on the prohibition of solicitation to all its employees in Korea and expatriate employees in China. The company also has a relevant organization in place to conduct regular monitoring and offer necessary legal advice.

Doosan Infracore prevents fair trade laws and relevant regulations by setting fair trading orders based on building prior business consultations and post business diagnosis systems, providing consistent education programs, etc. As a full participant of a free and fair market, also, we keep fostering a corporate culture of compliance.

# Internal Controls

**Audit and Monitoring**

In line with the increased scope of the company’s management and responsibility with the expansion of its overseas business and the adoption of the International Financial Reporting Standards (IFRS), Doosan Infracore has been operating an independent audit team in China for audit and monitoring since 2012. The Audit Team at its headquarters in Korea is working to increase overseas subsidiaries’ accounting and management transparency based on respect for subsidiaries’ responsible business management.

**Internal Controls Evaluation System**

Doosan Infracore established the Doosan Internal Control Assessment System (DICAS), an internal controls evaluation system, in 2006 and since then it has been carrying out regular evaluations for the entire business areas, ranging from finance to sales, purchasing, and production. The results of the evaluations are reported to the Audit Committee and the BOD, as well as at the annual general meeting (AGM), following the reports to CFO and CEO under the “Act on the External Auditing of Corporations.” In 2014, the company began applying the same internal controls evaluation system to the subsidiaries in China.

**Corruption Risk Assessment**

Korean companies are required to design and operate internal controls based on an internal accounting management system, under the Act on External Audit of Stock Companies. Corruption risk assessment is an internal control system through which a company identifies potential corruption risks and manages the changes required in response to actual risks. Doosan Infracore conducts corruption risk assessments on 31 items, including unfair financial reporting, asset misappropriation, and corruption. We reflect the results of these assessments in our internal accounting management system, and in the implementation of annual internal audit plan, thereby managing related risks.

**Internal and External Reporting Systems**

Doosan Infracore has a number of internal and external reporting channels which enable the reporting of any unethical acts or behavior, including the receipt of money and bribes, involvement in unfair business practices, corruption, and any violations of related laws and internal regulations such as the Doosan Credo and the Code of Conduct. These channels include the website, the Cyber Reporting Center<sup>2)</sup>, postal mail, telephone, fax, and in-person visits. The Cyber Reporting Center is available in Korean, English, and Chinese languages, and the company employees or any external stakeholder can file a report under their real name, or anonymously. The company guarantees the confidentiality of the identity of the person making the report and

<sup>1)</sup> Responsible contracts for win-win cooperation between large companies and SMEs, fair selection and management of suppliers, establishment and operation of the Internal Review Council, and desirable paperwork and its retention in subcontracting transactions  
<sup>2)</sup> Doosan Cyber Reporting Center: ethicsshelpine.doosan.com

its contents, and it also prohibits any measures being taken against the person making a report in good faith. Matters being reported are processed rapidly, and the whistleblower is notified of the results and the measures to be taken, with these measures also shared within the company to improve awareness of the importance of ethics.

**Information Security**

With the rapid development of information and communication, the importance of information security is increasing substantially as security threats related to personal and corporate information rise exponentially. Doosan Infracore has responded to potential issues around information security and cyber terrorism by strengthening its IT security systems, identifying potential risk factors, and increasing employee awareness of the risks and appropriate responses.

Doosan Infracore operates an integrated and advanced IT system to strengthen our information security, with the Doosan Group Data Center obtaining Information Security Management System (ISMS) certification every year since first being certified in 2013. The company also conducts business continuity planning (BCP) drills so that it can be prepared to respond to any attacks on the business promptly and effectively. In addition, the company’s Information Security Part conducts regular in-depth risk assessments on the information protection management systems to identify vulnerabilities and make improvements. Doosan Infracore is also subject to annual security checks by governmental organizations, including the Ministry of Trade, Industry and Energy, as a major company that holds technologies which are core to the Korean economy.

In 2015, the company fully upgraded the information security policy, that had been originally established in 2013, by dividing it into general security regulations and detailed guidelines covering personnel security, protecting trade secrets, security management for

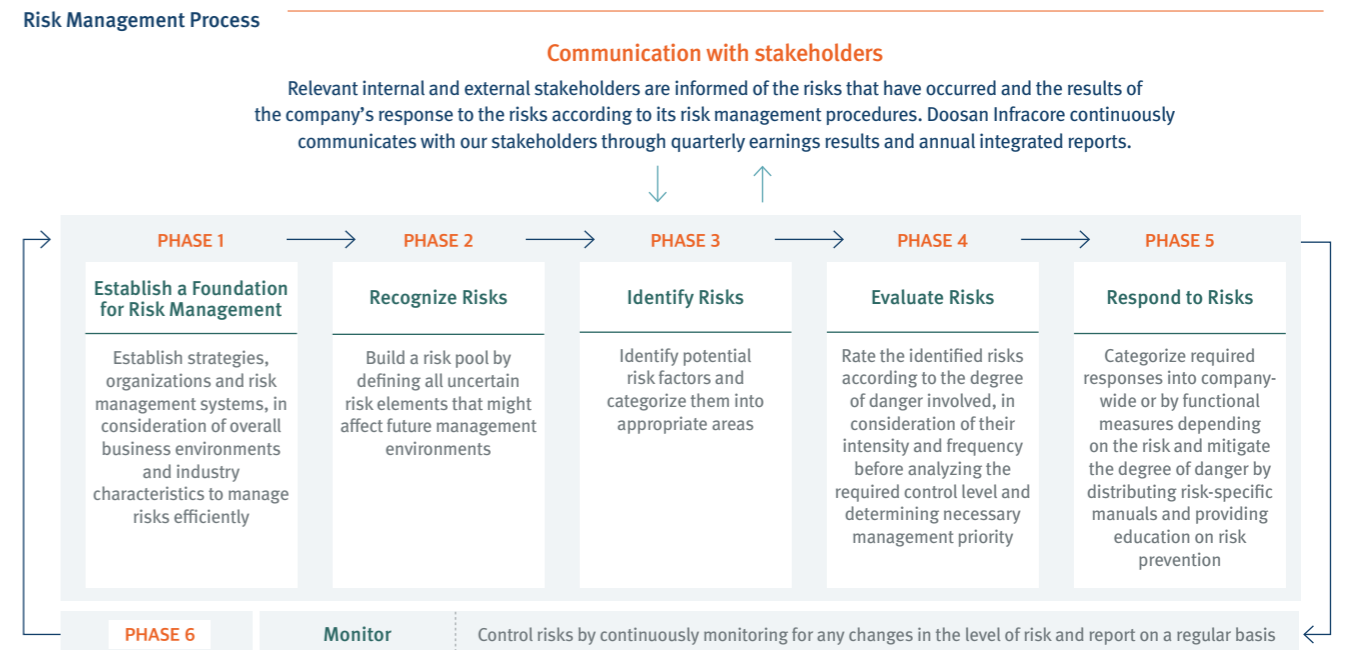
information assets and devices, information system security, facility security, audit security, security incident response, and cloud security. It shares all its information security policies on the company portal. All employees must also attend annual information security training, which covers email security, the prevention of leaks of information after retirement or changing jobs, managing trade secrets, managing PCs, and personal information management.

Doosan Infracore has appointed a Chief Information Security Officer (CISO) to define the roles and responsibilities of the key personnel within the company’s information security systems. In the event of an issue arising with information security, all employees involved are required to report it to their department head and to the Information Security Department in accordance with the company’s security incident response guidelines. The Department will then take action, according to the type of incident involved. As a result of our continuous efforts to strengthen information security, there have been no material cases of information leakage over the past three years.

# Risk Management

**Integrated Risk Management**

**Risk Management Organization** Doosan Infracore identifies potential risks and countermeasures against such risks, and discusses risk prevention at the monthly management meetings and at CSR Committee meetings with participation from senior management. In the monthly management meeting, the CEO and key executives discuss several issues such as financial, non-financial, and emerging risks, and establish appropriate countermeasures.



Meanwhile, in CSR Committee, held three times a year, the committee members identify mid-to-long-term non-financial and emerging risks against our company and minimize the impacts of potential risks by setting countermeasures based on our CSR strategic tasks.

**Risk Management Process** Doosan Infracore has established a risk management process which are designed to enable its executives and working-level employees to detect potential risks threatening corporate value and profits, and to take prompt actions. The risk management processes ensure effective risk controls through various elements, such as identification of risk factors, assessment of the potential impacts of risks on the company, establishment of countermeasures, monitoring of changes in risk levels, and constant reporting based on a coherent reporting system.

**Scope of Risk Management**

**Financial Risk** Doosan Infracore has classified our financial risks into four types – market risk, credit risk, liquidity risk, and capital risk – and monitors and manages them by risk type.

We monitor the market risks based on foreign exchange and interest rates. Foreign exchange risks are related to future transactions, existing assets and liabilities, and investments in overseas operations. We undertake hedge trading to reduce volatility in profitability due to the effects of changes in foreign exchange rates. Interest rate risks are related to adjustable rate deposits and loans. We minimize external loans through our reserve funds, reduce high interest rate loans, improve the borrowing structure, monitor changes in interest rates, and establish countermeasures.

Credit risk arises from transactions or investment activities when customers or business partners do not follow the conditions of the relevant business agreements. It may also arise from cash, cashable assets, derivatives, and deposits in financial institutions. Doosan Infracore manages our credit risks with the goal of minimizing losses under its credit policies. For credits in which default is anticipated at the end of the fiscal year, the company properly assesses the risks and addresses the results in its consolidated statements of financial position.

Risk type	Responsive measures
Market risks	Manage exchange rate fluctuations, interest rates, and price risks
Credit risks	Manage credit risks and minimize losses through safeguard measures in bonds
Liquidity risks	Establish quarterly and annual financial balance plans
Capital risks	Reduce capital costs and manage liabilities

To prevent liquidity risk arising from a lack of liquidity or difficulties in financing due to abnormal operations, the company establishes three-month and annual funding plans to predict the funding required related to sales, investments, and financial activities, and to secure and maintain the required liquidity in advance.

Capital risk management involves the maintenance of an optimum capital structure to ensure the company’s capabilities to provide its shareholders and other stakeholders with corporate profits while reducing capital expenditure. Doosan Infracore maintains its capital in alignment with its debt ratio. It also manages capital risks by adjusting its dividend paid to shareholders, repaying share capital, and issuing new shares and selling assets to reduce debts.

**Non-financial Risk** Non-financial risks are categorized into product, ethics and compliance, the environment, safety, and disaster risks, and the company has established a preemptive risk response system for each.

Doosan Infracore improves customer safety and satisfaction through a range of activities aimed at improving product quality in cooperation with its suppliers.

The company makes ethical management the basis of decision-making by establishing the Code of Conduct and conducting activities to promote CP. In addition, we undertake preemptive risk management based on transparent management, thereby ensuring the safety of our management environment.

Risk type	Responsive measures
Product quality	Establish a quality management system; manage quality indicators; and strengthen supplier quality management
Ethics and compliance	Establish ethical standards; operate reporting channels for violations of the Code of Conduct or CP; conduct audits; and provide employee ethics training
Discharge of pollutants, complaints, and environmental accidents	Establish an environmental management system; obtain ISO 14001, an international standard for environmental management system; and manage environmental pollutants and disclose relevant information
Workplace fire and safety accident	Engage in risk factor self-management activities; enhance fire safety management (operation of the Disaster Prevention Center); provide safety training; and run programs to boost safety management of suppliers
Natural disasters and man-made hazards	Build the BCM and run BCM drills

To avoid risks due to pollutant discharge and environmental accidents, Doosan Infracore uses resources more efficiently, reduces the environmental footprint of its business sites, and strengthens its systems for preventing environmental accidents based on the EHS management systems.

Doosan Infracore minimizes safety risks and increases employee awareness of health and safety by focusing on preventative action and offering extensive health and safety training.

We expanded our health and safety management systems to include our suppliers and outsourcing companies, thereby strengthening the monitoring system of safety accident. We have also made it mandatory for all visitors to our business sites to watch safety training videos.

As required by the Group-level business continuity management (BCM), Doosan Infracore has established response manuals and emergency notification systems for 20 essential items of infrastructure in each area. This enables the company to respond promptly to threats to employee safety.

**Emerging Risk** With society changing faster than ever before, new and diverse economic, environmental, and social risks continue to emerge. Doosan Infracore, therefore, analyzes the trends shaping the global economy and consumer sentiment, as well as changes in culture and institutions. Based on the results of its analysis, the company identifies emerging risks, that are relevant to the company, and implements countermeasures in its business operations.

**Emerging Risk**

Risk type	Details	Responsive measures
Global economic slowdown	<ul style="list-style-type: none"> <li>Demand in the construction equipment and engine industries is affected by energy, front-end industries like automobiles, economic trends, and national SOC investment policies</li> <li>COVID-19, which emerged in 2020, is likely to hit global industries and cause a global economic downturn</li> </ul>	<ul style="list-style-type: none"> <li>Promote entry into new markets so as to diversify the company’s global portfolio (Strengthen performance in advanced markets for construction equipment business, and enter the Indonesian market for engine business)</li> <li>Review and respond to market, credit, liquidity, and capital structure risks through monthly management meetings</li> </ul>
Stricter product environmental regulations	<ul style="list-style-type: none"> <li>Enforcement of emissions regulations for commercial goods and vehicles by country and continent</li> <li>The accelerating introduction cycle of new emissions regulations not only in advanced markets but also in China and emerging markets, with the level of standard increasing</li> </ul>	<ul style="list-style-type: none"> <li>Establish company-wide goals for developing and applying eco-friendly technologies and expanding related research</li> <li>Monitor the trends of strengthening emissions regulations by country and continent, and develop new engine products, such as engines that meet EU Stage V and China’s Stage IV emissions standards</li> <li>Develop hybrid powertrains</li> </ul>
Personal information protection and information security	<ul style="list-style-type: none"> <li>Increasing security threats related to personal and corporate information following the development of information and communication technologies and hacking and smishing techniques</li> <li>Increasing risks of human rights violations if the personal information, that a company collects, handles and stores, is leaked</li> </ul>	<ul style="list-style-type: none"> <li>Conduct a risk assessment of the information protection management system, led by the Information Security Part, to identify vulnerabilities and take prompt actions; provide information security training for employees; and obtain the Information Security Management System (ISMS) certification</li> </ul>
Worsening climate change	<ul style="list-style-type: none"> <li>Increasing frequency and intensity of extreme weather events, such as heavy rain/snowfall, typhoons, and heat and cold waves, due to climate change</li> <li>Increasing limit on business operations and logistics due to extreme weather events</li> <li>More strict regulations related to energy and greenhouse gases, such as the energy target management system and the emissions trading system in line with climate change emerging as a major global agenda item</li> </ul>	<ul style="list-style-type: none"> <li>Establish a climate change response system, including the GHG/Energy Reduction Council, EMS operation and performance management, and the establishment of a mid- to long-term roadmap for the emissions trading system</li> <li>Set a mid- to long-term greenhouse gas reduction target and monitor the relevant performance</li> </ul>

# Environment, Health & Safety



## OUR APPROACH

At Doosan Infracore, environmental values and safety culture are non-negotiable principles to achieve sustainable growth.

Doosan Infracore is striving to use resources more efficiently and to minimize its environmental footprints by reducing pollutant discharge based on its company-wide integrated Environment, Health & Safety (EHS) management system. The company also participates in global efforts to respond to climate change by making continuous improvements to energy efficiency and managing greenhouse gas (GHG) emissions. Moreover, we have been establishing a safer work environment by raising the safety awareness of all employees and rigorously controlling risk factors at all worksites.

## CSR STRATEGIC TASK FOR 2019

### Reduce GHG emissions

Doosan Infracore strives to effectively respond to the second phase of the national emissions trading scheme from 2018 to 2020, thereby securing a stable and sustainable base for the scheme. To this end, the company carried out a series of GHG emission reduction activities, led by the GHG/Energy Reduction Council, with the participation of all relevant departments.

Activities and Achievements	Established and operated the GHG/Energy Reduction Council; established and implemented the investment plan for GHG reduction, and submitted opinions to the government by forming a business council
Plans	Establish GHG emission forecasting and responsive measures, and discover investment items related to GHG reduction and energy conservation

## SUSTAINABLE VALUE FRAMEWORK

### People | Employee health

Doosan Infracore aims to reduce the occupational illness frequency rate (OIFR) and improve the health and wellbeing of its employees by implementing active illness management.

OIFR	(Unit: %)	
0.147	0.315	N/A
2018	2019	Goal for 2025

### Progress | Production safety

Doosan Infracore actively reduces the lost time incidents rate (LTIR) at its worksites and improves the health and welfare of its employees by implementing active incident management.

LTIR	(Unit: %)	
0.97	1.17	0.54
2018	2019	Goal for 2025

### Progress | Response to climate change

Doosan Infracore will contribute to the climate change response by integrating our carbon emissions target management into our corporate strategies and plans.

Reduction of CO <sub>2</sub> emissions in the production processes	(Unit: tCO <sub>2</sub> eq)	
108,244	112,186	96,404
2018	2019	Goal for 2025

CO <sub>2</sub> emission intensity in the production processes	(Unit: tCO <sub>2</sub> eq/KRW million)	
0.035	0.036	0.024
2018	2019	Goal for 2025

# Integrated EHS Management

## EHS Management System

Doosan Infracore has been enhancing the level of its EHS management by systematizing relevant organizations under the EHS Policy and strategies, operating an EHS management system at its global business sites, obtaining international certifications, reviewing the status of implementation and managing performance, and operating an EHS IT system.

## EHS Management Strategies

In 1995, Doosan Infracore established the EHS Management Policy in order to share key elements of its environmental management strategies both internally and externally. The company amended the Policy for 10 times to set the current one which consists of five specific principles, including the operation of the EHS management system, through which the company promotes company-wide participation in EHS management. In addition, we declared our EHS management vision of becoming a "Global Leading Green Company," and established and implemented five strategic tasks in our efforts to achieve sustainable growth.

The company makes continuous efforts to better respond to changes in the internal and external environment, such as stricter EHS regulations in Korea, increased demand for corporate social responsibility, the upward trend in the rate of safety accidents, and more focus on on-site inspections by external organizations. To this end, Doosan Infracore set its EHS directions for 2019 as the enhancement of on-site EHS capability, efficient improvement of the EHS system, and preemptive investment. Based on the directions, the company focused on developing an EHS IT system, strengthening the education system, enhancing the crisis management capabilities, and responding to the GHG emissions trading system. In 2020, we will strengthen our sustainable fundamentals that can endure internal and external changes in the business environment, and build an EHS culture that enables employees to protect their own safety by focusing on compliance, preemptive regulatory response, risk management, enhanced leadership and EHS capabilities of executives, and the establishment of the emergency response system.

## 5 Strategic Tasks for EHS Management

### Global Leading Green Company



## EHS Policy

### Operation of the EHS System

We establish, operate, and continue to develop a system designed to improve EHS impacts of our products, activities, and services.

### Compliance with EHS Regulations

We adhere to national and international EHS regulations and agreements, establish strict internal management standards, and faithfully implement them.

### Development of Eco-friendly Technology to Boost Customer Safety

We develop eco-friendly technologies that place top priority on our customers' health and safety, and then preserve resources and energy to actively contribute to sustainable environmental conservation and fight against global warming.

### Realization of Zero Occupational Accident

We create a pleasant and safe people-centered work environment, improve the health and quality of the lives of all our employees and suppliers, and thus achieve a zero-accident workplace. In addition, we focus on minimizing our environmental impact and carrying out pollution prevention activities to contribute to environmental conservation.

### Communication with Stakeholders

We expand communication with our stakeholders and disclose EHS performance transparently to continue to grow as a trusted and respected company that fulfills its social responsibilities.



**EHS Organization** In response to the expansion of our overseas business sites and the increasing concerns over global environmental issues, the EHS units at overseas business sites of Doosan Infracore work in unison for systematic and effective EHS management, with central roles performed by the EHS Team at the Incheon Plant, which is the company’s head office. Also, the company established a global EHS governance in 2017, and has been strengthening the EHS support and management by building a company-wide EHS risk management system, sharing its EHS policies, and establishing a joint response system for global issues related to REACH and climate change. In 2019, the company expanded the regular EHS Committee to include DIC, its Chinese affiliate, to form the EHS Committee for Overseas Manufacturing Subsidiaries, and shared EHS issues and implementation tasks through such channels as video workshops. In 2020, the company plans to build an EHS governance system for the global production corporations including ones in DIN, thereby sharing EHS data and conducting Doosan EHS Rating system (DSRS) evaluations.

Doosan Infracore also holds monthly EHS steering meetings to discuss EHS issues and share the progress of EHS goals. The CSR Committee, composed of the CEO and the BG heads, makes decisions on EHS-related policies, plans, and activities. In November 2019, the first “EHS Session” was held with the CEO and executives in charge of production in attendance to check the progress of the company’s EHS targets and to further raise leaders’ interest. Agenda items discussed at the session include the anticipated legislative amendments related to safety and environment in 2020 and the key implementation plans, along with the current EHS status by Business Group. Starting from 2020, there will be two EHS Sessions per year – at the company level in the 1st half and at the Doosan Group level in the 2nd half – where EHS issues, strategic directions, and implementation plans will be shared and discussed.

**Managing the EHS Management System** Doosan Infracore has put an EHS management system in place based on international standards, and examines the operation of its EHS management system and the level of compliance with relevant laws and regulations by conducting internal and external inspections every year. The global business sites of Doosan Infracore continue to put efforts in minimizing environmental pollution and damage that can arise from corporate activities by earning such international standards as ISO 14001 Environmental Management Certification and the Occupational Health and Safety Management System (OHSAS 18001/KOSHA 18001) Certifications, and thorough safety inspections on hazardous machines and equipment and the process safety management (PSM) system. They also remove industrial accident risk factors. In 2019, the company’s business sites in Korea received surveillance audits for their ISO 14001, OHSAS 18001, and KOSHA 18001 certifications to ensure that they are continuing to comply with those standards.

**Self-evaluation of Global EHS**

To further advance our EHS management and strengthen EHS fundamentals, Doosan Infracore conducts Doosan EHS Rating System (DSRS)<sup>1)</sup> evaluations as well as evaluations on compliance with EHS laws and regulations. Developed on the basis of global standards and in consideration of business characteristics, the DSRS is a basis to build an advanced EHS system and create an EHS culture shared by staff.

Each year, we conduct EHS compliance evaluations for all our business sites to prepare them for external assessments and inspections, while ensuring that they always comply with relevant laws and regulations. The evaluation is carried out through field guidance to review the proper use and management of dangerous machines, equipment, and chemicals, as well as the status of safety training progress. Evaluation results are linked to the management by objectives (MBO) of relevant executives and the integrated reward system by duty type, which in turn is increasing employee awareness and identifying areas where improvement is needed, thereby leading to actual improvements. Doosan Infracore has been conducting two EHS compliance evaluations per year at the business sites in Korea and China, and of the in-house suppliers since 2018. In particular, one of the two evaluations is carried out through the self-assessment to improve worksite execution capability in complying with laws and regulations. In 2020, the company plans to conduct an autonomous safety diagnosis and evaluation under the supervision of the team leaders and site managers so as to make a compliance culture to take root at its worksites. We will also conduct compliance assessments including our suppliers.

**Environmental Management Certified Worksites**

Korea (Incheon, Gunsan, Ansan),  
China (Yantai)

ISO 14001

**Safety and Health Management System Certified Worksites**

Korea (Incheon, Gunsan, Ansan),  
China (Yantai)

OHSAS 18001

Korea (Incheon, Gunsan)

KOSHA 18001

<sup>1)</sup> DSRS: The EHS evaluation system developed by Doosan Group to evaluate the EHS level of its worksites quantitatively and to encourage them to make improvements; Doosan Group has made adjustments to the ISRS applied by global leading companies to suit its own circumstances.

**EHS Performance Management** Doosan Infracore has developed company-wide EHS management evaluation indicators and applied them to our business sites in Korea and China. We also manage them through an annual performance analysis in a bid to continuously improve and develop our EHS performance. In addition, we strive to improve the execution capability of our EHS management system and raise the standards including by reflecting the EHS management evaluation to the performance indicators of the executives of related departments. We will further strengthen our execution capabilities by strengthening required competencies based on clear EHS standards and systems linked to our value chains, such as purchasing and production, and by applying EHS management to all business operations.

**EHS IT System** Doosan Infracore has established an EHS IT system for more systematic EHS management. Leveraging the system, the company manages EHS information in real time and analyzes them comprehensively to respond to areas which need to be strengthened or improved.

In 2019, we complemented our existing EHS IT system by adding such functions as laws/standards, chemicals, laboratory safety, firefighting facility management, and employee health checkup history management, and thus developed the “DooGreen” system, with the goal of supporting on-site EHS activities. In 2020, we will further upgrade the system by stabilizing the DooGreen system through standard maintenance, offering user training, conducting VOC survey, and making improvements.

In order to secure business continuity by responding to the increasingly strict environmental regulations and preventing environmental accidents, the company will establish an integrated IoT-based monitoring system to reduce environmental risks while increasing the operational efficiency. In April 2020, it launched an IoT-based integrated monitoring system that focuses on the establishment of real-time environmental facility management software and an integrated management platform; the integration of existing environmental monitoring systems; and real-time IoT-based monitoring aimed at managing the operational status of air and water pollution prevention facilities and preventing environmental accidents.

# Energy Management and Responses to Climate Change

Global warming and climate change caused by an increase in GHG emissions is influencing the ecosystem as well as all areas related to humankind, including industrial activities. To preemptively respond to climate change risks and opportunities, Doosan Infracore forecasts GHG emissions based on our annual production plan, and makes investment in improving energy efficiency and carries out activities to achieve the target. The company is also expanding the development and sales of highly energy-efficient, low-carbon products, including electric excavators. The quantitative data on the company’s energy consumption and GHG emissions over the past three years is found in the “CSR Facts & Figures” section (pages 113-114) of this report.

**Improving Energy Efficiency**

Doosan Infracore has identified and implemented energy conservation tasks, established an energy intensity management system, and upgraded the energy monitoring systems to reduce energy consumption and improve energy efficiency at our business sites. In addition, we upgraded the Energy Management System (EMS) to lay the groundwork for energy-related information reporting that would enable us to monitor the energy consumption and costs, monthly energy consumption trends by energy source, and energy intensity performance in relation to production. We also built an energy measurement equipment monitoring system, thereby enhancing our EMS data credibility. The company’s energy conservation efforts in 2019 include the distribution of boilers to minimize heat dissipation and energy loss; investments in air compressor load control facilities; replacement of old boiler burners at the Gunsan Plant, installation of high-efficiency lighting lamps; and use of high-efficiency low-temperature oxidation catalysts in its paint shops. Moreover, in line with the digital transformation strategy, the company has installed environmental sensors in its medium-sized engine plant to build an air-conditioning and illumination control system, in addition to the construction of a wireless monitoring system for gas sensors used in boilers and pipe plants. As a result of such investments and improvements, the energy intensity of Doosan Infracore has improved by 7.5% as of 2019 year-end compared to the 2017 figure.

**Energy Consumption in 2019 (Korea)**

(Unit: TJ)



2,142 TJ

**Responsible Response to Climate Change**

**GHG Emissions Management** In managing GHG emissions at business sites in Korea, their energy consumption (electricity, LNG, etc.) is gauged by plant and production line, and the data is analyzed through the integrated EHS IT system to identify monthly emissions amount. Given the characteristics of the company’s assembly processes, indirect emissions from purchased electricity account for about 73.7% of its total GHG emissions. In 2019, the company’s total GHG emissions rose by around 3.6% to 112,186 tCO<sub>2</sub>eq.

**Response to Emissions Trading** Doosan Infracore was designated as subject to the Korean government’s GHG & Energy Target Management System in 2010, and fulfilled all the legal obligations by 2014. During the first phase of the emissions trading scheme from 2015 to 2017, the company kept its total GHG emissions at around 68% of the quota allocated by the government, recording 313,383 tCO<sub>2</sub>eq. Only the Incheon Plant is subject to the second phase from 2018 to 2020, and the plant is now managing its emission allowances.

In 2019, GHG emissions of the Incheon Plant amounted to 93,197 tCO<sub>2</sub>eq or 49.8% of the quota allocated by the government. In 2020, the company will establish a mid- to long-term roadmap for GHG emissions to identify opportunities based on the strategy aimed at securing GHG emission allowances. Thereby, it will forecast future demand for GHG emission allowances for each internal and external scenario; form the portfolio of carbon assets (purchase, internal/external reduction, etc.); and set directions for the response to climate change in connection with its business models. The company will also prepare for the third phase of the emissions trading scheme from 2021 to 2025, responding to the quota allocated by the government, and trade its emission allowances by swapping remaining allowances.

Doosan Infracore is striving to lay a foundation for the operation of the emissions trading system and set the direction for responding to the system from the mid- to long-term perspectives, such as preemptive trading. To this end, the company has been taking actions to reduce its GHG emissions and to respond to the emissions trading system in a phased manner, as part of its strategic CSR tasks, every year since 2017. In 2019, the company set “reduction of GHG emissions” as one of its CSR strategic tasks, based on which it established and implemented the investment plan for GHG reduction to secure the emission allowances during the second phase of the GHG emissions trading scheme and to better respond to the scheme; established and operated the GHG/Energy Reduction Council; and enhanced its negotiating power with the government and submitted opinions to the government by forming a business council.

**GHG Emissions in 2019 (Korea)** (Unit: tCO<sub>2</sub>eq)



# Improving Resource Efficiency and Reducing Environmental Impact

Doosan Infracore explores better ways of using limited resources more efficiently while striving to minimize the impact of its business activities on the environment and local communities. To this end, the company has adopted various ways of promoting the eco-friendly use of resources and conducts activities to reduce the discharge of pollutants. In 2020, the company will conduct an environmental impact assessment based on the material balance for each process to improve efficiency in using resources in the production process, in addition to registering important environmental impacts and setting goals for each department in terms of resources.

Doosan Infracore manages the emissions of pollutants more strictly than required by laws in all relevant areas. The quantitative data on the company’s resource use and discharge over the past three years is found in the “CSR Facts & Figures” section (pages 113-115) of this report.

**Improving Efficiency in Resource Use**

**Water Consumption** As extreme weather, such as drought and heavy rainfall, becomes more frequent, the importance of managing water resources has been increasing. The Incheon plant, as part of its efforts to reduce water consumption, changed its way of allowing water to flow constantly to prevent pipes from bursting due to freezing weather conditions, and now does so only when burst pipes are anticipated through daily patrols. The Plant has been also operating a wastewater recycling system designed to recycle the effluent discharged from its wastewater treatment facility and reuse it for the manufacturing processes, and has continued to expand the use of recycled effluent. It reused 44% of its wastewater for manufacturing processes and others in 2019, thereby saving KRW 87 million on its water bills. It also established a wastewater reclamation and reuse system that enabled it to reuse 5,197 tons of water in 2019. In addition, a separate rainwater-harvesting system was built to reuse 867 tons of rainwater for landscaping and coolants.

**Wastewater Reuse (Incheon Plant)**



**Reuse and Recycling of Waste** To ensure the efficient use of limited resources, Doosan Infracore pursues design optimization, checks our plant facilities, and maintains them in the optimal operational state, thereby conserving resources in our daily operations. In Korea, we have been implementing the resource recycling policy, enabling us to reuse 95% of the waste in 2019. Doosan Infracore plans to further increase our resourcization rate by improving additional recycling plans and waste disposal methods such as diversification of recycling methods and segmentation of waste by type.

**Management of Environmental Pollutants**

**Water Quality Management** All wastewater generated from production processes goes through a series of treatment process at the wastewater treatment facility, and is purified before final discharge. The company operates non-point pollution source reduction facilities to remove the environmental risk of polluting nearby ocean waters with rainwater that may have deposited at plant sites and carry pollutants. Clean rain water is discharged after going through a vortex device and a fiber-type filter. Also there are extra water gates on general drains, thereby building a system that blocks the spread of pollution at the source even in the event of an unexpected leakage of hazardous substances. The Incheon Plant made improvements in the amount of chemicals used for wastewater treatment and blocked the infiltration of non-degradable wastewater at source by conducting a technical diagnosis of its wastewater treatment practices in 2018. As it was able to measure the concentration of influent wastewater through the installation of a COD for measuring raw water from wastewater, the plant made operational improvements in its raw water concentration, thereby reducing discharge of water pollutants. The Gunsan Plant improved the sludge filter press facility at its wastewater treatment plant to manage the wastewater treatment sludge water content. It has also increased the efficiency by installing intermediate wastewater collection tanks, thus preventing the inflow of malignant wastewater.

More than 44% of the wastewater at the Incheon Plant goes through in-house treatment and is reused for its manufacturing processes, resulting in minimized outside discharge of pollutants. Wastewater of the Gunsan Plant is purified at a legitimate wastewater treatment facility which then flows into each respective local government’s sewage treatment plant for retreatment. Doosan Infracore also set an internal standard on discharging water pollutants at around 40% of the legal requirement, as part of the efforts to comply with environmental laws and regulations.

**Management of Air Pollutants and Odors** Air pollutants, such as NO<sub>x</sub>, SO<sub>x</sub>, dust, and volatile organic compounds (VOCs), are from electric furnaces and painting process. To minimize damage to local communities and reduce environmental hazards, Doosan Infracore sets up dust collectors, new painting facilities, and concentration catalytic oxidation facilities at each worksite unit, while also investing in the replacement of old boilers. In addition, the company conducts strict measurements, more than the self-pollutant measurement cycle that is legally required, and monitors pollutants. It set a standard so that pollutants are emitted at less than 40% of the legal requirement.

The Incheon Plant conducted an external diagnosis on its processes that generate odors to contribute to improving air quality in the metropolitan area and enhancing residents’ quality of life nearby the Plant. Based on the outcome, it established an improvement plan together with the respective local government, and continues to expand facility investments. In addition, it has been carrying out more systematic monitoring along the worksite border and nearby areas since 2017.

**Management of Soil Contamination** In 2010, Doosan Infracore conducted a voluntary soil contamination survey of the areas where facilities that cause soil contamination were operating in the Incheon Plant, and completed soil remediation in those areas over the following three years. In 2013, the company extended the survey scope to the areas surrounding all its worksites. There has been additional voluntary soil remediation work since 2014 and completed it in August 2018, receiving confirmation from the municipal government.

**Strengthening Environmental Disaster Response System**

Doosan Infracore has established an emergency response system against environmental spills, including a pollutant leakage block system at the Incheon Plant and spill monitoring system. The company increased the number of floodgates to six to minimize the risks of pollutant leakage by rainwater. We also further strengthened our infrastructure to respond to the risks by installing pollutant detection sensors and building automatic water gate shutdown systems along with the replacement of old wastewater pipes. In 2019, we actively prevented and responded to environmental accidents by preparing for the enactment and amendment of relevant laws and regulations. In particular, we expanded the existing infrastructure for spill incident, and thus completed the establishment of an IoT-based integrated environmental monitoring system in April 2020. The system enables optimal operation of facilities that prevent pollutants from leaking into the air and water systems, and also prevents spill incidents before they happen. Thanks to these efforts, there was neither spills to outside company nor serious environmental accidents in 2019. In 2020, Doosan Infracore plans to sign a joint response agreement with external organizations such as the Korea Coast Guard, local government, nearby businesses and residents’ groups in a bid to strengthen our emergency response capabilities. There will be efforts to ensure the stable operation of the wastewater treatment plants by optimizing wastewater treatment processes, developing operation standards, and installing facilities to block malignant wastewater.

**Reducing Environmental Impact on Local Communities**

Doosan Infracore has intensified its efforts to minimize environmental impacts on local communities, and thus making continued improvements for a clean living environment. In 2015, the company set up a digital signboard to display information on air pollutants in the Incheon area with three other companies in the area. The company fulfills the obligations as a corporate citizen by engaging in precautionary management of factors that may cause resident complaints, such as foul odors, as well as making continuous investments in local communities, including the Hwasu wharf improvement project near the Incheon Plant.

# Enhancing Worksite Safety Risk Management

With the amendment of the Occupational Safety and Health Act, effective as of January 16, 2020, the responsibilities of employers have been increased so that they are subject to a shutdown and/or suspension of business in the event of an industrial accident in any of their workplaces including those of their suppliers. Operating losses may be incurred as the scope of the contractor's liability has been extended to all business sites, and the operations of an entire site may be suspended in the event of a serious disaster. To achieve zero accident in the workplace, Doosan Infracore has established such mid- to long-term goals as the establishment of a disaster prevention system, internalization of self-management activities for risk factors, and facilitation of compliance monitoring and evaluation. Accordingly, the company has been making concentrated efforts to further improve its safety devices so as to prevent serious disasters; promote a safety culture based on close cooperation between labor and management as well as with suppliers; and strengthen relevant organizations and workforce.

## Prevention-focused Worksite Safety Management

**Safety Training** Doosan Infracore provides safety education aimed at encouraging voluntary participation and capacity building of its employees. To this end, it runs training programs designed to promote EHS leadership, increase awareness, cultivate knowledge, and encourage self-development by job title. In 2019, the company expanded its supervisor training from 16 hours of online training to 8 hours of online training and 16 hours of offline training to promote voluntary participation and capacity building through strengthened EHS leadership and increased awareness. In 2020, the company plans to offer various EHS training courses, such as training programs for the CEO and executives; intensive training programs for supervisors,

such as team leaders, part leaders, and senior technicians; and customized training programs for different processes and job titles.

**Worksite Hazard Management** Doosan Infracore implements a discussion-based risk factor identification process with its workers to encourage them to manage risk factors by themselves in the first place by observing and improving potentially hazardous behaviors. It implemented self-management activities for risk factors in the first half of 2019, and conducted a risk factor self-management evaluation in the second half. It also ran monthly EHS meetings held by each business unit, and asked each technical staff to identify more than two items or activities, that need safety improvements, and took corrective actions. As a result, a total of 5,362 risk factors (2,874 in Korea and 2,488 in China) were identified, and necessary corrective actions have been taken in 2019.

**Acquisition of Safety Zone Certification** Doosan Infracore's business sites in Korea are all certified by the government in terms of disaster safety with the Incheon and Gunsan Plants' acquisition of the Safety Zone Certification in December 2014 and November 2015, respectively. Awarded by Safety Zone-CERTI® and supervised by the National Fire Agency, the Safety Zone Certification is the only voluntary corporate safety evaluation system in Korea and entails a comprehensive evaluation of building design, construction, and maintenance. In 2017, Doosan Infracore received a detailed evaluation on six safety areas, including the safety management system, firefighting, building/fire proof, dangerous goods, machine/electricity/gas, and evacuation/natural disaster, from experts in the field of disaster and safety. The company actively made improvements for matters that were pointed out, and obtained the Safety Zone Certification for the second consecutive time in December 2017 following 2014. The Certification is valid for three years. Investments in safety and firefighting are not expenses but a must to protect its employees. The company therefore will further spread awareness of the importance of fire and disaster prevention and systematically and efficiently manage safety facilities based on the Safety Zone Certification.

## Acquisition of the Safety Zone Certifications



**Response to Process Safety Report Evaluation** Worksites with large hazardous, dangerous facilities have risks of fatal industrial accidents, so that they are required to operate the Process Safety Management (PSM) system. Accordingly, they create a report on comprehensive, scientific prevention activities, such as process risk assessment and establishment of a safe operation and emergency plan, and submit to the government, after which the government examines and reviews the report and has the respective worksite implement preventive activities to prevent fatal industrial accidents. Doosan Infracore carried out an internal audit on the PSM of its Incheon Plant and Gunsan Plant, and based on the results of the internal audit, the company identified improvement measures, such as increasing supplier safety training, expanding the scope of job safety analysis (JSA), and revising safe work permissions, and continues to inspect the implementation status.

## Expansion of Safety Management Culture

Doosan Infracore believes that the safety awareness of its employees is the most important factor in preventing safety accidents, along with efforts to improve facilities. The company, therefore, actively implements programs and operates systems in which both its employees and those of the suppliers participate so as to strengthen the safety culture.

**Building a Culture of Safety** Doosan Infracore continues to promote compliance with the “EHS 3-3-3 Basic Rules” and engage in safety culture activities, including improvements in the field of safety, to achieve zero accidents. Each month, the heads of Business Groups provide safety reports to employees. The company has designated April as Health and Safety Month during which it strives to improve safety and raise safety awareness through education sessions, promotional campaigns, and inspections. Visitors to its worksites are required to watch a video on safety precautions first to raise their safety awareness.

**Support for Suppliers' Safety Management Capabilities** Doosan Infracore has been implementing “Symbiotic Cooperation Programs” since 2012 to help its suppliers boost their safety management capabilities under one of its EHS principles – “We aim to create a pleasant and safe people-oriented working environment, improve the health and quality of life of all employees, including those of our suppliers, prevent losses, and thus ultimately realize a zero-accident workplace.” Launched by the Ministry of Employment and Labor in 2011, the Symbiotic Cooperation Program is designed to urge large companies to help improving the health and safety capabilities of their suppliers to prevent industrial accidents through continuous cooperation. In March 2019, the company held a ceremony to launch a team devoted to the implementation of the “2019 Health and Safety Symbiotic Cooperation Program,” and then supported its suppliers in the areas of risk factor assessment and improvement, health and safety training, distribution of guidelines, and supply of the related goods. In particular, it focused on promoting the Safety Observation System (risk factors self-control), a scheme for removing potential risks based on concentrated daily monitoring by not only field supervisors but also working-level employees, so that suppliers themselves can identify risk factors and work on them.

In 2020, Doosan Infracore aims to improve the safety management system of its suppliers to the standard of its own. To this end, it will provide specialized risk assessment training and self-management support through the Symbiotic Cooperation Programs; form a council attended by all its internal suppliers; and help its suppliers make improvements to any unsafe practices or behaviors.

**Safety Management for Outsourced Projects** Doosan Infracore is further strengthening safety management to prevent supplier safety accidents during outsourced projects at its worksites. The company operates a daily on-site patrol to check on-site safety status and reports the results to the management. It also runs the “Safety Walk” program every month in which executives, production managers, and EHS officers carry out a safety patrol and come up with improvements, thereby managing potential safety risks.

In 2019, a serious accident occurred at the Incheon Plant when a worker of an external contractor fell. Although the company's suspension was cleared, irrespective of its legal liability, it has enhanced its safety management for the safety of all its suppliers and visitors. In 2019, the company also strengthened its safety management process for outsourced projects by establishing work plans for high-risk work, such as high-place operation, and running a committee; monitoring risks based on JSA; and providing trainings aimed at helping a construction manager increase his/her capacity. In 2020, it will make continuous efforts to strengthen its safety management process while also focusing on managing outsourced construction projects throughout the year, and thus achieve zero safety accident.

## Emergency Prevention System

**Fire Prevention System** As the number of fires related to electricity, overheating, and dust increases, Doosan Infracore has been upgrading its firefighting facilities and improving its firefighting capabilities. In December 2019, the Incheon Plant, having been chosen as the representative workplace within the jurisdiction of the Incheon Central Fire Department, conducted a “Self-Defense Forces Firefighting Training Assessment” involving a total of 500 employees. The assessment is a fire drill led by Incheon Metropolitan City to strengthen the initial response and firefighting capability in the event of a fire. The Incheon Plant conducted evacuation, fire suppression, and emergency drills following a hypothetical firefighting scenario in which its R&D center is hit by an earthquake. Following the fire drill, it had trainings on the risks of smoke inhalation, an air mat experience, how to operate a fire extinguisher, and cardiopulmonary resuscitation.

In 2020, to minimize losses in the event of a fire, the company will install oil mist detectors and fire extinguishers in the painting process, thereby establishing an initial fire suppression system. It also plans to upgrade its fire prevention system by identifying and removing fire hazards in advance through the installation of motion-detection CCTVs in blind spots such as underground machinery rooms, as well as installing proper firefighting facilities when building new buildings and expanding facilities.

**Upgrading Emergency Response Training** Doosan Infracore aims to minimize human and material damages by responding promptly in the event of an emergency such as a fire. In 2020, it will upgrade its drills to better handle fire suppression, fire truck entry, and lifesaving, with a particular focus on such processes with a high probability of a fire as painting and commissioning. It will also strengthen its prevention system so that it can respond quickly and efficiently by developing an emergency response scenario for each department.

### Industrial Accident Rate Management

The traditional method used to calculate the industrial accident rate does not faithfully reflect the incidence of minor accidents. Doosan Infracore, therefore, began to use the LTIR<sup>1)</sup>, TRIR<sup>2)</sup>, and LWSR<sup>3)</sup> indicators in 2018, which allowed the company to identify minor accidents that resulted in lost time as well as those who received treatment at the company or its suppliers. By doing so, the company aims to prevent minor accidents from repeating and becoming a major accident, and to further strengthen supplier's safety management. Accident rate indicators are managed as a major key performance indicator (KPI) of respective executives, based on which Doosan Infracore plans to further promote a safety management culture.

The company analyzed accidents that had occurred at its worksites in the past four years, and found that conventional accidents, such as jamming, fall, and bump, have been occurring continuously, with unstable practices and behaviors being the root cause of 70% of such accidents. In 2020, it will, therefore, focus on preventing accidents due to unsafe practices and behaviors by enforcing compliance with the on-site safety rules and behavioral requirements, expanding site inspections and facility improvements, and strengthening the safety culture based on employee participation.

<sup>1)</sup> LTIR (Lost Time Incidents Rate): Number of incidents involving more than one-day closure of workday per 100 workers, Total number of lost time cases/Total number of hours worked by employees \* 200,000

<sup>2)</sup> TRIR (Total Recordable Incidents Rate): Number of recordable incidents that require treatment for injuries or illness per 100 workers, Total number of injuries and illnesses/Total number of hours worked by employees \* 200,000

<sup>3)</sup> LWSR (Lost Workday Severity Rate): Number of lost work days experienced per 100 workers, Total number of lost work days/Total number of hours worked by employees \* 200,000

## Enhancing Employee Health Management

### Improving Employee Health Management

**Occupational Disease Prevention** Doosan Infracore strives to prevent occupational diseases such as noise-induced deafness and musculo-skeletal disorders, and to strengthen implementation capabilities at its worksites. To this end, the company holds a monthly meeting of the Musculoskeletal Disorder Improvement Working Council, which is composed of labor union officials, worksite managers, and employees in charge of EHS and production, to discuss physical load risks and identify ways of making improvements. It also arranges for medical professionals to visit its worksites regularly as part of its efforts to improve employees' health and boost their morale. As the number of workers suffering from hearing problems, such as noise-induced deafness, has been increasing, Doosan Infracore has set a strategic direction to fundamentally minimize noise-generating processes while also offering high-quality earplugs and other protective gears, and providing education on the proper use of them. In addition, with the increasing amount of surface particulate matter around the country, the company has developed response guideline that calls for the provision of protective gears and proper work breaks starting at the stage of caution.

In 2020, the company will carry out various preventive activities for each type of occupational disease including by monitoring its working environment through health risk assessments; measuring noise at all of its worksites and developing a noise map; preventing respiratory diseases by inspecting and improving control speed efficiency of local exhaust systems; expanding the activities of the Musculoskeletal Disorder Improvement Working Council to prevent musculoskeletal disorders; conducting regular inspections on harmful factors (every 3 years); and assessing the risks of brain and cardiovascular diseases.

**Health Management Programs** In helping its employees manage their health, Doosan Infracore operates various health promotion programs, including the installation of automated external defibrillators (AEDs) and the preparation of a low sodium diet menu. Whenever a healthcare issue such as the spread of an infectious disease arises, the company operates the Emergency Situation Room and promptly offers the relevant information on preventive measures to its employees. The company pays for mandatory vaccinations for six diseases – yellow fever, cholera, malaria, typhoid, hepatitis A, and tetanus – designated internally for employees who go on business trips to countries with limited healthcare.

In response to the COVID-19 pandemic that has swept the world in 2020, the company has provided masks to its employees and those of its internal suppliers, disinfected business sites, and made hand sanitizers and thermometers available for any employee.

It has also followed the guidelines issued by the Korea Centers for Disease Control and Prevention, and established its response guidelines to prevent the spread of COVID-19, including countermeasures (working hours, domestic/overseas business trips, preventive activities, etc.) by stages, as well as reporting system and employee behavior standards in the event of an emergency. The company strives to keep its working environment safe by strictly obeying all the relevant rules and guidelines.

**IT System for Health Checkup History Management** In 2019, Doosan Infracore developed and launched “DooGreen,” an integrated EHS IT system that includes an employee health checkup history management function. The system enables the management of company-wide health checkups and the related training schedules to prevent employees from inadvertently skipping their regular medical checkups and education, while preventing legal risks related to a lack of special checkup data. In addition, the system helps Doosan Infracore employees improve their health by managing their personal health checkup-related items, including health checkup history management, management of chemicals used for each task, and management of working environment measurement results.

**Programs to Manage Job Stress** Doosan Infracore conducts stress surveys to manage the mental health of its employees, and runs a professional stress management program, with a particular focus on high-risk employees, based on statistical analysis. The company ensures that its employees can access counseling services whenever necessary through the psychological counseling office within an affiliated clinic and an external counseling center linked to the company. Launched in April 2014 for the first time among affiliates of Doosan Group, “DOOHUG” is a professional counseling service offered in partnership with an external professional institution. It provides employees with professional counseling services about not only their work-related concerns but also personal worries, including their families and childcare. The company keeps all DOOHUG counseling details and personal information strictly confidential, and pays all of counseling expenses.

Moreover, Doosan Infracore runs a “healing program” for teams. In 2019, the company conducted a “Psychological Health Test” for all of its employees to diagnose their stress level, including job stress, and provided support for employees with a high level of stress. The supportive measures include a total of 1,134 cases of counseling services through its in-house counseling center and an outside counseling center, a healing program, visiting counseling services to Doosan Tower, and relevant education programs. In 2020, the company will continue conducting employee surveys (job stress index, etc.) and analyses while providing training and conducting assessments aimed at protecting the psychological health of emotional workers. It will also offer professional training as part of its Employee Assistance Program (EAP), and expand the operation of “DOOHUG,” a job stress prevention program.

### Certified as Excellent Worksite in Employee Health Promotion

In October 2019, the Incheon Plant was re-certified by the Korean Ministry of Employment and Labor and the Korea Occupational Safety and Health Agency for its excellence in promoting employees' health, following its initial certification in 2013 and the recertification in 2016 (evaluation period: 3 years). The Gunsan Plant was first designated as an Excellent Worksite in Employee Health Promotion in November 2015, and re-certified in February 2019 in recognition of its exemplary in-house health promotion activities customized for the characteristics of workers, including a health management program, a musculoskeletal disorder prevention program, and a job stress prevention program. The Excellent Worksite in Employee Health Promotion certification is the most important health industry-recognized certification, which involves a comprehensive evaluation of 40 items in six areas, such as organizational culture, health promotion activities and programs, and environmental management. Designated worksites are awarded the benefit of being exempted from supervision by the Ministry of Employment and Labor for the next three years. The company will continue employee health promotions as part of its efforts to create a better workplace.

# Suppliers



## OUR APPROACH

Doosan Infracore rapidly grows into a global company based on the principle of building a “virtuous cycle of partnerships” that enables it to achieve shared growth with its suppliers.

Doosan Infracore considers win-win growth with suppliers as a primary source of its competitiveness. We, therefore, share our technology, quality, and management systems with our suppliers to strengthen their competency and build a virtuous cycle of partnerships. In addition, we help them improve CSR capabilities in an effort to fulfill our roles and responsibilities in building a sound economic ecosystem.

## CSR STRATEGIC TASK FOR 2019

### Strengthen CSR management system of the supply chain: Identify suppliers with high CSR risks, and support improvement activities

As the occurrence of CSR issues, such as human rights, environment, and safety of suppliers, has been on the rise, the CSR management system of the supply chain has also been gaining importance around the world. Against this backdrop, Doosan Infracore strives to help our suppliers manage their CSR more systematically. To this end, we set the CSR strategic task for 2018 as to “Strengthen CSR management system of the supply chain: Define core suppliers and identify suppliers with high CSR risks, and establish a management process” which was followed by the 2019 strategic task to “Strengthen CSR management system of the supply chain: Identify suppliers with high CSR risks, and support improvement activities,” and carried out activities to accomplish the tasks.

#### Activities and Achievements

Defined suppliers with high CSR risks; established and implemented plans to help suppliers with high CSR risks make improvements; and verified the improvement results by re-conducting on-site assessment (OSA)

## SUSTAINABLE VALUE FRAMEWORK

### People | Suppliers capacity building

Doosan Infracore leads the shared growth with its suppliers by expanding the Doosan Supplier Excellence Program (DSEP) program which is designed to provide training, consulting, and other supports to help suppliers strengthen their competitiveness.

Cumulative No. of DSEP participants	(Unit: Company)
27	32
2018	2019
	52
	Goal for 2025

### Progress | Supply chain ESG

Doosan Infracore makes continuous efforts to conduct ESG inspection for its core suppliers and help them make improvements as a way to prevent risks and lay solid foundations for shared growth.

No. of companies subject to supplier ESG inspection <sup>1)</sup>	(Unit: Company)
116	N/A
2018	2019
	125
	Goal for 2025

<sup>1)</sup> Supplier ESG inspection is conducted every other year. Thus, the Year 2024 goal is reflected as the Year 2025 goal.

# Strengthening Suppliers' Competitiveness

Doosan Infracore focuses on enhancing its overall competitiveness in purchase and production by helping its suppliers boost their competitiveness. To this end, the company provides a range of support programs, including financial support, competency enhancement training, and on-site guidance. In addition, it is implementing the Leading Supplier (LS) project to help its core suppliers grow into small giants based on the Doosan Supplier Excellence Program (DSEP), a system for fostering suppliers.

## Fostering Leading Suppliers

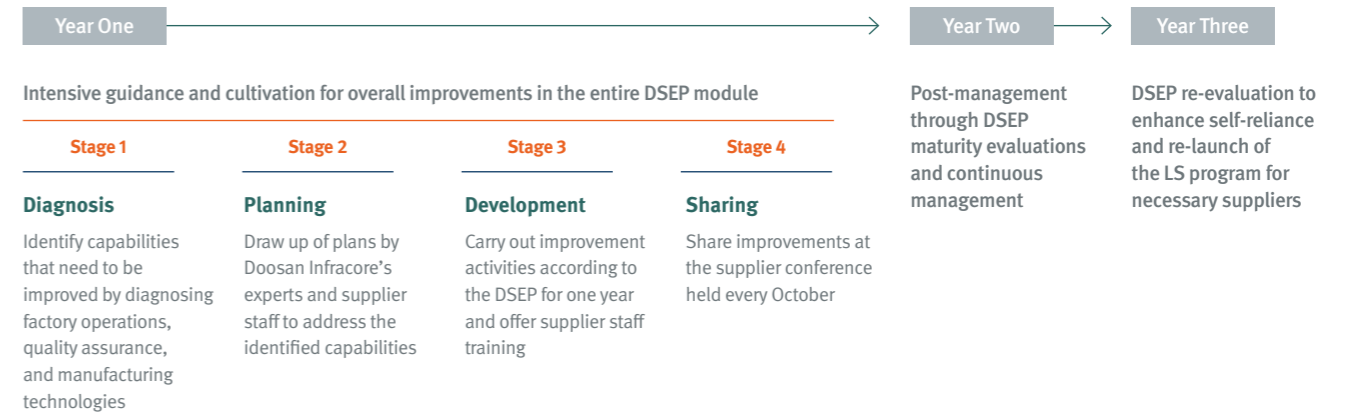
Doosan Infracore conducts an annual survey of core suppliers according to the criteria for core suppliers defined by the analysis of transaction dependency and supplier relationship segmentation. And the company helps them have the capability to supply quality products at competitive prices on time by making innovative improvements in the areas of plant operations, quality assurance, and manufacturing technologies. It also makes continuous efforts to foster them to become Leading Suppliers, setting a benchmark for other suppliers. The LS project aims not only to solve problems that suppliers are facing but also to raise their fundamental competitiveness by enabling them to secure supply capacity and quality competitiveness in terms of a comprehensive ranking evaluation (supplier evaluation) through one- to three-year support programs. To foster 52 Leading Suppliers by 2025, Doosan Infracore has selected and supported a total of 32 suppliers from 2014 through 2019.

In 2019, the company focused on improving product quality and delivery compliance for five suppliers that were newly selected as Leading Suppliers. It categorized its support period into four – fostering period, follow-up management period, self-sufficiency period, and internalization period – to help them to continue improving their performance even after the LS support programs. In 2020, Doosan Infracore will focus more on helping its suppliers to establish a smart factory system. In connection with the government’s “Smart Factory Supply and Diffusion Project,” it will support the establishment of a manufacturing execution system (MES) at its suppliers, through which they will be able to strengthen their quality capabilities and competitiveness.

## Expanding Participation in the Benefit Sharing System

The benefit sharing system is an agreement made between large companies and small and medium-sized enterprises (SMEs) to improve suppliers' capabilities to deliver high-quality goods on time and share the benefits. It is an iconic model for the creation of a healthy corporate ecology. Doosan Infracore collects suppliers' suggestions regarding new product development, parts localization, quality improvements, and design changes through the benefit sharing system. It reflects good suggestions into its products and shares the outcome, thereby creating win-win partnerships with its suppliers. In October 2019, the company ran the “Benefit Sharing Academy,” with some 40 Doosan Infracore purchasing staff and suppliers' employees in attendance, in order to increase stakeholders' understanding of the system and to encourage their participation. Going forward, Doosan Infracore will extend the scope of our benefit sharing system to include not only first-tier suppliers but also second-tier suppliers, to enhance our fundamental competitiveness as well as that of our suppliers, create synergy, and establish a fair subcontracting culture.

## LS Development Stages



### Strengthening the CSR Competencies of Suppliers

Doosan Infracore has established systems and programs designed to enable its suppliers to lay the groundwork for their response to CSR issues, including ethical management, fair trade, human rights, environmental protection, and social problems.

**Strengthening CSR Management System of the Supply Chain** Doosan Infracore has developed the Supplier CSR Guidelines, which consist of 27 clauses under 10 categories, such as labor, human rights, health and safety, environment, ethics, and fair trade, and distributed them to its suppliers in the form of newsletters and booklets. The company also reflects the Guidelines in its purchase policies to ensure that consistent principles are applied not only to diagnosis and evaluation but also to purchase, based on which the company urges its suppliers to engage in practical CSR activities. The Supplier CSR Guidelines are available at Doosan Infracore’s website.

**Reflecting CSR Elements into Supplier Evaluation** Doosan Infracore reflects CSR elements, such as employee training, labor management, environmental management, and regulatory compliance, in the evaluation and registration of its new suppliers at all of its business sites in Korea and China. In the area of EHS, in particular, such as environment and health, the company evaluates the status of building foundations and level of practices including the establishment of relevant systems and improvement in risk factors. The company also has been conducting on-site EHS assessment of new suppliers prior to their registration since 2015.

**Activates to Support and Improve Suppliers’ CSR** For more systematic CSR management of its supply chain, Doosan Infracore established criteria to define core suppliers and set standards in 2018, based on which it surveyed their status; conducted an on-site assessment (OSA) on their response to CSR issues, such as human rights protection, ethical management, and EHS; and identified suppliers with high CSR risks. In 2019, the company selected nine suppliers with high CSR risks, helped them to establish and implement improvement plans, and re-evaluated those suppliers which completed making the proposed improvements. Going forward, Doosan Infracore will enhance CSR management capabilities of its suppliers through comprehensive supplier evaluation linked to the CSR evaluation and improvements.

## Diverse Supplier Support Programs

### Competitiveness Enhancement Programs

**Supporting the Enhancement of Suppliers’ Competitiveness** An exclusive team, composed of dedicated staff from the Supplier Development Team and Shared Growth Team, visits suppliers if necessary, to help them conduct innovative activities. In 2019, 195 Doosan Infracore employees – twice as many as planned at the beginning of the year – helped suppliers with their innovation efforts for more than five consecutive days<sup>1)</sup>. Specifically, Doosan Infracore staff helped suppliers improve their manufacturing capability by providing key technical support for welding, materials manufacturing, and non-destructive inspection; and support for innovation in the fields of 3 P’s 6 S’s<sup>2)</sup>, Lean<sup>3)</sup>, DTC<sup>4)</sup>, single PPM<sup>5)</sup>, quality guidance and problem solving, localization, and product development.

**Management Doctor System** Doosan Infracore is an active participant in the Management Doctor System which is currently being promoted by the SME Support Center of the Federation of Korean Industries (FKI). Suppliers recommended by large companies are selected through a review process, whereupon experts from three parties – large companies, suppliers, and the FKI’s management consulting team – help them improve management environments and solve problems.

**Industrial Innovation Campaign 4.0** Industrial Innovation Campaign 4.0 is one of Doosan Infracore’s leading programs for shared growth. Through this program, consultants are dispatched to the company’s suppliers to provide them with practical assistance with their production innovation and smart factory operations, based on the company’s financial contributions. The Campaign entered its second phase in 2019 following the successful completion of the first phase in 2018. The company will help some 50 suppliers for the next five years to increase their productivity, thereby making practical improvements in their performance.

**Competency Building Training for Suppliers’ Staff** Doosan Infracore reflects its suppliers’ feedback into the Supplier Academy, a customized training program to help suppliers secure competitiveness, and offers the program every year. In 2019, 97 employees from 38 suppliers benefited from the Supplier Academy in seven areas, including quality, manufacturing, and production costs. To further increase training effectiveness, in 2020 the company plans to add training courses in such areas as production quality, Industry 4.0,

<sup>1)</sup> Criteria of the Korea Fair Trade Commission: 5 days = 1 person (1 day = 8 hours, based on the time and attendance criteria)  
<sup>2)</sup> 3 P’s 6 S’s: 3 P’s (Proper Items, Proper Quantity, Proper Place), 6 S’s (Safety, Sort, Straighten, Shine, Standardize, Sustain)  
<sup>3)</sup> Lean: Activities designed to minimize inventories and innovate work processes, thus reducing costs and enhancing productivity  
<sup>4)</sup> DTC: Design to cost Innovation  
<sup>5)</sup> Single PPM (parts per million): A quality innovation campaign designed to achieve the quality management goal of reducing the ratio of faulty products to under 10:1,000,000 products

import and customs clearance, and intellectual property rights based on the results of demand survey. In terms of training efficiency, it will offer both internal and external training programs.

**Seminars for Suppliers** Doosan Infracore has been holding the “Seminar for People in Charge” for its suppliers twice a year since 2017, to introduce its shared growth programs, motivate suppliers to actively participate in and take advantage of the programs, and help them build competency. At the seminars held in 2019, the company introduced its leading programs for shared growth with suppliers; shared information on suppliers’ technical data management system and the Occupational Safety and Health Act; and discussed suppliers’ measures to respond to the amendment of the Act.

### Financial Support

In Korea, Doosan Infracore helps its suppliers enhance their financial soundness by providing them with four types of financial support – direct support, indirect support, mixed support, and special support.

#### Financial Support for Suppliers in 2019 (Korea)

	Programs		Amounts supported
Direct Support	Facility Investment Fund	Provided suppliers with interest-free facility investment funds	KRW 2.3 billion
	Financial Support for Shaping Fixtures	Provided financial support for shaping fixtures to enhance product competitiveness	KRW 28.7 billion
Indirect Support	Network Loans, Family Corporate Loans	Helped suppliers receive loans to fund operations with low interest rate based on deposits	KRW 30.0 billion (promised)
Mixed Support	Shared Growth Special Fund	Helped suppliers receive loans to fund operations with low interest rate based on deposits	KRW 78.5 billion (raised)
			KRW 63.0 billion (loaned)
Special Support	Special Contribution for the Industrial Innovation Campaign 4.0 (KOFCA) <sup>1)</sup>	Made contributions to shared growth programs for second- and third-tier suppliers	KRW 300 million
	Contribution to Win-Win Supporters		KRW 100 million

### Support for the Creation of Sound Corporate Ecosystem

Beginning in 2017, Doosan Infracore has been running a supplier support program that helps reduce the wage gap and increase welfare benefits for the employees of its second- and third-tier suppliers<sup>2)</sup>, in-house subcontractors<sup>3)</sup>, and service providers. For the employees of those companies, it provides them with KRW 1.2 million per year (KRW 100,000 per month for each person) to reduce their wage gap in the form of Win-Win Encouragement Funds while also offering high school tuition fees to their children and allowing them to use the company’s daycare center free of charge to enhance their welfare benefits.

<sup>1)</sup> KOFCA: Korea Foundation for Cooperation of Large&Small Business, Rural Affairs  
<sup>2)</sup> Second- and third-tier suppliers: Suppliers that depend more than 35% in terms of sales on Doosan Infracore’s first-tier suppliers that count on the company by more than 35% in terms of sales  
<sup>3)</sup> In-house subcontractors: Employees of in-house subcontractors (except for large companies and foreign enterprises)

## Establishing a Culture of Shared Growth

### Building Win-Win Partnerships

Doosan Infracore has set “building a virtuous cycle of partnerships for shared growth with our suppliers” as the motto for shared growth to strengthen our global competitiveness and grow together with our suppliers. The virtuous cycle of partnerships aims to include all of our suppliers in the unique technology-quality-management system, which is designed to enhance our technological capabilities and upgrade business practices internally. This integrated operation system enables Doosan Infracore and its suppliers to build an even stronger partnership by improving the competitiveness of the overall system ranging from production to supply and by sharing the profits generated through the improvements with suppliers. The virtuous cycle of partnerships also means that Doosan Infracore goes beyond the previous relationship with its suppliers that is limited to purchasing and subcontracting. The company has determined to implement the shared growth strategy at the company level, and then has been making continuous efforts to build the virtuous cycle of partnerships including by linking detailed plans to business plans of the company, reflecting performance results into the evaluation of its top executives, and establishing an effective monitoring system. To build a virtuous cycle of shared growth, the Supplier Development Team and the Shared Growth Team take the lead in helping suppliers improve their jobs and technical competencies while enhancing their financial soundness, while also actively communicating with them through the Integrated Cooperation Council.

### Shared Growth System



**Motivating Shared Growth** Doosan Infracore reflects the shared growth performance of the relevant executives in the evaluation of their management by objectives (MBO), and it also reflects the findings of the benefit sharing system in the MBO of executives in charge of purchasing to promote the system. Furthermore, to encourage suppliers to participate in shared growth activities, it reflects their involvement in shared growth and relevant performance in the comprehensive supplier evaluation.

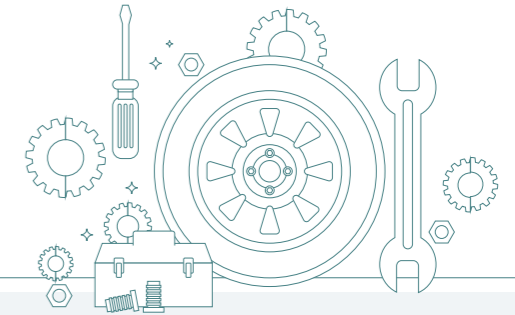
**Strengthening Communication with Suppliers**

To enhance communication with its suppliers, Doosan Infracore operates a “Shared Growth Hotline” while also holding agreement ceremonies and meetings. The CEO visits the company’s second-tier suppliers twice a year to listen to their concerns and find solutions to their problems. In China, senior executives attend a meeting with suppliers twice a year, share the purpose of shared growth, and encourage commitment to realizing shared growth.

**Integrated Cooperation Council** For active and effective communication with suppliers, Doosan Infracore launched the Integrated Cooperation Council in 2015. The Council meets twice a year to share the company’s business plans, quality policies, and the latest global trends including environmental restrictions, and to align the strategies of the company with the suppliers and strengthen mutual exchanges.

**Grievance Handling Channel for Suppliers** Doosan Infracore has established the Shared Growth Hotline on its company website in the Shared Growth section, through which people may express their overall opinions and grievances about the company’s trade practices and shared growth activities or request related programs. In addition, the company has put diverse communication channels in place, such as telephone, fax, and postal service, and notifies to its suppliers. All communication made through the Shared Growth Hotline is kept strictly confidential, and for those wishing to maintain their anonymity, the Hotline can be used anonymously. Doosan Infracore makes sure that no one faces retaliation for submitting a grievance, and critical issues are reported to the CEO and relevant executives.

# Product Quality & Stewardship



**OUR APPROACH**

Doosan Infracore provides world-class products, parts, and services with the goal of maximizing customer value.

**SUSTAINABLE VALUE FRAMEWORK**

**Product, Solution, Service | Product stewardship**

Doosan Infracore is committed to responsible production and consumption by integrating the concept of sustainability into the entire product life cycle ranging from production to sales, utilization, and disposal.

Doosan Infracore offers customers better value through products that take into account not just performance but also customer safety and environmental impacts. In addition, the company focuses on improving product quality, enhancing customer services, and having more dialogues with customers to become a company trusted by customers.



## Customer-centered Product Development

**Strengthening Product Responsibility**

Doosan Infracore is committed to securing customer safety and minimizing environmental impact throughout the entire process ranging from product development to production and sales. To this end, the company strives to ensure customer safety and convenience from the product planning and development stage, and also focuses on expanding the development of eco-friendly products in order to minimize the environmental impact of product manufacturing and use. In addition, the company aims to contribute to the improvement of human rights and the environment in areas that produce conflict minerals by continuously monitoring the use of conflict minerals in its products.

**Compliance with International Safety Standards** Doosan Infracore sets up new product development and verification plans at the planning stage by reviewing various countries’ technical regulations and international standards on safety and environment, including fire, explosion, noise, rollover, electromagnetic compatibility, and toxic chemicals. The company also reflects the guidelines set forth in major technical regulations when setting up its product development

objectives, such as the “Rules on Construction Machinery Safety Standards” of Korea, the “Machinery Directive” of Europe, and the “Guobiao (GB) Standard” of China. The company also ensures that its products are manufactured to meet the regulations of the markets to which they will be exported. Moreover, we have the Global Product Compliance Council (GPCC), through which we share information on the latest trends in global safety regulations and standards and discuss preemptive responses to any changes.

**Management of Hazardous Chemicals** Doosan Infracore makes various efforts to respond to hazardous chemicals regulations, including the EU’s REACH/RoHS 3, and the “Act on the Registration and Evaluation etc. of Chemical Substances” and the “Chemicals Control Act” of Korea. The company conducted a total inspection on hazardous chemicals used throughout its work processes in 2015; conducted a study on the possibility of replacing some of hazardous chemicals, and replaced or removed 11 types of chemicals subject to management under The Chemicals Control Act in 2016; and developed a world-leading process and IT system to respond to REACH/RoHS 2 and completed its roll-out at Doosan Infracore China Corporation in 2017. In 2018, to cope with even stricter regulations systematically, the company created a CF team for company-wide hazardous chemicals management and operations; established a policy to manage restricted materials; distributed work process guidelines to the relevant departments; developed alternative materials to respond to RoHS 3; established response processes at overseas subsidiaries; input

new REACH/RoHS 3 substances and requested renewal. In 2019, the company reduced the use of hazardous chemical substances included in the Candidate List of Substances of Very High Concern (SVHC), Annex 17 and RoHS 10 Restricted Substances. Also, the company has extended the applicable laws and regulations to include California Proposition 65 and other international agreements in addition to REACH/RoHS 3 so as to proactively respond to high risks posed by hazardous chemicals and to avoid regulatory obstacles in import/export of products.

The scope of application of the relevant regulations has been extended from finished products to include parts. In response, Doosan Infracore included supplier's obligation to REACH/RoHS 3 in the basic purchase contract form to raise suppliers' awareness of the importance of hazardous substance management. It has also continued to assist suppliers with training and on-site guidance to improve the management competency of their staff, and helped them establish the management process. In 2019, the company offered online trainings aimed at urging its suppliers to respond to the regulations and helping them improve relevant competencies.

**Conflict Mineral Management** Conflict mineral refers to four minerals – tin, tantalum, tungsten, and gold – that are mined in 10 war-torn countries in Africa, including the Democratic Republic of the Congo, Sudan, Rwanda, Burundi, Uganda, Congo, Zambia, Angola, Tanzania, and Central Africa Republic. Armed forces in these countries are believed to be caught up in conflict as they are raising funds through the mining and distribution of the minerals, which in turn causes human rights issues, such as loss of human life, human rights abuses, child labor, and sexual violence, in addition to serious social problems including environmental pollution. The international community, therefore, has been requiring companies to disclose the origin of the minerals they use in their production processes, and to eradicate the use of conflict minerals. As a responsible corporate citizen, Doosan Infracore strives to ensure that no conflict minerals associated with armed forces in the conflict areas are included in its supply chain. Furthermore, all suppliers that do business with Doosan Infracore are required to make sure that they do not use conflict minerals in their manufacturing processes and to submit certificates of origin.

**Classification of Eco-Friendly Products**



Products that preemptively satisfy the environmental regulations of the relevant market(s)

The company has also put the conflict minerals management process in place based on close cooperation among different departments including purchasing, CSR, and chemical materials. In addition, it strives to increase understanding of conflict minerals including by establishing a conflict mineral response system, conducting surveys on the usage of minerals, helping its suppliers manage their risks, and providing guidance to them.

**Increasing Eco-friendly Products** Doosan Infracore is conducting its business based on its corporate philosophy which defines minimizing environmental footprint as a corporate responsibility through which the company can create values. Following this corporate philosophy, the company established definition and management standards for eco-friendly products in 2015, and reflected the eco-friendly product management process in its new product development process and completed an upgrade of the environmental friendliness index in 2016. At Doosan Infracore, products that preemptively meet mandatory environmental regulations of each market in five areas – fuel efficiency, durability, noise control, safety, and emissions control – are defined as eco-friendly products. The portion of eco-friendly products in 2019 recorded 87.3%, similar to the figure of the previous year.

## Responsible Customer Service

**Preemptive Response for Customers**

Doosan Infracore has been solidifying its relationship with customers based on trust by acting ahead of customers' requests. The company provides information on products for customer safety and increased convenience, and carries out voluntary preemptive correction measures.

**Providing Information for Customer Safety** Doosan Infracore complies with regulations of each country related to increased customer safety, including Safety Standards and the Product Liability Act, and takes all the necessary actions to prevent related accidents. To ensure safe operation and maintenance of its products, the company provides customers with safety labels of three levels – danger, warning, and caution – according to the severity of the safety risks involved. It also specifies matters that are critical to customer safety in a product manual. Doosan Infracore complies with ISO 9244<sup>1)</sup> for the safety labels attached to its construction equipment and provides operator manuals for its machinery under ISO 6750<sup>2)</sup>.

**Preemptive Correction Measures** Preemptive correction measures are improvement measures carried out by manufacturers after making notices to customers without any external pressure. To better manage

<sup>1)</sup> ISO 9244: International standard specifications on general rules regarding construction equipment safety labels  
<sup>2)</sup> ISO 6750: International standard specifications on the format of construction equipment manuals (guidance and content)

its preemptive correction measures, Doosan Infracore not only utilizes local staff at its overseas business sites but also dispatches its experts from the head office to any location in the world. Construction equipment must be able to withstand rough work environments. The company therefore repeatedly checks the whole range of equipment features, from the performance of the specialty parts to simple malfunction, when performing preemptive correction measures, and makes corrections so that the product can be delivered to customers in the best possible state. In addition, the company frequently manages the major correction measure status using a system for quicker preemptive correction measures.

In March 2013, construction equipment and excavators were designated by law as a subject to a recall in Korea. The voluntary recall involves the company making a direct report if it discovers an issue and officially implements preemptive correction measures. In December 2017, Doosan Infracore voluntarily chose one of its products as a subject of a recall for it found possible defects in the lower heater of the fuel filter which may cause an inflow of moisture into an inner pin, damage it, overheat the fuel filter and thus make the filter stop functioning. The company sent out a recall notice to customers and offered free repairs at designated maintenance centers or locations preferred by consumers.

**Process to Reflect Customer Feedback**

**Collecting and Responding to Customer Feedback** Doosan Infracore collects and promptly handles customer feedback and requests through its dealers and direct visits to major customers. It also regularly holds meetings to share the voice of customers (VOC) in which major suppliers participate, and thus uses them as opportunities to analyze and apply market trends.

In Korea, the Customer Support Center receives customer requests, and assigns personnel who are in a position to quickly visit customers through the global positioning system (GPS). This is followed by the "Happy Call" with customers one day after to check final progress. To smoothly provide services to customers, the company has built a one-stop after market (AM) service system from sales to end-of-life disposal, and continues to enhance its dealer service training. It also carries out trainings for office and field staff of the Customer Support Center quarterly in line with a new product release. As an outcome of such efforts, the company has achieved 97.4% of claim settlement ratio within the timeline required by customers.

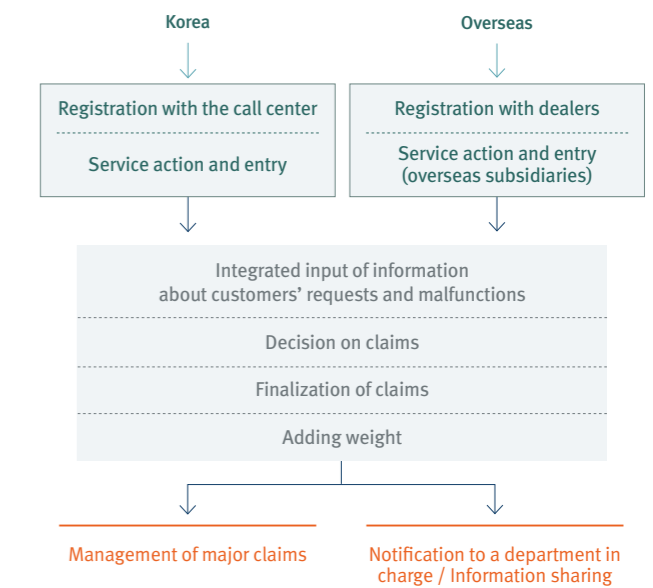
In China, dealers receive customer feedback and requests through the Service Call Center and aim to handle them within 24 hours and complete their services within seven days. VOCs are reflected in product design and quality improvement. Doosan Infracore provides various online and offline trainings to enhance the technical capabilities of its dealers' service personnel. Approximately 20 emergency service engineers make two-month training visits to around 30 dealers throughout China to provide training on mechanical repairs and maintenance while also helping to solve technical issues of the company's C (Chinese) models. As a result of these efforts, in 2019 the

company achieved 91.7% in claims processing rates for all its models. It also achieved 92% in making improvements by successfully working on 34 cases out of 37 design-related VOCs.

**Standardizing Product Post-sale Management Services** Doosan Infracore offers our customers the 4-One Service – One Hour Contact, One Day Repair, One Touch Repair, One Plus Service – to deal with product malfunctions and provide technical assistance. The company strives to provide One Touch Repair on the day when requests are made. Therefore the company continues to make improvements in its technical capabilities and service procedures while building a comprehensive customer support system that leaves no blind spot unaddressed and supplies parts in a timely manner.

**Customer Satisfaction Management** Doosan Infracore has been standardizing our customer services to improve the overall customer service quality, and providing all the service personnel with customer satisfaction (CS) trainings to foster them into CS experts. In addition, we conduct CS surveys on Happy Call services in Korea and China, and strive to keep the satisfaction level above 4.5 points on a scale of 1-5 points. In 2019, the level of satisfaction in Korea stood at 4.83 points.

**Customer Feedback Collection and Handling Process**



**NPD Process** Doosan Infracore operates the New Product Development (NPD) process with the participation of such departments as R&D, Advance Quality, Sales Strategy, and Marketing, to reflect VOCs into the new product development. The company's business sites in Korea, China, and Europe operate customer feedback collection channels from diverse perspectives. They also have built the NPD 4.0 in 2013, with improved perspectives in terms of laws, safety, and quality. They are currently operating the NPD 4.3 to ensure quality innovation throughout all steps of product development.



In 2019, we began to build the Project Management Information System (PMIS), an integrated system to better manage our new product and technology development tasks. PMIS is a platform-type integrated task management system that targets entire NPD and NTD (New Technology Development) processes of the company. The system digitalizes the information accumulated during the development process, which enables the company to manage its NPD and NTD gate as well as project schedules and issues. PMIS also supports efficient resource allocation of the company and quick decision making of its leaders. Doosan Infracore aims to complete the establishment of PMIS through two stages over the next two years. During the first stage, the company will carry out stage gate management, resource management, and project management, while the functions for strategic planning and portfolio management will be developed in the second stage.

**Building Customer Trust in Marketing and Sales Stages**

**Responsible Marketing Policies** Doosan Infracore sets and complies with proactive and responsible customer service policies to build customer trust and enhance our product values. For responsible marketing, it provides the latest product information via its website and social media channels, along with unique brand guidelines to serve as the yardstick for marketing and communication activities, including advertising and sales promotions. The company complies with legislation related to sales, marketing, and information security, and was not subject to any sanctions for falsehood including exaggerated advertising practices in 2019.

## Quality Stabilization and Standardization

**Foundation of Quality Management**

**Quality Management System** Doosan Infracore has established and been operating a customer-oriented quality management system in order to achieve its vision of developing into a “Global Leader in Infrastructure Solutions.” In 2019, in its efforts to continue to place top priority on quality, the company strived to secure a quality competitiveness of new products; enhance its global quality management by establishing differentiated quality strategies for different regions; enhance mass production quality and strengthen proactive quality management by reinforcing suppliers’ quality competitiveness and expanding the scope of their quality management; establish an infrastructure system by laying foundations for a quality management system and improving its quality system; and make continuous efforts to improve fundamental quality.

To strengthen its quality management throughout the entire value chain, the company has established and been operating a diagnosis and management system for its quality management system (QMS) that enables the company to assess the level of its quality management in the production, purchasing/quality, R&D, sales, and service sectors and to derive improvement measures. The company has also built a risk management system and set up strategies to better respond to key risks that are managed at the company level.

**Quality Management System**



In 2020, it will further strengthen the preventive quality of its new models, plants, and suppliers, and will expand its global governance through a set of global quality indicators and the standardization of quality management practices at its overseas production subsidiaries. In addition, the company will upgrade its quality management system based on digital data and cultivate internal quality experts in a bid to continuously improve its quality capabilities. It will secure fundamental competitiveness and achieve zero-defect quality management to global standards by establishing a real-time statistical process control (SPC) system, improving its preemptive quality management capabilities through mechanical failure predictions based on digital data analysis, and fostering internal quality experts in connection with the functional competency (FC) diagnosis.

**Company-wide Integrated Quality Conference** Doosan Infracore has been holding the Company-wide Integrated Quality Conference, participated by the CEO, every month since 2010 with the goal of attaining the highest quality from a customer’s perspective. The conference agenda reflects the result of the product quality analysis and shares improvement points and responses.

**Quality Improvement Index Management** Doosan Infracore focuses on making innovations in parts quality and improving product perfection to produce products that meet customer needs. The company has selected initial quality and warranty quality as indicators for customer recognition, and set an ambitious goal to increase customer satisfaction through quality management.

**Project Tracking System** The Project Tracking System (PTS) is Doosan Infracore’s system for managing quality projects. Using PTS, the company checks the progress status of the projects related to market quality, process quality, and advance quality; responses to VOCs; and improvement effects to help the company make improvements to quality and accelerate the pace of improvement. In 2019, the company focused on upgrading PTS by improving the quality conference screen, developing a dashboard for its process audit, improving batch mails, and building a database for claims, and thus increased work efficiency and established a real-time monitoring system. In 2020, it will continue to manage quality issues.

**Strengthening Preventive Quality**

In 2019, Doosan Infracore concentrated its efforts on making rapid and considerable quality improvements in a drive to secure fundamental competitiveness and increase customer value. To raise the level of the product quality by 3% compared to the current level, the company is implementing tasks aimed at quality improvement, and encouraging its manufacturing plants and suppliers to abide by the basics of product quality. In 2020, Doosan Infracore will analyze quality problems that have occurred previously by using big data in line with the Fourth Industrial Revolution to predict quality problems associated with customers’ working environments and/or equipment operation time. In addition, it will focus more on strengthening preventive quality through the preventive inspections and TMS-based remote diagnosis service so as to prevent quality issues.

**Strengthening Quality at the Parts Production Stage**

In order to minimize the number of defects at the production stage, Doosan Infracore is continuing to improve parts quality in partnership with its suppliers. As a result, the company’s warranty quality, which serves as a quality index of construction equipment parts, has improved by 20% and 21% in Korea and China, respectively, over the past three years. To prevent fluctuations in quality due to personnel change and process improvement, the company assigns different reporting obligations according to the business type of each supplier, while enhancing quality management through pre-inspections. It also holds the worst quality supplier meetings to raise suppliers’ awareness on the importance of quality and urge them to implement quality-first policies.

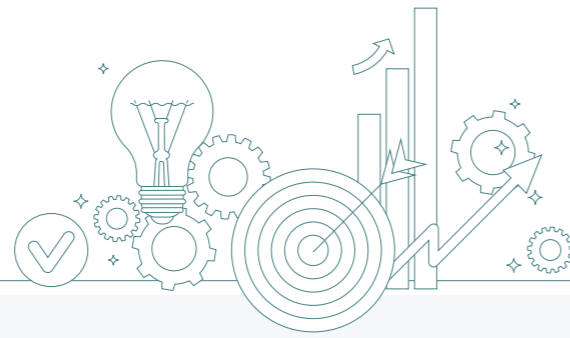
Doosan Infracore conducts quality audits customized to each supplier’s level of quality and business type to help them improve quality, and inspects their quality systems, processes, and products on a regular basis to prevent quality defects and ensure the consistency in quality management. In 2019, it conducted on-site assessment (OSA) and quality inspection audit for 74 suppliers, and in 2020 it will select 53 suppliers that need quality improvements and make concentrated efforts to help them improve their quality level. Going forward, Doosan Infracore will continuously prevent quality issues by diagnosing and checking quality risks in advance, including cases of transfer of suppliers’ contractual status, and modifications in design or processes.

**Enhancing Supplier’s Quality Management**

Doosan Infracore has put the statistical process control (SPC) system in place and analyze data to prevent quality defects and ensure stable manufacturing processes. In 2019, as part of its digital transformation tasks, the company began to develop a real-time SPC management system that automatically receives SPC data from its suppliers and monitors their process management capability. As of 2019, it completed its goal for the first stage by establishing the system for 10 suppliers. In 2020, it will proceed to the second stage and expand its scope to a total of 30 suppliers. Through the operation of the SPC system, the company expects to make continuous improvements in fundamental quality and reduce warranty costs; build a foundation for quality data analysis based on big data; secure data reliability by automating data input; and improve work efficiency through the automated transfer of suppliers’ quality information.

In addition, Doosan Infracore has been making continuous efforts to manage SPC data of its suppliers. In 2019, the company registered and managed data on 332 inspection items of 86 suppliers, resulting in continuous improvements. In 2020, it plans to expand the scope to 349 items of 100 suppliers.

# Employees



## OUR APPROACH

Doosan Infracore continually fosters talented people who support fundamental values of the company, are committed to enhancing their competitiveness, and act in the right way.

## CSR STRATEGIC TASK FOR 2019

### Establish management system and strengthen monitoring to enhance the human rights mindset

Doosan Infracore has been building a human rights management system focused on the prevention aspect through its CSR strategic task of “establishing management system and strengthening monitoring to enhance human rights mindset”. It also takes a step forward from the existing post-management enhancement efforts and education on human rights, and diagnoses the organization’s awareness level on human rights, develops its due diligence tool to prevent human rights violations from occurring, and takes necessary preventive activities in advance.

Based on a corporate culture where employees are considerate of others and diversity is respected, Doosan Infracore helps its employees achieve personal growth at their own pace according to the Functional Competency (FC) system while applying reasonable standards and principles and providing fair opportunities. Through this, the company has been building a mutually beneficial cycle in which people grow, and the growth of people in turn leads to the growth of the business. In addition, the company has been enhancing its organizational culture and win-win labor-management relations with the aim of standing proud based on the Doosan Credo.

**Activities and Achievements** Provided human rights education to all employees (gender equality, improving disability awareness, anti-bullying legislation); ran the “Building Healthy Partnership Together” program for employees in contact with suppliers; and implemented the WTD (Winning Team Dynamics) course to promote mutual respect within the organization and team building

**Plans** Strengthen human rights management system; protect employees’ human rights through the due diligence tool; run organizational development programs using the WTD course; and continue to provide human rights education

## SUSTAINABLE VALUE FRAMEWORK

### People | Talent retention

Doosan Infracore manages its employee turnover rate as part of its efforts to attract and retain outstanding talent, create socially decent jobs, and create a great workplace for its employees.

Turnover rate	(Unit: %)
1.29	1.05
2018	2019
	N/A
	Goal for 2025

### People | Employee development

Doosan Infracore helps its employees develop their capabilities to achieve both corporate and personal growth. To this end, it conducts efficient training activities for employee competency development while managing training hours and expenses per employee.

Training hours per employee	(Unit: Hour)
31.7	40.6
2018	2019
	N/A
	Goal for 2025

Training expenses per employee	(Unit: KRW 1,000)
663	750
2018	2019
	N/A
	Goal for 2025

# Human Rights and Diversity

## Respect for Human Rights

As a participant of the UN Global Compact (UNGC), Doosan Infracore supports the UNGC’s 10 Principles on Human Rights, Labor Standards, Environment, and Anti-Corruption, and complies with the International Bill of Human Rights and the International Labour Organization (ILO) Declaration on Fundamental Principles and Rights at Work. Moreover, we respect the human rights of comprehensive stakeholders, including our employees and suppliers. We do not tolerate any type of verbal abuse, violence, sexual harassment, or other improper acts that violate the spirit of “Inhwa,” meaning harmony between people, in interactions within the company and with suppliers. Doosan Infracore runs reporting channels, such as the Human Rights Protection Center (Help Line) and the Internal Reporting Center to report verbal and physical abuse. In the event of a violation, the Personnel Committee will take immediate action according to the relevant regulations and provide education to ensure that the same violation is never repeated and to build up human rights awareness.

**Enhancing the Management of Human Rights Risks** As a global company, Doosan Infracore is committed to fulfilling its responsibilities regarding human rights. The establishment and implementation of a human rights risk management system is, therefore, one of the company’s strategic CSR tasks, supported by the concerted efforts of the CSR Committee. To identify the status of human rights within the organization, Doosan Infracore reviewed the reports received through its reporting channels and the outcomes of its focus group interviews, and established a process for responding to violations of human rights based on the results of its studies. It also distributed human rights risk prevention manual throughout the company. To raise awareness concerning the importance of the human rights of its employees, it expanded the existing Gender Equality Center into the Human Rights Protection Center. In addition, the company has continued to run the offline and online human rights campaigns and education programs which were begun in 2017, and is now customized to the different requirements of its office and technical staff. In 2019, Doosan Infracore added a course on the prevention of workplace harassment to its

curriculum for human rights education for all its employees. The company also launched an in-depth course called “Building Healthy Partnerships Together,” customized for employees in direct contact with our suppliers, including those in the purchasing, production management, parts quality, and R&D departments.

In 2018, Doosan Infracore surveyed on its leaders and office workers to identify potential human rights risks, and to preempt such risks by analyzing awareness of the importance of human rights among its employees. Based on the results of this survey, in 2019 the company launched an organizational development program, called Winning Team Dynamic (WTD), for new leaders and for members of specific departments. The program is structured to increase cooperation and build a positive organizational culture through mutual understanding and respect between employees, as well as to encourage better communications. The program earned highly positive responses from participating employees, so that the company will expand the WTD program to be run company-wide and solve related issues.

In 2020, Doosan Infracore will reduce human rights risks by running educational courses and undertaking due diligence on human rights throughout the company, while also strengthening its human rights management system.

**Grievance Reporting Channels and Handling Processes** Doosan Infracore strives to prevent and properly handle sexual harassment and any other verbal and physical abuse. To this end, the company is operating the Help Line at the Human Rights Protection Center (previously called the Gender Equality Center), while also providing all employees with education on gender equality, including prevention of sexual harassment. It identifies employees’ grievance through diverse channels, such as the Human Rights Protection Center, the Internal Reporting Center, and the Cyber Reporting Center on the company website, and promptly responds to them. The company protects the privacy of the informant by maintaining anonymity, and handles the grievances under the relevant company regulations and procedures. As a result, Doosan Infracore has handled all major grievance reports filed in Korea in 2019.

## Respect for Diversity

**Protection of Employee Diversity** As of December 31, 2019, there were 4,603 employees across the globe at Doosan Infracore, including 2,860 in Korea. Given the characteristics of the machine manufacturing industry, it is not easy to recruit female employees. The company however strives to eliminate bias by having its female engineers take part in the interviews for recruiting. To foster the personal growth of female staff, the company does not discriminate against its female staff in their job assignments, nor does it place any restrictions on their assignments. The number of female employees is on the rise, and it is expected that the percentage of female managers will also steadily increase.

## Types and Details of Human Rights Violations

Type <sup>1)</sup>	Details	Type <sup>1)</sup>	Details
Discrimination	Gender	Verbal and physical abuse	Verbal abuse and violence
	Age, position, and employment type		Sexual harassment
	Country of origin and race		Alienation and bullying
	Marriage and childbearing		Invasion of privacy

<sup>1)</sup> The types of human rights violations are based on the company’s code of conduct and guidelines on the creation of a sound organizational culture.

**Providing Fair Opportunities** As specified in the Doosan Credo and the company's Ethics Charter, people at Doosan are respected for their individual characteristics. Their employment, evaluation, and compensation are not discriminated against the grounds of gender, religion, disability, age, social status, country of origin, nationality, ethnic backgrounds, race, skin color, physical conditions, marital status, pregnancy, childbearing, family type or status, ideology, political opinions, sexual orientation, educational backgrounds, or military service. Doosan people are also not treated unfairly depending on their personal relationships with the company's officials based on their academic or geographical backgrounds.

**Women's Council** Doosan Infracore expanded the scope of its Women's Council, launched for the Technology Division in 2014, to company-wide in 2017, thereby listening to the voice of female employees and sharing information on gender equality from an unbiased perspective. In 2018, to enhance internal communication channels, each member of the Women's Council was assigned to a particular department to identify any violations of human rights and collected ideas on improving gender equality in the organization. The Council also held a meeting with HR executives twice every half-year to share the collected feedbacks and took necessary improvement measures. In 2020, we launch programs designed to realize gender equality and collect opinions of a wide range of minority groups, including millennials, thereby establishing a horizontal organizational culture where diversity is respected.

## Human Resources Development

Doosan Infracore has established a human resources development system, with a particular focus on the right balance between leadership and expertise, aimed at fostering "global leaders who can lead the way in organizational changes and innovation." Individual employees develop their training plans according to their strength and competency levels, and participate in various education programs suited to their growth path.

### Global HR Information System

Doosan Infracore has been standardizing and streamlining its HR systems, processes, standards, and data from the Doosan Credo perspective. Accordingly, the company launched a new HR system called "MY HR" in March 2017 to integrate some 50 HR systems that had been previously used by different subsidiaries in various countries around the world. MY HR is a globally integrated one-stop HR system designed to handle various HR tasks, such as Doosan Competency Model (DCM), management by objectives (MBO), and development plan (DP), as well as training applications. It is available

to all Doosan Infracore business sites in Korea, China, the U.S., and Europe. All employees have the right to create or view personal information about themselves and their team members (if they are managers) through MY HR. They are thus required to sign the Pledge of Personnel Information Protection to promise to handle and process the personnel information of themselves and their team members according to certain principles.

### Enhancing Functional Competency

Doosan Infracore has put a sophisticated Functional Competency (FC) development system in place, with the head office taking a central role, in consideration of individual employee's unique skill sets and capabilities. The company also encourages its employees to devise their education plans according to the result of their FC assessment.

**Building the FC Development System** FC enables employees to define the competencies they need to perform their duties successfully and to set their roadmap for personal growth in line with their level of competencies. Doosan Infracore operates an FC-based HR education and development system to help its employees become experts in their respective fields. In 2015, the company published a development directory which contains a list of training courses and details required for each job competency level. In 2016, it completed the establishment of the FC development system for R&D, production, and sales, and restructured functional courses. In 2017, it launched an FC level-up program that enables its employees to establish and implement their development plans on their own based on the result of the FC assessment. Starting from 2019, Doosan Infracore is diagnosing its employees' job competency level based on the latest FC system, while also implementing an FC level-up program for all employees every two years.

To nurture its technical staff to a high level of expertise and competitiveness in their respective fields, in 2014 Doosan Infracore set up a draft FC system for technical staff based on National Competency Standards (NCS)<sup>1)</sup>. This was followed in 2017 by competency assessments across 11 technical categories, and the implementation of an FC-based HR development plan, including the building of an FC diagnostic system and the launch of job training linked to the FC system in 2018. In 2019, the FC diagnostic system was completed for all 11 job categories, and new job training courses were launched based on the results of the diagnostics. NCS-based training programs and self-diagnostic tools have enabled the company to more systematically manage technical job competencies, and to set up more targeted training. Doosan Infracore became the first major Korean company to apply the NCS to its employee skill diagnostics system, and its NCS-based FC development system for technical staff was recognized as a pioneering case by the Human Resources Development Service of Korea in January 2020 and will be shared throughout the industry. In 2020, Doosan Infracore will improve its production and quality by running a new curriculum which

<sup>1)</sup> NCS: The systemization of the knowledge, skills and processes required to perform various jobs at industrial sites in Korea

reflects the results of its FC diagnostics. It will also share the results more widely as part of its efforts not only to increase the understanding of its own employees, but also to help the entire Korean manufacturing industry to improve.

**Competency Development Trainings** Doosan Infracore has set up a self-directed learning system so that employees may study voluntarily under their own volition. Employees can search, apply for, or access various courses offered by the company's self-directed learning system on their computers or mobile devices anytime, anywhere through MY HR, an integrated HR system. In December 2017, the company launched CELL (Community of Employee-Led Learning), a new employee learning support system, to promote and support employees' self-directed, small-group, job-related learning activities. A CELL consists of 3-10 employees who choose their education contents and methods, and undertake autonomous learning on this basis for 5 months. Launched in 2018, the CELL had run 4 classes by the end of 2019, participated by 1,188 employees in 173 CELLS. Outstanding CELLS were selected following performance evaluations, and were rewarded with cash prizes and gift certificates. In 2020, the company will continue to support self-directed CELL-based learning by its employees.

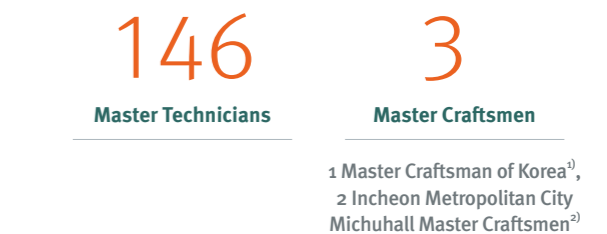
As set out in the company's digital transformation direction, Doosan Infracore offers courses to help foster experts with business acumen and theoretical skills in data analysis, management, and utilization. The "DRAW (Digital Edge Reinforcement at Work)" course was launched in 2018, followed by the "FIDAS (Field Data Scientist)" course in 2019 to nurture in-house data experts. In 2020, Doosan Infracore will accelerate the training of data experts by setting up the "AI Community," a self-directed AI learning group, in addition to running its regular training courses.

In 2019, Doosan Infracore launched its "MEX (Marketing Excellence)" course to improve the marketing skills and strategic thinking of its sales and marketing leaders. The MEX course consists of lectures on market sensing, marketing strategy (STP/4P), pricing & channel, and brand power. There are also workshops on the hot topic of digital marketing, and an action learning module during which participants can apply the theories and practices they learn during the course to the company's actual sales strategies. Eight MEX courses were run in 2019, enabling the company to enhance the sales and marketing strategies needed to increase the value of its brand and generate long-term sustainable growth.

To improve the expertise of its technical staff and foster in-house professionals, Doosan Infracore runs technical job training based on the FC system, and also supports technical study clubs and the acquiring of certification by individual employees. The technical job training system was established through cooperation between its production executives and on-site VOCs. 271 courses in total are now being developed, in stages according to priority. In 2019, there were 36 programs for the employees' study clubs, aimed at sharing technologies or passing technical license exams, and 236 individuals (including double counting) completed the courses. In 2020, the company will continue to support the employees' study clubs, establish a management system for the outcomes of the study clubs using TEAMS, and develop them into knowledge assets of the company, to promote a voluntary, field-oriented learning culture. As a result of these efforts to foster technical experts, 146 Doosan Infracore employees had been nationally certified as master technicians (12% of all its regular technical workers) as of December 2019, and 15 of them have obtained their master technician title in more than two areas, meaning that the company has obtained 165 master technician licenses. Those employees who acquire expertise through the company's support system in turn disseminate it throughout the company, creating a virtuous cycle within the organization.

### Outcomes of Development of Technical Staff

(As of December 2019; Accumulated figure)



<sup>1)</sup> Master Craftsman of Korea: This refers to those who are designated by Article 11 of the Act on Encouragement of Skilled Crafts among those who have the highest level of skilled crafts, and greatly contributed to the development of skilled crafts and the improvement of the status of skilled craftsmen by having worked in industrial fields for a long period of time.

<sup>2)</sup> Incheon Metropolitan City Michuhall Master Craftsmen: This refers to those who are designated by Paragraph 1 of Articles 3 of the Ordinance on the Selection and Support of Incheon Metropolitan City Michuhall Master Craftsmen among those who are equipped with an outstanding spirit of master craftsmen and the highest level of skilled crafts, and greatly contributed to the development of technologies by having worked in industrial fields for a long period of time

### Developing Global Talent

**Leadership Training** The future of a business depends to a great extent on its leaders. Doosan Infracore, therefore, offers a wide range of advanced leadership education programs, including the Leader Coaching Program, the Partnership Coaching Program, and the Competency Improvement Course for Part Leaders. These courses enable leaders to understand their duties and acquire the leadership skills required for different leadership positions. The Leader Coaching Program was run between June 2019 and January 2020, to offer team leaders and part leaders the opportunity to demonstrate effective leadership. They were taught various coaching skills, and learned how to apply them to their working environments. The Partnership Coaching Program was offered two times to deputy managers and managers from June to September 2019, enabling them to tap into their personal strengths and contribute to the development of their department within the organization as a whole. In 2020, the company will continue to offer customized coaching courses which enable employees to improve their leadership skills, prepare leaders to step forward, and, through the Winning Team Dynamics course, bring positive changes at the team level.

Doosan Infracore runs group coaching programs tailored for field leaders in technical positions. This helps to resolve any on-site issues with the support of professional coaches, and is bringing about practical changes and more advanced leadership through daily learning and coaching. In 2018, based on the role model for technical field leaders established in 2017, the company made improvements in the technical leadership education system, and operated a leadership course while expanding the technical field leader coaching program to the Incheon Plant. In addition, the company has set an education plan

#### HRD System



to boost organizational vitality to nurture YBs<sup>1)</sup> in the technical field, and has been running the "Vision Camp" to enhance their leadership since 2016. In 2019, the company improved its existing leadership courses for employees moving to new positions and for those who have recently been promoted as well as the Vision Camp. It also launched six new leadership courses, including "Happy Retirement Preparation Course" for employees soon to be retired and "New Technology Managers Course" that reflects the new personnel system for technical staff.

**Education on the Global Work Environment** To help its employees work efficiently in a global business environment without any communication difficulties, the company runs "Let's Do Biz English," an 80-hour practical English course, in addition to short-term intensive Chinese courses. In 2015, Doosan Infracore launched a collaboration website called Global Mobility Support (GMS) to provide employees assigned to overseas posts with information about various regulations, welfare benefits, and tips intended to help them enjoy a pleasant life overseas. The company also runs online and offline programs including language courses tailored to its employees and their family members. From 2020, it will launch an in-house language course for technical personnel at customer contact points such as CS and PS.

### Reorganizing Personnel Management System for Technical Staff

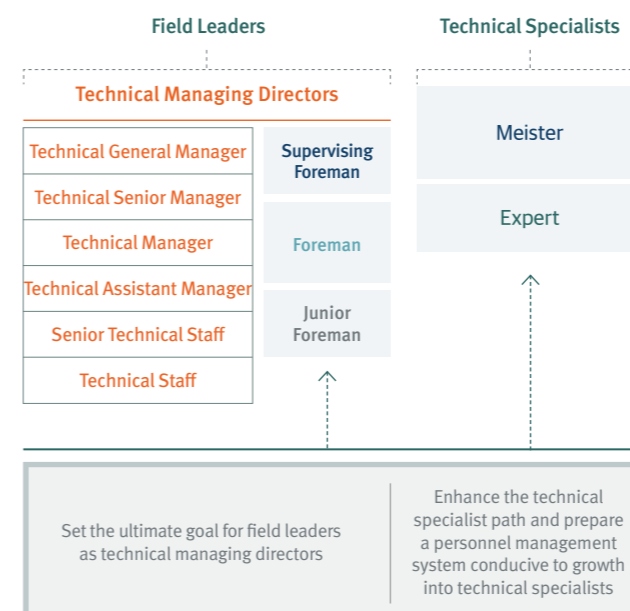
Doosan Infracore has been building human resources development (HRD) systems for its technical staff in line with the Doosan Credo to encourage them to pursue personal development and have a clear vision. To this end, the company has been making continued efforts including by reforming the systems for the job assignment, promotion, and competency evaluation; launching courses to develop technical experts; establishing an FC system; operating the change agent (CA) system for technical staff; and conducting global benchmarking. In 2012, it introduced the position and promotion system so as to present its technical staff with a vision for personal growth and pride in their individual ability and status. With the introduction of the Doosan Competency Model (DCM), an assessment system for technical staff, leaders became aware of the importance of nurturing their team members' competency, while team members were encouraged to develop their own strengths. The company also has established technical specialist courses designed to help its technical staff further develop their job competencies and provide them with opportunities for personal growth while working as an Expert or Meister. In addition, CA activities of technical staff contributed to solving issues within the organization, while education programs and growth opportunities based on global benchmarking helped the company to further enhance its organizational competitiveness. In 2016, Doosan Infracore overhauled its FC-based HRD system in cooperation with field leaders and changed the titles of its technical staff from entry-level employees to managers, thereby bringing about positive effects of raising their social status.

<sup>1)</sup> Young Boy (YB): Technical staff hired in 2004 or after

Doosan Infracore established its Career Development Paths of Technical Staff by creating a technical managing director system and strengthening the existing technical expert system, thereby offering its technical staff a choice of becoming a "field leader" or a "technical specialist." A technical managing director is a person with leadership and practical skills and plays his/her role as a team leader in the company's production units, presenting technical staff with a vision to be a top leader. A technical specialist is a field expert with professional skills and strong competitiveness, presenting technical staff with a vision to be a top technician. Through this system, technical staff can choose from the two development paths – the "technical specialist track" which enables them to grow into Meisters and the "field leader track" in which they develop into executives in charge of production sites.

Following the first appointment of a technical managing director on the company's 80th anniversary in January 2017, four Meisters were chosen in April 2019. The title of Meister is the highest honor granted to professional technicians who have long been engaged in particular job categories for the purpose of cultivating technical staff and inspiring pride in them. Doosan Infracore selects a Meister through a strict comprehensive evaluation conducted by the Professional Technical Committee that includes evaluation and verification of their personal competencies, fact-checking through 360-degree interviews with their colleagues, and in-depth interviews, during a span of six months. The four Meisters have worked for over 30 years in calibration/testing, welding, engine assembly, and facility maintenance using their top-of-the-line technical competencies, with their colleagues taking them as their role models. Doosan Infracore will continue to foster its technical staff in a systematic way so that they can improve their work engagement with pride, thereby building a virtuous cycle of growth at the corporate level.

#### Career Development Paths of Technical Staff



## Invigorating Organizational Culture

### Internalization of the Doosan Credo

All members of Doosan internalize the Doosan Credo, a set of principles that represents Doosan's philosophy and unique way of doing business, thereby contributing to the development of the company as a sustainable organization. To create sustained positive outcomes through a virtuous cycle structure, all employees of Doosan Infracore strive to internalize the Doosan Credo with its leaders undertaking an exemplary role and CAs playing a central role in bringing change. The company promotes and shares the Doosan Credo on a continuous basis by annually discovering and honoring exemplary cases of employees who have made an exceptional contribution to promoting core values of Doosan and improving office work productivity.

### Improving the Way of Working

**Changes Starting from Leaders** Doosan Infracore emphasizes the need for its leaders to initiate changes and set a strong example for others to follow. The company holds leadership sessions on an annual basis to bring together the CEO and senior executives to share the latest changes in business management environments, figure out the implications of such changes, discuss the directions that the company's organizational culture must pursue, and find ways to make improvements.

**Operating the CA Channel** Doosan Infracore makes constant improvements in its way of working through the Change Agent (CA) channel run by each executive organization. Serving as a bridge between executives and staff, a CA has a CORE Time on a monthly basis to identify inefficiencies at work, discuss improvement measurements with leaders, and implement necessary tasks.

**Improving Office Work Productivity** Since 2018, Doosan Infracore has implemented the company-wide campaign and action plans to boost office work productivity. In 2019, the company made a positive impact on productivity by adopting more efficient ways of working, helping its employees create the right work-life balance, and strengthening its execution capabilities. Meetings and reports have been made more efficient and smarter, with a particular emphasis on eliminating gray zones which can arise from job assignments falling into gaps between departments, new types of work emerging, and ambiguities in roles and responsibilities (R&R) occurring. If issues and problems related to gray zones are solved, the office work productivity can be significantly improved. Doosan Infracore, therefore, strives to identify gray zones and solve any related problem at the company level, thereby further enhancing its office work productivity. The company has also made progress in improving work-life balance, including through more flexible working hours and automatic PC shutdown after business hours. In addition, it strengthened its execution capabilities by continuing to discuss the improvement measures regarding office productivity in its leadership sessions.

**Communication and Consideration**

Doosan Infracore operates diverse communication channels, including online and offline grievance mechanisms, the Human Rights Protection Center, the company website, and the in-house portal with the goal of boosting employees’ satisfaction at work through genuine communication between the company and its employees. In addition, the company has been sharing media coverage about the company and public notices that it has made externally through “D-Briefing” since 2016. Moreover, it shares with its employees the corporate vision, including key business strategies, new businesses, and new growth drivers, through “CEO Talks” to ensure transparent communication of corporate activities.

**Work-Life Balance**

Doosan Infracore complies with the labor regulations of the countries in which it operates. To further improve its employees’ quality of life, the company offers a wide range of welfare benefits that match each country’s unique situation. In particular, it proactively supports a sound work-life balance through family-friendly management practices, including the operation of childcare centers and the granting of parental leave, reduced working hours, and family care leave. It also carries out customized activities to improve corporate culture by promoting the use of flextime.

**Operation of Flextime** In Korea, Doosan Infracore operates a flextime system to support its employees’ work-life balance. When working hours need to be altered as a means of improving work productivity and efficiency, employees can freely adjust their work hours by receiving pre-approval from their leaders as long as their regular working time per day is eight hours.

**Support for Building a Stable Life** In Korea, Doosan Infracore offers industrial accident insurance, supports medical costs, and carries out regular medical checkups to protect its employees in the events of health emergencies or accidents. It also helps its employees financially through loans for their children’s tuition fees and housing support measures.

**Employee Assistance Program** Doosan Infracore runs the Employee Assistance Program (EAP) which offers counseling and education on health, finance, and other matters. In Korea, the company has been operating DOOHUG, an in-house psychological counseling center, since 2014. (Please refer to page 83 of this report for further details about DOOHUG.) In China, the company offers sand-therapy as a special program for employees and their family members, and operates psychological counseling programs for expatriate employees and their family members.

Moreover, the company runs a life-cycle design program in cooperation with an external professional organization to help retiring employees with any career shift they may be considering. The life-cycle design program offers one-on-one consulting and open lectures in such areas as career exploration, support for starting a business, life counseling, finance, and liberal arts licenses for up to ten days for around six months depending on the individual lifetime design goals.

**Recharging Opportunities** In Korea, Doosan Infracore encourages its employees to take a two-week vacation before or after the first week of August when domestic plants halt their operations. The company has also implemented the Overseas Advanced Culture Exploration Support System for its regular staff – office or technical staff who joins the company before January 1st of the previous year – to help them experience foreign culture on the occasion of their annual vacation periods. The company offers them round-trip air tickets and Eurail passes so that they can take the opportunity to recharge themselves. This is a differentiated benefit program from other companies offered to Doosan employees, thus boosting their pride in the company.

**Family-friendly Management** Doosan Infracore allows its employees to choose childcare leave and family care leave or reduced working hours depending on their situations. The company also runs flextime and leave of absence systems according to the circumstances of the relevant countries. In Korea, Doosan Infracore runs the Mom’s Caring Program, a company-wide policy to support pregnant employees. To this end, the company publishes a “Guidebook on Pregnancy, Childbearing, and Childcare” to offer information about support programs available in and outside the company regarding pregnancy, childbearing, and childcare. Also, it creates a “Mom and Pop Guidebook” based on the opinions collected through the Women’s Council, shares it with all employees, and makes constant updates.

For pregnant employees, the company grants reduced working hours and prenatal checkup leave, while also offering parental leave. It guarantees a recovery period for female employees who have suffered from miscarriage or abortion comparable to that granted for childbearing. In addition, the company allows its employees, regardless of their gender, to choose either childcare leave or reduced working hours, and operates in-house childcare centers in three locations – Incheon, Gunsan, and Seoul. The company also allows its employees to use their leave to take care of family members in need, promote personal development, or focus on infertility treatment. In China, the company offers a leave of absence or a shorter workday to female employees who have just given birth to a child.

**Support Systems for Family-friendly Business Management (Korea)**

	System	Details	Eligibility and period
Pregnancy	Pregnant employee caring program	Parking permit for pregnant employees	Pregnant female employees
		Guidebook on pregnancy, childbearing, and childcare	
	Pregnant employee badges, stickers, and parking permit		
	Use of affiliated hospitals, in-house lounges, internal and external psychological counseling centers, if needed		
Basic support during pregnancy	Compliance with 8-hour workday and prohibition of holiday work	Pregnant female employees (the entire pregnancy period)	
	Support for medical bills during pregnancy and childbearing	Pregnant female employees (from pregnancy to childbearing)	
	Shortened working hours during pregnancy	Shortened working hours for the health of pregnant employees and their babies	Pregnant female employees (reduce working time up to 2 hours per day until the 12th week and after the 36th week of pregnancy)
Leave for prenatal checkup	Parental checkup leaves	Pregnant female employees (once per month until the 28th week of pregnancy; once every two weeks from the 29th to the 36th week; and twice per week after the 37th weeks)	
Childbearing	Leave before or after childbearing	Childbearing leave	Female employees who give birth to a child (90 days / 120 days for twins)
		Miscarriage/abortion leave	Male employees whose wives give birth (10 days)
	Childbirth cash gift	Cash gift in celebration of childbirth	Female employees who have a miscarriage or abortion (Leave duration varies depending on pregnancy period, with a ceiling of 90 days for pregnancy of more than 28 weeks)
Childcare	Leave for childcare	Childcare leave	Employees who have childbirth
	Reduced working hours for childcare	Reduction of working hours for child care (15-30 hours per week)	Employees with children aged less than 8 years or second graders in elementary school (up to 2 years for a total of childcare leave (1 year) and shortened working hours)
	In-house daycare center	Daycare centers in Incheon, Gunsan, and Seoul	Employees with children aged 3-5 years (selected through transparent procedures at a fixed time)
Family	Special leave of absence	Leave of absence to take care of family members suffering from illness or recovering from accidents	Employees (90 days per year)
		Leave of absence intended for family members in need of special care, personal development, and treatment of infertility	Employees (6 months + additional 6 months)

# Win-Win Labor-Management Relations

## Compliance with Labor Policies

Doosan Infracore complies with the labor standards of the International Labour Organization (ILO). Each year, the company conducts investigations to detect any child labor or forced labor practices within the company through the annual CSR assessment of all domestic and major overseas business sites. In 2019, none of the company's business sites in Korea and overseas have resorted to child labor or forced labor of any kind. It has also signed the Guidelines on the Protection of the Working Conditions of In-house Subcontractors' Workers with the Korean Ministry of Employment and Labor. Accordingly, the company ensures compliance with relevant regulations through a regular monitoring, and it also complies with the government's guidelines on fair transactions and thus properly operates in-house subcontracting activities.

## Labor-Management Relations

Since the launch of the Win-Win Labor Union in 2011, Doosan Infracore has maintained and developed labor-management relations based on mutual trust and respect, including the strike-free conclusion of collective bargaining agreement for nine consecutive years. Labor and management continue to communicate through diverse channels, including the Labor-Management Council and the Welfare Subcommittee, and share major issues through the quarterly Business Information Session.

In 2019, the company held diverse labor-management events, including "Family Day" for its technical staff, participation in the Incheon International Half Mara hon, and support for local welfare facilities. In addition, each of its business sites in Incheon, Gunsan, and Ansan holds a "Building a Great Workplace Committee" meeting every two months, and thus improves the work environment based on employees' opinions.

Its Chinese subsidiary has established a special council in accordance with the Trade Union Law of the People's Republic of China which is equivalent to the Labor Standard Act in Korea. The special council's members are elected by vote. The company holds a monthly meeting with the special council to discuss major developments and share opinions on various worksite issues, and discusses wage on an annual basis.

## Joint Customer Support of Labor-Management

The labor union and management of Doosan Infracore have been working in unison to overcome the market downturn since 2016 through the joint customer support program by visiting customers, listening to their voice, and providing customer services. The joint customer support activities enable the company to identify customer requirements and forwarded them directly to the company's production sites, thereby further improving product quality and also enhancing the brand value of Doosan Infracore.

# Communities



## OUR APPROACH

Doosan Infracore will grow into a reliable and reputable company that contributes to the sustainable growth of local communities by generating not only business opportunities but also social values based on its expertise and competencies.

Based on our purpose of sincere corporate community involvement (CCI), Doosan Infracore has established a global CCI system and guidelines that reflect its corporate capabilities and social demands while carrying out CCI activities worldwide guided by a common set of core values. The CCI Committee ensures that donations are spent in a transparent way. Together with its employees around the globe, Doosan Infracore is implementing CCI programs that are instrumental to the development of local communities.

## SUSTAINABLE VALUE FRAMEWORK

### People | Corporate citizenship and donations

Doosan Infracore, as a responsible corporate citizen, aims to contribute to the creation of a sustainable community through constant CCI activities based on partnerships.

CCI investment (Korea) (Unit: KRW billion)			CCI investment per sales (Korea) (Unit: %)		
2018	2019	Goal for 2025	2018	2019	Goal for 2025
7.73	8.64	N/A	0.25	0.28	N/A

# CCI Strategies and Directions

## CCI System

**CCI Strategies** Doosan Infracore generates not only business opportunities but also social values by leveraging its expertise and competencies to grow into a trusted and reputable company that contributes to the sustainable growth of its own and local communities as well. To this end, the company plans and executes corporate community involvement (CCI) activities that take into account the characteristics of local communities based on its CCI guidelines and continuous communication with local communities. The CSR Part at the head office is taking a central role and works in partnership with staff in charge of its overseas business sites.

## CCI Strategies



<sup>1)</sup> Based on the announcement of the World Economic Forum (Davos Forum)

In 2019, the company aligned its business directions with strategic CCI directions, and subsequently expanded its employees' voluntary CCI activities, stabilized the operations of the reorganized Dream School program, strengthened community-centered activities, and developed new programs. In 2020, it plans to assess the Dream School program performance and develop new community-centered CCI programs.

**Operation of the CCI Committee and the CCI Council** Doosan Infracore spends donations after carrying out a comprehensive review of the public interest and appropriateness of programs and institutions, and the relevance of programs to the company's CCI direction. For the more transparent and proper collection of donations and execution thereof, the company has launched the CCI Committee, an organization that deliberates on and determines all matters related to donation, in 2017 and established relevant regulations. Led by the CEO, who also serves as the chairman of the CSR Committee, the CCI Committee is comprised of the CFO and executives in charge of legal affairs and CSR. The Committee deliberates where to spend donations followed by reviews of how much to spend on each proposed program considering each program's relevance to the company's business and its public nature together with the company's financial situation. Doosan Group's CCI Committee, which is composed of executives from major affiliates of the Group including Doosan Infracore, discusses and makes decisions on policies on donations along with the donation beneficiaries and amounts for each affiliate. In addition, donations worth KRW 500 million or those deemed necessary to be reviewed by the BOD are deliberated and approved by the BOD.

### Support for the Next Generation

**Dream School** Doosan Infracore has been running "Dream School" since 2012 together with World Vision, an international NGO devoted to humanitarian aid across the world. As one of the company's flagship CCI programs, the Dream School helps youth living nearby its business sites in Seoul, Incheon, and Gunsan to nurture their dream for five years from second grade of middle school by offering mentoring programs, education for self-discovery, Dream Project activities, and other experiential programs to help them shape their career path. Middle school mentees take part in a mentoring program provided by Doosan Infracore employees for two years – it also includes education for self-discovery, specialist mentoring sessions, and career experiences. High school mentees engage in self-directed activities, including meeting with professionals through Dream Club activities, in an effort to shape their career paths.

The first year of Dream School mainly consists of "Dream Leaders" activities where a mentor and mentee meet once a month to discover the mentee's area of interest and dream. There are also other activities that form a sense of closeness between mentors and mentees including the "Summer Camp" where mentees meet friends from other regions, "Professional Mentoring" where mentees meet professionals, and "Home Coming Day" where mentees meet Dream School graduates. In the second year, the "Dream Project" is executed to improve youth's problem-solving capabilities with the advent of the Fourth Industrial Revolution era that is changing the world faster than ever. Mentees think about, identify with, and discover solutions for daily life problems that require improvement, and challenge themselves to find solutions, thereby enhancing their independent problem-solving skills. The high school program focuses on emotional support and capacity building through coaching programs while also increasing the practical understanding of their dreams and aspired careers through opportunities to meet professionals.

In 2019, Doosan Infracore selected 42 mentors and mentees for the 6th class of Dream School. The 6th class, in particular, was run under the new program direction of "career exploration to prepare future generations," based on which the company has been making continuous efforts to help the mentees to grow into good members of society by encouraging them to participate in various community activities, such as experiential activities, professional coaching, and peer activities, in addition to mentoring supports offered by its employees. From 2012 to 2019, 415 youth and 370 employees shared the journey to nurture dreams of youth, and those who participated in the 1st, 2nd, and 3rd classes of Dream School have grown into respectable members of society. Going forward, Doosan Infracore will continue to develop new programs in consideration of expectations and standards of the participating students so as to make Dream School a more practical and sustainable CCI activity.

**Construction Support for Hope Elementary Schools in China** Under the slogan of "We will build a beautiful China together," Doosan Infracore China Corporation (DICC) has been participating in "Project Hope," a public service project that involves the provision of educational support for Chinese youth and improvement of the educational environment in underprivileged regions of China. DICC has been supporting the construction of Hope Elementary Schools, thereby providing local youths opportunities for education and contributing to the development of local education and sustainable development of the country. In 2019, it expanded the scope of its support from 12 in the previous year to 30 schools, sharing hope with children. DICC also operate an "honorary school principal system" together with dealerships in China, and it has been holding the "Doosan Hope Travel Summer Camp" every summer since 2007. Teachers and students of Doosan Hope Elementary Schools from all around the country are invited to join the summer camp, which enables students to enjoy cultural experiences while having fun. Under the honorary principal system, the CEOs of Doosan Infracore dealerships are appointed as principals with the aim of encouraging participation of dealers and ensuring continued support for the schools.

### Support for Local Communities

Doosan Infracore carries out corporate community involvement (CCI) activities in consideration of the characteristics and needs of local communities with an aim to grow together with them. The company holds workshops with staff in charge of CCI at its business sites, and shares the CCI direction and major annual schedule, while collecting their opinions. By doing so, the company promotes various CCI activities that address the needs of communities based on cooperation with reputable non-profit organizations in local communities.

Doosan Infracore carries out a variety of CCI activities with the participation of not only its employees but also their family members in a way that the activities can bring practical assistance to local communities. In Seoul, the company conducts activities to improve the residential environment of the neighborhoods in which its business site is located, while in Incheon and Gunsan, the company supports local community welfare facilities as part of its efforts to improve the welfare of local residents. The company also continues to supply kimchi and briquettes to the underprivileged in local communities. It undertakes its CCI activities with funds raised through voluntary financial contributions from its employees in the form of "Collecting Small Change from Employee Salary" and the "Employee Donation Accounts," as well as the company's donation in the form of a matching grant.

In recognition of its efforts to understand the needs of local communities and continue with its CCI activities, Doosan Infracore received the Prime Minister's Commendation in the donation category at the 2019 National Sharing Grand Awards. The company will continue its CCI activities based on the enduring interest it has developed as a member of communities where its business has prospered.

### Support Based on the Company's Core Competencies

Doosan Infracore leverages its business resources to promote its CCI activities, including expertise in construction mechanical engineering and product development.

**Support for Natural Disaster Relief** In the event of a massive disaster such as an earthquake or a typhoon, Doosan Infracore promptly provides construction equipment, such as excavators, wheel loaders, and compact construction machinery, and funds for relief efforts, thus providing support based on its core competencies – one of the company's core CCI strategies. It has provided construction equipment and donations for rapid relief and recovery from devastating natural disasters around the world, such as Hurricane Katrina in the U.S. in 2005, the Sichuan earthquake in China in 2008, the earthquake in Haiti in 2010, the Tohoku earthquake in Japan in 2011, Typhoon Haiyan in the Philippines in 2013, the devastating earthquake in Nepal in 2015, and the earthquake that hit Indonesia in 2018.

**Donation of Equipment and Model** Doosan Infracore donates excavators, parts, and engines produced in the course of product development stage for tests to the relevant departments of universities and vocational high schools to be used as educational materials. In April 2019, Doosan Infracore signed a memorandum of understanding (MOU) with the Ajou Motor College in Boryeong, South Chungcheongnam Province, regarding a support project to train local young people about construction equipment. In accordance with the MOU, the company donated construction equipment, engines, hydraulic pumps and cylinders, and also ran training programs. This cooperation project between industry, government, and academia is helping to cultivate outstanding construction equipment technicians in Boryeong, home to the company's proving ground. In addition, it has donated compact track loaders and the attachments needed to clear snow in winter and control weeds in hazardous conditions to military units stationed along Korea's often snowbound northern border.

**The Junior Engineering Class** Launched in 2008, the Junior Engineering Class is a talent donation circle mainly consisting of Doosan Infracore's R&D executives and employees. Doosan Infracore offers experience-based classes, including science kits, to elementary school students nearby its business sites in Korea to help them learn the basic principles of science in an easy and interesting way. It offered classes on topics in science and technology such as steel, solar cars, electrostatic power plants, and glasses which prevent drowsiness. In April 2019, the company held the Junior Engineering Class for some 20 local elementary school students on the topic of self-driving excavators at its Global R&D Center in Incheon. It also donated school supplies to the two public childcare centers in Incheon where the company held the class.

# Employee Engagement

## Doosan Day of Community Service

The Doosan Day of Community Service refers to the CCI activities undertaken by Doosan Group employees. They assess the needs of the local communities in which Doosan Group operates around the world, and then lend a helping hand. Doosan Infracore takes part in making meaningful changes through the Doosan Day of Community Service every year, making the event a festival of sharing. In 2019, 352 Doosan Infracore employees participated in the Doosan Day of Community Service and conducted volunteer activities, including putting up wallpaper and providing quarantine products in a shantytown of Dongdaemun in Seoul, improving the local community welfare facilities in Incheon, and upgrading a community center cafeteria for the elderly in Gunsan. As an active member of its local communities across the globe, Doosan Infracore will continue to participate in the Doosan Day of Community Service as part of its unique culture of voluntary engagement.

## Employee Donations

Approximately 73% of Doosan Infracore's employees in Korea participates in the company's employee donation programs as of the end of 2019. These consist of the "Collecting Small Change from Employee Salary" scheme and the "Employee Donation Accounts," alongside the company's matching grant. The funds raised are donated to the Community Chest to which the company has been making donations since 2011 as part of its efforts to spread a culture of sharing and donation. As a result, the company was recognized by the charity as one of "2019 The Best Good Company" in January 2020. This honor is given to the most outstanding of all those organizations whose employees donate part of their monthly salaries to the Community Chest, thereby setting a good example. For the 2019 award, 46 organizations were selected, out of more than 1,500 which were qualified nation-wide. Doosan Infracore will become a valued corporate citizen that contributes to local communities by continuing its wide-ranging sharing activities.

## Building a System for Employee Engagement

Doosan Infracore is operating various systems to establish a corporate culture where employees' participation in CCI is encouraged. The company built a CCI Information System on the company Intranet to increase employees' awareness of the company's voluntary services while keeping track of their participation and managing the employee donation. In addition to company-led CCI programs, Doosan Infracore operates a support system for voluntary service clubs run by employees. In addition, the company operates diverse support programs, such as the CCI diligence and indolence system and reward system, to encourage the voluntary participation of employees in CCI activities.

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# Consolidated Financial Statements

## Consolidated Statements of Financial Position

Doosan Infracore Co., Ltd. and Subsidiaries | December 31, 2019 and 2018

(in Korean won)

	2019	2018
<b>Assets</b>		
<b>Current assets</b>		
Cash and cash equivalents	₩ 756,173,371,116	₩ 1,053,016,029,210
Short-term financial instruments	144,970,645,937	261,439,186,727
Short-term investment securities	9,318,795,000	14,288,402,916
Trade and other receivables	1,369,116,857,182	1,353,418,884,045
Derivative assets	18,988,676,082	8,956,727,423
Inventories	1,786,289,860,152	1,524,363,766,335
Other current assets	220,054,157,373	211,338,773,310
	4,304,912,362,842	4,426,821,769,966
<b>Non-current assets</b>		
Long-term financial instruments	880,896,511	848,391,912
Long-term investment securities	14,272,106,397	99,008,790,522
Long-term trade and other receivables	3,801,609,182	10,891,458,308
Non-current derivative financial assets	-	7,996,253,597
Investments in associates and joint ventures	102,979,090,904	67,912,129,252
Property, plant and equipment	1,871,456,154,884	1,782,632,844,011
Intangible assets	4,562,367,986,165	4,328,656,381,720
Investment properties	138,829,679,310	26,308,106,687
Deferred tax assets	174,235,049,341	205,848,185,403
Right-of-use assets	95,677,455,743	-
Other non-current assets	69,180,589,842	72,242,380,666
	7,033,680,618,279	6,602,344,922,078
<b>Total assets</b>	₩ 11,338,592,981,121	₩ 11,029,166,692,044
<b>Liabilities</b>		
<b>Current liabilities</b>		
Trade and other payables	₩ 1,599,449,470,221	₩ 1,613,823,764,093
Short-term borrowings	591,083,320,796	937,599,855,700
Current portion of bonds	1,037,594,646,618	505,338,874,285
Current portion of long-term borrowings	621,375,844,987	173,048,137,404
Current tax liabilities	30,414,605,601	25,849,607,446
Derivative liabilities	492,095,603	12,301,480,333
Provisions	236,982,347,908	179,066,431,365
Current lease liabilities	28,225,777,667	-
Other current liabilities	338,801,722,238	331,546,013,747
	4,484,419,831,639	3,778,574,164,373
<b>Non-current liabilities</b>		
Non-current other payables	1,370,355,771	1,156,747,007
Bonds	902,476,286,676	944,061,136,540
Long-term borrowings	751,008,617,154	1,708,761,427,603
Net defined benefit liabilities	429,338,000,825	406,106,460,314
Non-current derivative liabilities	1,974,340,123	4,127,632,054
Deferred tax liabilities	260,072,401,549	204,364,376,024
Non-current provisions	52,254,778,188	20,377,900,315
Non-current lease liabilities	51,179,799,272	-
Other non-current liabilities	136,946,531,665	140,821,964,241
	2,586,621,111,223	3,429,777,644,098
<b>Total liabilities</b>	₩ 7,071,040,942,862	₩ 7,208,351,808,471
<b>Equity</b>		
Share capital	1,040,806,395,000	1,040,790,385,000
Capital surplus	154,356,219,760	213,014,383,085
Other components of equity	(70,649,474,593)	(129,310,962,134)
Accumulated other comprehensive income	(159,818,151,453)	(256,805,144,728)
Retained earnings	1,257,868,188,737	1,049,189,116,801
<b>Equity attributable to owners of the Parent Company</b>	2,222,563,177,451	1,916,877,778,024
<b>Non-controlling interest</b>	2,044,988,860,808	1,903,937,105,549
<b>Total equity</b>	4,267,552,038,259	3,820,814,883,573
<b>Total liabilities and equity</b>	₩ 11,338,592,981,121	₩ 11,029,166,692,044

## Consolidated Statements of Profit or Loss

Doosan Infracore Co., Ltd. and Subsidiaries | Years Ended December 31, 2019 and 2018

(in Korean won)

	2019	2018
<b>Revenue</b>	₩ 8,185,839,945,377	₩ 7,730,107,942,853
<b>Cost of sales</b>	(6,273,218,676,924)	(5,936,246,301,169)
<b>Gross profit</b>	1,912,621,268,453	1,793,861,641,684
Selling and administrative expenses	(1,072,224,207,963)	(945,734,195,514)
<b>Operating profit</b>	840,397,060,490	848,127,446,170
Finance income	150,590,559,071	104,252,463,898
Finance costs	(330,376,100,312)	(303,338,799,287)
Other non-operating income	13,936,345,577	36,084,086,449
Other non-operating expenses	(63,836,570,629)	(63,697,135,116)
Loss on equity method	(7,702,168,374)	(5,001,734,320)
<b>Profit before income tax</b>	603,009,125,823	616,426,327,794
Income tax expense	(207,310,954,827)	(222,256,598,381)
<b>Profit for the year</b>	₩ 395,698,170,996	₩ 394,169,729,413
<b>Profit is attributable to:</b>		
Owners of the Parent Company	₩ 239,913,446,929	₩ 246,409,919,128
Non-controlling interests	155,784,724,067	147,759,810,285
<b>Earnings per share attributable to the equity holders of the Parent Company</b>		
Basic earnings per share	₩ 1,153	₩ 1,184
Diluted earnings per share	1,139	1,115

## Consolidated Statements of Comprehensive Income

Doosan Infracore Co., Ltd. and Subsidiaries | Years Ended December 31, 2019 and 2018

(in Korean won)

	2019	2018
<b>Profit for the year</b>	₩ 395,698,170,996	₩ 394,169,729,413
<b>Other comprehensive income</b>		
<i>Items that will not be reclassified to profit or loss</i>		
Remeasurements of net defined benefit liability	(41,849,401,252)	37,545,492,014
Revaluation reserves of property, plant and equipment	33,791,953,262	3,000,935,957
Gain on valuation of equity instruments at fair value through other comprehensive income	(2,369,093,630)	311,745,173
Share of other comprehensive income of associates	1,737,603,778	-
Share of retained earnings of associates	(183,785,886)	(109,506,066)
<i>Items that may be subsequently reclassified to profit or loss</i>		
Exchange differences	112,466,225,181	129,649,536,168
Cash flow hedges	1,406,355,621	2,510,805,778
<b>Other comprehensive income for the year, net of tax</b>	104,999,857,074	172,909,009,024
<b>Total comprehensive income for the year</b>	₩ 500,698,028,070	₩ 567,078,738,437
<b>Total comprehensive income for the year is attributable to:</b>		
Owners of the Parent Company	305,666,065,211	342,631,656,647
Non-controlling interests	195,031,962,859	224,447,081,790
	₩ 500,698,028,070	₩ 567,078,738,437

## Consolidated Statements of Changes in Equity

Doosan Infracore Co., Ltd. and Subsidiaries | Years Ended December 31, 2019 and 2018

(in Korean won)

	Attributable to Owners of the Parent Company							Non-controlling Interest	Total
	Share Capital	Capital Surplus	Other Components of Equity	Accumulated Other Comprehensive Income	Retained Earnings	Subtotal			
<b>Balance at January 1, 2018</b>	₩ 1,040,000,595,000	₩ 211,545,565,029	₩ (108,457,073,777)	₩ (334,050,917,882)	₩ 784,702,285,730	₩ 1,593,740,454,100	₩ 1,579,421,175,054	₩ 3,173,161,629,154	
Changes in accounting policy	-	-	-	-	(899,052,422)	(899,052,422)	(372,370,064)	(1,271,422,486)	
<b>Balance after changes</b>	1,040,000,595,000	211,545,565,029	(108,457,073,777)	(334,050,917,882)	783,803,233,308	1,592,841,401,678	1,579,048,804,990	3,171,890,206,668	
<b>Total comprehensive income (loss):</b>									
Profit for the year	-	-	-	-	246,409,919,128	246,409,919,128	147,759,810,285	394,169,729,413	
Remeasurement of net defined benefit liabilities	-	-	-	-	13,693,307,289	13,693,307,289	23,852,184,725	37,545,492,014	
Revaluation reserves of property, plant and equipment	-	-	-	(2,371,378,063)	5,372,314,020	3,000,935,957	-	3,000,935,957	
Gain on valuation of financial assets at fair value through other comprehensive income	-	-	-	296,376,151	15,369,022	311,745,173	-	311,745,173	
Share of retained earnings of associates	-	-	-	-	(105,025,966)	(105,025,966)	(4,480,100)	(109,506,066)	
Exchange differences	-	-	-	79,549,916,777	-	79,549,916,777	50,099,619,391	129,649,536,168	
Cash flow hedges	-	-	-	(229,141,711)	-	(229,141,711)	2,739,947,489	2,510,805,778	
<b>Total comprehensive income for the period</b>	-	-	-	77,245,773,154	265,385,883,493	342,631,656,647	224,447,081,790	567,078,738,437	
<b>Transactions with owners</b>									
Cancellation of share options	-	1,117,895,000	(1,117,895,000)	-	-	-	-	-	
Exercise of stock warrants	789,790,000	350,923,056	-	-	-	1,140,713,056	-	1,140,713,056	
Dividend of subsidiary	-	-	-	-	-	-	(53,727,499,200)	(53,727,499,200)	
Disposal of subsidiary shares	-	-	(19,735,993,357)	-	-	(19,735,993,357)	154,168,717,969	134,432,724,612	
<b>Total transactions with owners</b>	789,790,000	1,468,818,056	(20,853,888,357)	-	-	(18,595,280,301)	100,441,218,769	81,845,938,468	
<b>Balance at December 31, 2018</b>	₩ 1,040,790,385,000	₩ 213,014,383,085	₩ (129,310,962,134)	₩ (256,805,144,728)	₩ 1,049,189,116,801	₩ 1,916,877,778,024	₩ 1,903,937,105,549	₩ 3,820,814,883,573	
<b>Balance at January 1, 2019</b>	₩ 1,040,790,385,000	₩ 213,014,383,085	₩ (129,310,962,134)	₩ (256,805,144,728)	₩ 1,049,189,116,801	₩ 1,916,877,778,024	₩ 1,903,937,105,549	₩ 3,820,814,883,573	
<b>Total comprehensive income (loss):</b>									
Profit for the year	-	-	-	-	239,913,446,929	239,913,446,929	155,784,724,067	395,698,170,996	
Remeasurement of net defined benefit liabilities	-	-	-	-	(31,295,789,705)	(31,295,789,705)	(10,553,611,547)	(41,849,401,252)	
Revaluation reserves of property, plant and equipment	-	-	-	31,876,521,385	60,968,141	31,937,489,526	1,854,463,736	33,791,953,262	
Gain on valuation of financial assets at fair value through other comprehensive income	-	-	-	(2,540,552,371)	171,458,741	(2,369,093,630)	-	(2,369,093,630)	
Share of other comprehensive income of associates	-	-	-	1,614,767,527	-	1,614,767,527	122,836,251	1,737,603,778	
Share of retained earnings of associates	-	-	-	-	(171,012,170)	(171,012,170)	(12,773,716)	(183,785,886)	
Exchange differences	-	-	-	61,553,072,511	-	61,553,072,511	50,913,152,670	112,466,225,181	
Cash flow hedges	-	-	-	4,483,184,223	-	4,483,184,223	(3,076,828,602)	1,406,355,621	
<b>Total comprehensive income for the year</b>	-	-	-	96,986,993,275	208,679,071,936	305,666,065,211	195,031,962,859	500,698,028,070	
<b>Transactions with owners</b>									
Cancellation of share options	-	243,505,810	(243,505,810)	-	-	-	-	-	
Exercise of stock warrants	16,010,000	3,324,216	-	-	-	19,334,216	-	19,334,216	
Dividend of subsidiary	-	-	-	-	-	-	(53,980,207,600)	(53,980,207,600)	
Reclassification of other components of equity	-	(58,904,993,351)	58,904,993,351	-	-	-	-	-	
<b>Total transactions with owners</b>	16,010,000	(58,658,163,325)	58,661,487,541	-	-	19,334,216	(53,980,207,600)	(53,960,873,384)	
<b>Balance at December 31, 2019</b>	₩ 1,040,806,395,000	₩ 154,356,219,760	₩ (70,649,474,593)	₩ (159,818,151,453)	₩ 1,257,868,188,737	₩ 2,222,563,177,451	₩ 2,044,988,860,808	₩ 4,267,552,038,259	

## Consolidated Statements of Cash Flows

Doosan Infracore Co., Ltd. and Subsidiaries | Years Ended December 31, 2019 and 2018

(in Korean won)

	2019	2018
<b>Cash flows from operating activities</b>		
Cash generated from operations:		
Profit for the year	₩ 395,698,170,996	₩ 394,169,729,413
Adjustments	699,544,598,699	731,167,416,259
Changes in operating assets and liabilities	(279,345,395,612)	(82,048,871,379)
Interest received	15,548,783,391	15,117,484,431
Interest paid	(152,315,252,013)	(166,701,900,364)
Dividends received	12,982,337,562	4,265,837,456
Income tax paid	(124,694,966,717)	(58,191,953,508)
<b>Net cash inflow from operating activities</b>	567,418,276,306	837,777,742,308
<b>Cash flows from investing activities</b>		
Decrease in short-term financial instruments	116,468,540,790	-
Disposal of short-term investment securities	4,229,388,547	22,809,378,447
Disposal of long-term investment securities	89,098,064,562	229,129,080
Decrease in loans	214,655,657	525,036,293
Disposal of property, plant and equipment	40,704,138,031	25,288,647,854
Disposal of intangible assets	2,661,894,631	242,643,718
Disposal of investments in associates	-	36,424,000,000
Increase in short-term financial instruments	-	(101,272,254,333)
Acquisition of long-term investment securities	(5,373,856,271)	(3,393,765,000)
Increase in loans	-	(393,666,636)
Acquisition of property, plant and equipment	(266,697,358,416)	(150,822,172,341)
Acquisition of intangible assets	(182,781,856,741)	(109,604,453,424)
Acquisition of investment properties	(89,941,811,010)	-
Acquisition of investment in associates	(41,386,826,160)	(18,059,850,000)
Others	(6,569,781,464)	(14,820,807,038)
<b>Net cash outflow from investing activities</b>	(339,374,807,844)	(312,848,133,380)
<b>Cash flows from financing activities</b>		
Proceeds from borrowings	11,656,500,000	637,834,889,738
Proceeds from issuance of bonds	954,050,856,272	283,474,563,443
Changes in Subsidiary Equity	-	140,764,800,002
Repayment of borrowings	(941,445,938,332)	(909,251,648,286)
Repayment of bonds	(498,648,637,732)	(521,653,462,500)
Payments for lease liabilities	(21,423,052,313)	-
Dividends paid	(53,980,207,600)	(53,727,499,200)
<b>Net cash outflow from financing activities</b>	(549,790,479,705)	(422,558,356,803)
Effects of exchange rate changes on cash and cash equivalents	24,904,353,149	7,163,635,831
<b>Net increase (decrease) in cash and cash equivalents</b>	(296,842,658,094)	109,534,887,956
Cash and cash equivalents at the beginning of the year	1,053,016,029,210	943,481,141,254
<b>Cash and cash equivalents at the end of the year</b>	₩ 756,173,371,116	₩ 1,053,016,029,210

# CSR Facts & Figures

## Economic

Economic Growth: Sales Records					
Classification	Unit	2017	2018	2019	
Consolidated	Sales	KRW million	6,567,897	7,730,108	8,185,840
	Operating income	KRW million	660,769	848,127	840,397
	Net income	KRW million	296,643	394,170	395,698
Separate	Sales	KRW million	2,651,329	3,058,277	3,102,184
	Operating income	KRW million	137,632	181,518	178,187
	Net income	KRW million	60,472	71,748	53,024

Financial Soundness: Financial Status					
Classification	Unit	2017	2018	2019	
Consolidated	Total assets	KRW million	10,276,090	11,029,167	11,338,593
	Total liabilities	KRW million	7,102,929	7,208,352	7,071,041
	Total equity	KRW million	3,173,161	3,820,815	4,267,552
Separate	Total assets	KRW million	5,053,901	4,923,151	4,965,757
	Total liabilities	KRW million	3,707,435	3,516,787	3,490,347
	Total equity	KRW million	1,346,466	1,406,364	1,475,410

Research & Development					
Classification	Unit	2017	2018	2019	
R&D investment	Korea	KRW million	111,802	135,084	149,291
R&D investment per sales		%	4.2	4.4	4.8

\* Based on separate financial statements

Intellectual properties	Application	Global	Cases		2019
			2017	2018	
	Registration		3,422	3,576	3,914
	Registration		2,184	2,467	2,871

\* Number of intellectual property rights applications and registration made at home and abroad; Based on consolidated financial statements

## Transparent Management

Corporate Governance					
Classification	Unit	2017	2018	2019	
Attendance rate of directors in BOD meetings <sup>1)</sup>	Korea	%	86.9	85.7	92.9

<sup>1)</sup> In 2018, the reporting scope was changed from attendance rate of outside directors (in 2017 Integrated Report) to the attendance rate of all directors. Accordingly, the attendance rate for the past 3 years was revised.

CEO-to-Worker Remuneration Ratio					
Classification	Unit	2017	2018	2019	
CEO remuneration		KRW million	1,105	1,543	1,443
Average remuneration per employee	Korea	KRW million	79	87	89
Ratio <sup>1)</sup>			13.99	17.74	16.21

<sup>1)</sup> Figure calculated by dividing the total CEO remuneration by the average remuneration per employee

Ethical Management					
Classification	Unit	2017	2018	2019	
Completion rate of ethical management training <sup>1)</sup>	Korea	%	94.4	95.3	95.0
	China	%	94.6	95.3	100.0

<sup>1)</sup> No. of employees who have completed the ethical management training / No. of total employees (once a year per person)

Collection rate of statement of interests form <sup>1)</sup>					
Classification	Unit	2017	2018	2019	
	%	100	100	100	

<sup>1)</sup> No. of employees who submitted a signed copy of statement of interests form / No. of office worker who has a job title of part leader or higher from among employees in Korea and resident employees in China

Actions Taken Against Code of Conduct Violations <sup>1)</sup>					
Classification	Unit	2017	2018	2019	
Disciplinary action	Cases	6	7	5	
	(Percentage)	(55%)	(44%)	(71%)	
Warning or lesser measure	Cases	5	9	2	
	(Percentage)	(45%)	(56%)	(29%)	
Total	Cases	11	16	7	
	(Percentage)	(100%)	(100%)	(100%)	

<sup>1)</sup> Includes violation of "Inhwa" (human rights, workplace harassment, sexual harassment, etc.), honesty and transparency (misconduct, corruption, information security, conflict of interest, etc.), and fair competition (supplier and fair trade, etc.)

Compliance					
Classification	Unit	2017	2018	2019	
Legal measures on unfair trade conduct	Korea	%	0	1	0
Fine levied due to a violation of laws or regulations	Korea	KRW million	0	382	100

\* Due to a violation of Article 12-3 of the Fair Transactions in Subcontracting Act, Doosan Infracore paid a fine in 2018 and penalty in 2019. In relation to this matter, a lawsuit requesting cancellation, including a correction order, was filed on December 18, 2018, and is in progress.

Policy-related Expenditures					
Classification	Unit	2017	2018	2019	
Total political donation	Korea	KRW million	0	0	
Total contributions to associations		KRW million	1,502	1,271	

\* Information related to politics and relevant organizations has been disclosed since 2018

Largest Expenditures to Associations in 2019		
Classification	Unit	Amount
Korea Foundation for Cooperation of Large & Small Business, Rural Affairs	KRW million	400
Incheon Employers Federation	KRW million	288
Korea Construction Equipment Manufacturers Association	Korea KRW million	270
Incheon Chamber of Commerce & Industry	KRW million	80
Gunsan Chamber of Commerce & Industry	KRW million	51

## Customers

Protection of Customer Information					
Classification	Unit	2017	2018	2019	
Customers information leakages	Korea	Cases	0	0	0
	China	Cases	0	0	0

## Environment

Environmental Expenditure and Investment					
Classification	Unit	2017	2018	2019	
Environmental investments and operating costs	Korea	KRW billion	16.7	17.6	7.9

Environmental Management System					
Classification	Unit	2017	2018	2019	
Worksites with ISO 14001 (EMS) certification	Korea	Sites	3	3	3
	China	Sites	1	1	1

Energy Consumption						
Classification	Unit	2017	2018	2019		
Energy consumption (including direct and indirect consumption)	Total	TJ	1,871	2,067	2,142	
	Korea	LNG	TJ	216	251	248
		Electricity	TJ	1,463	1,632	1,701
		Diesel	TJ	124	109	122
	Others (LPG, kerosene, etc.)	TJ	68	75	71	
		Total <sup>2)</sup>	TJ	175	254	228
	China <sup>3)</sup>	LNG	TJ	51	68	69
		Electricity	TJ	58	78	75
		Steam	TJ	15	25	16
		Diesel	TJ	50	81	67
Gasoline		TJ	1	1	1	

<sup>1)</sup> China calculates energy consumption based on net calorific value according to the "General Principles for Calculation of Comprehensive Energy Consumption GB/T2589-2008" (for steam, a formula developed by the Yantai municipal government is applied). In 2019, unit of China's energy consumption was changed to TJ, and accordingly, energy consumption data for the past three years was revised.

<sup>2)</sup> All figures are rounded off to the nearest tenth, and therefore there may be singular number difference in the sum of figures.

Resources Usage					
Classification	Unit	2017	2018	2019	
Raw material consumption	Scrap metal	ton	25,170	29,974	34,225
	Scrap metal intensity	ton/KRW million	0.009	0.010	0.011
	Sand (molding sand) <sup>2)</sup>	ton	14,484	17,762	18,406
	Sand intensity	ton/KRW million	0.006	0.006	0.006

\* Intensity is calculated based on sales of separate financial statements of each year.

<sup>1)</sup> No usage of steel plate at the Incheon Plant since the excavator plant advancement; and No usage of steel plate, scrap metal, and sand at the Gunsan Plant

<sup>2)</sup> Molding sands are 100% recycled.

Water consumption					
Classification	Unit	2017	2018	2019 <sup>3)</sup>	
Water consumption	Volume of water consumed	ton	554,044	605,326	584,771
	Water consumption intensity <sup>1)</sup>	ton/KRW million	0.209	0.198	0.189
	Recycled or reused water <sup>2)</sup>	ton	85,450	67,742	56,771
	Volume of water consumed	ton	67,416	67,863	93,289

<sup>1)</sup> Intensity is calculated based on sales of separate financial statements of each year.

<sup>2)</sup> Total volume of reused water, including reused waste water, reclaimed water, and recycled rainwater

<sup>3)</sup> In January 2019, the volume consumed by industrial vehicles was excluded from the volume of water consumed.

Air Emissions							
Classification	Unit	2017	2018	2019			
Emissions of greenhouse gas (Including direct and indirect emissions)	Total <sup>1)</sup>	tonCO <sub>2</sub> eq	97,955	108,244	112,186		
	Korea	Scope 1	tonCO <sub>2</sub> eq	26,890	28,951	29,550	
		Scope 2	tonCO <sub>2</sub> eq	71,067	79,295	82,639	
		Intensity <sup>2)</sup>	tonCO <sub>2</sub> eq/KRW million	0.037	0.035	0.036	
		Total	tonCO <sub>2</sub> eq	79,625	88,572	93,197	
	Incheon	Scope 1	tonCO <sub>2</sub> eq	16,924	18,102	18,754	
		Scope 2	tonCO <sub>2</sub> eq	62,701	70,470	74,443	
	Gunsan	Total	tonCO <sub>2</sub> eq	15,518	16,798	16,340	
		Scope 1	tonCO <sub>2</sub> eq	8,706	9,636	9,515	
	Others	Scope 2	tonCO <sub>2</sub> eq	6,812	7,163	6,825	
Total		tonCO <sub>2</sub> eq	2,812	2,874	2,649		
Emissions of greenhouse gas <sup>3)</sup> (Including direct and indirect emissions)	Total <sup>4)</sup>	tonCO <sub>2</sub> eq	22,632	31,982	29,214		
	China	Scope 1	tonCO <sub>2</sub> eq	6,668	10,049	9,012	
		Scope 2	tonCO <sub>2</sub> eq	15,963	21,933	20,201	
		Intensity <sup>2)</sup>	tonCO <sub>2</sub> eq/KRW million	0.022	0.023	0.021	
		Total	tonCO <sub>2</sub> eq	21,500	30,843	28,118	
	DICC (Yantai)	Scope 1	tonCO <sub>2</sub> eq	6,646	10,021	8,964	
		Scope 2	tonCO <sub>2</sub> eq	14,854	20,821	19,154	
	DISD (Yantai)	Total	tonCO <sub>2</sub> eq	968	1,008	965	
		Scope 1	tonCO <sub>2</sub> eq	5	11	26	
	Others (Including DICI)	Scope 2	tonCO <sub>2</sub> eq	964	996	939	
Total		tonCO <sub>2</sub> eq	163	132	131		
Others (Including DICI)	Scope 1	tonCO <sub>2</sub> eq	17	17	22		
	Scope 2	tonCO <sub>2</sub> eq	146	115	108		

<sup>1)</sup> There is a difference between the total emissions volume by GHG type and the total of worksites which sums up rounding off numbers of each worksite's emissions.  
<sup>2)</sup> Intensity is calculated based on sales of separate financial statements of each year. Intensity for the Chinese business sites is calculated after Korean won calculations that are based on the average exchange rate of the respective year.  
<sup>3)</sup> Figure was calculated by applying energy usage volume to the "Yantai Energy Reduction Information System," and can be subject to error. Doosan Infracore plans to carry out external verification of GHG emissions to increase reliability.  
 - Source of Scope 1 emissions includes LNG, diesel fuel, LPG, gasoline, and carbon dioxide (shielding gas for welding)  
<sup>4)</sup> All figures are rounded off to the nearest tenth, and therefore there may be singular number difference in the sum of figures.

Classification	Unit	2017	2018	2019		
Emissions of air pollutants	Korea	NOx <sup>1)</sup>	ppm	12.9	20.3	14.2
		Sox <sup>2)</sup>	ppm	0.4	0.2	1.3
	Incheon	VOCs (Continuous type/Non-continuous type) <sup>3)</sup>	ppm	9.8/25.2	11.6/11.8	17.1/20.2
		Dust (Electric arc furnace/ Others) <sup>4)</sup>	mg/m <sup>3</sup>	4.6/6.0	5.7/6.8	1.98/1.81
	Gunsan	NOx <sup>5)</sup>	ppm	0.37	1.82	9.96
		SOx <sup>6)</sup>	ppm	0.10	0.04	0.02
	China	VOCs <sup>7)</sup>	ppm	6.39	7.05	5.63
		Dust <sup>8)</sup>	mg/m <sup>3</sup>	3.56	4.13	3.64
	China	VOCs	mg/m <sup>3</sup>	10.15	3.80	2.82
		Dust	mg/m <sup>3</sup>	11.12	10.44	2.76

<sup>1)</sup> Legal limit: 200ppm, company's internal limit: 80ppm  
<sup>2)</sup> Legal limit: 400ppm, company's internal limit: 160ppm  
<sup>3)</sup> Continuous type: Legal limit: 40ppm, company's internal limit: 32ppm / Non-continuous type: Legal limit: 200ppm, company's internal limit: 160ppm  
<sup>4)</sup> Electric arc furnace: Legal limit: 20mg/m<sup>3</sup>, company's internal limit: 8mg/m<sup>3</sup> / Others: Legal limit: 50mg/m<sup>3</sup>, company's internal limit: 20mg/m<sup>3</sup>  
<sup>5)</sup> Legal limit: 200ppm, company's internal limit: 80ppm  
<sup>6)</sup> Legal limit: 400ppm, company's internal limit: 160ppm  
<sup>7)</sup> Legal limit: 40ppm, company's internal limit: 32ppm  
<sup>8)</sup> Legal limit: 50mg/m<sup>3</sup>, company's internal limit: 20mg/m<sup>3</sup>

Classification	Unit	2017	2018	2019		
Emissions of ozone-depleting substances	Incheon	CFC, HCFC, CH <sub>3</sub> Br, R-22	ppm	0	0	0
	Gunsan	CFC, HCFC, CH <sub>3</sub> Br, R-22	ppm	0	0	0

\* Zero emissions of ozone-depleting substances

Effluents and Waste						
Classification	Unit	2017	2018	2019		
Emissions of effluents	Korea	ton	58,953	81,861	87,137	
	Incheon	ton	51,288	74,244	80,539	
	Gunsan	ton	7,665	7,617	6,598	
	China	ton	57,737	58,037	71,878	
	Emissions of water pollutants	Incheon	BOD <sup>1)</sup>	mg/L	13.1	17.1
COD <sup>2)</sup>			mg/L	23.7	18.4	10.6
Gunsan		Suspended solids <sup>3)</sup>	mg/L	12.7	3.0	4.0
		BOD <sup>4)</sup>	mg/L	188.7	144.7	103.2
China		COD <sup>5)</sup>	mg/L	161.0	169.1	143.5
China	Suspended solids <sup>6)</sup>	mg/L	7.0	15.2	8.5	
	COD	mg/L	23.0	20.5	21.5	

<sup>1)</sup> Legal standard 120mg/L, company's internal standard 48mg/L  
<sup>2)</sup> Legal standard 130mg/L, company's internal standard 52mg/L  
<sup>3)</sup> Legal standard 120mg/L, company's internal standard 48mg/L  
<sup>4)</sup> Legal standard 400mg/L, company's internal standard 160mg/L  
<sup>5)</sup> Legal standard 400mg/L, company's internal standard 160mg/L  
<sup>6)</sup> Legal standard 200mg/L, company's internal standard 80mg/L

Classification	Unit	2017	2018	2019			
Waste discharge and recycle	Total waste	ton	27,179	32,691	37,655		
	Korea	Recycled waste	ton	25,334	30,881	35,660	
		Recycling rate	%	93	94	95	
	Incheon	General waste	ton	23,932	29,309	33,426	
		Specified waste	ton	2,321	2,349	3,567	
Gunsan	Recycling rate	%	94	95	96		
	General waste	ton	743	727	419		
China	Specified waste	ton	183	306	243		
	Recycling rate	%	71	78	71		
China	Total waste <sup>1)</sup>	ton	3,470	6,086	4,878		
	Recycled waste <sup>2)</sup>	ton	1,815	2,801	2,836		
China	Recycling rate	%	52	46	58		

<sup>1)</sup> Includes both hazardous and non-hazardous waste  
<sup>2)</sup> Waste steel, waste wood

### Safety

Occupational Safety and Health						
Classification	Unit	2017	2018	2019		
Occupational accident rate	Korea	%	0.54	0.85	1.01	
	China	%	0.10	0	0	
	* Based on accidents requiring medical care covered by Industrial Accident Insurance					
LTIR <sup>1)</sup>			0.97	1.17		
TRIR <sup>2)</sup>	Korea		2.45	1.99		
LWSR <sup>3)</sup>			48.68	70.31		
LTIR			0	0		
TRIR	China		0	0		
LWSR			0	0		

\* LTIR, TRIR, and LWSR have been managed since 2018  
<sup>1)</sup> LTIR (Lost Time Incidents Rate): Number of incidents involving more than one-day closure of workday per 100 workers, Total number of lost time cases / Total number of hours worked by employees \* 200,000  
<sup>2)</sup> TRIR (Total Recordable Incidents Rate): Number of recordable incidents that require treatment for injuries or illness per 100 workers, Total number of injuries and illnesses / Total number of hours worked by employees \* 200,000  
<sup>3)</sup> LWSR (Lost Workday Severity Rate): Number of lost work days experienced per 100 workers, Total number of lost work days / Total number of hours worked by employees \* 200,000

Occupational Illness Frequency Rate					
Classification	Unit	2017	2018	2019	
OIFR <sup>1)</sup>	Korea	%	0.147	0.315	

\* OIFR data has been managed since 2018  
<sup>1)</sup> OIFR (Occupational Illness Frequency Rate): Number of workers who have occupational illness and other related illness / Total workers (Application of calculation formula of the Korea Occupational Safety and Health Agency)

Shared Growth

Support for Suppliers					
Classification	Unit	2017	2018	2019	
Financial support	Number of suppliers received financial support	Companies	42	62	53
		Amount of financial support <sup>1)</sup>	KRW billion	43.5	43.5
	Ratio of cash settlement cases	%	0.1	0.3	0.2
	Number of payments	Times	Once a month	Once a month	Once a month

<sup>1)</sup> Excluding indirect support

Technical development support	Support for developing technology	Cases	45	28	22
	Support for protecting technology	Cases	7	6	6

Education support	Training courses	Courses	11	14	12
	Staff at suppliers who completed trainings	Persons	124	82	96
	Training hours	Hours	28	52	108

Competitiveness enhancement support	Operation days	man-day (Person)	260	196	195
	Support for enhancing competitiveness	man-day	286	357	357

\* Fair Trade Commission standard: 5 days=1 person (1 day=8 hours, Based on the application period of punctuality)

Part development capacity enhancement support	Provision of casting molds to strengthen suppliers' part development capacity	Companies	74	99	134
		KRW billion	12.8	21.9	28.7
		Companies	77	77	77

\* Including multiple provision of casting molds to suppliers

EHS support <sup>1)</sup>	Companies	44	46	55
	Companies	3	0	13

<sup>1)</sup> In 2019, calculation criteria for "Supplier EHS Support" were adjusted, and accordingly, the number of suppliers which had received EHS support for the past three years was revised.

Employees

Employment					
Classification	Unit	2017	2018	2019	
Number of employees	Korea	Persons	2,602	2,720	2,860
	China	Persons	1,266	1,299	1,255
	Global	Persons	4,027	4,468	4,603
By job	Office	Persons	1,426	1,505	1,622
	Technical	Persons	1,176	1,215	1,238
By employment type	Temporary <sup>1)</sup>	Persons	87	66	96
	Ratio of temporary <sup>2)</sup>	%	3.3	2.4	3.4
Diversity	Disabled <sup>3)</sup>	Persons	28	32	35
	Veterans <sup>4)</sup>	Persons	82	90	92
	Elderly <sup>5)</sup>	Persons	219	224	327
	Male	Persons	2,408	2,479	2,608
	Female	Persons	194	241	252
By job	Office	Persons	550	561	562
	Technical	Persons	716	738	693
By employment type	Temporary	Persons	62	41	39
	Ratio of temporary	%	4.7	3.1	3.1
Diversity	Disabled	Persons	0	0	0
	Elderly	Persons	7	7	9
	Male	Persons	1,087	1,117	1,071
	Female	Persons	179	182	184

<sup>1)</sup> Contract workers (entrustment, technology entrustment, outside directors, advisory, outside appointment)

<sup>2)</sup> Temporary worker / Total staff \* 100

<sup>3)</sup> Based on MY HR; national disabled classification (levels 1-6)

<sup>4)</sup> Based on MY HR; national merit recipients (person with a merit number or someone approved)

<sup>5)</sup> Above the age of 55 (Based on total staff in Korea)

Classification	Unit	2017	2018	2019	
Turnover rate <sup>1)</sup>	Korea	%	1.92	1.29	1.05
	20S	%	3.65	2.26	2.44
	30S	%	2.33	1.59	1.12
	40S	%	1.72	0.93	0.71
Turnover rate by age <sup>2)</sup>	50 and above	%	0.18	0.35	0.48

<sup>1)</sup> Based on regular workers. Total number of turnovers in 2019 / Annual average number in Korea in 2019

<sup>2)</sup> Based on regular workers. Total number of turnovers in 2019 by age / Annual average number in Korea in 2019 by age

Classification	Unit	2017	2018	2019	
Number of employees on parental leave	Male <sup>1)</sup>	Persons	116	118	118
	Female <sup>2)</sup>	Persons	14	16	11
Number of employees eligible for childcare leave <sup>3)</sup>	Male	Persons	875	884	926
	Female	Persons	47	54	65
Number of employees on childcare leave <sup>4)</sup>	Male	Persons	14	14	19
	Female	Persons	11	10	22
Number of employees returning to work after childcare leave <sup>5)</sup>	Male	Persons	7	15	19
	Female	Persons	9	9	11
Continue to work rate for 12 months after childcare leave <sup>6)</sup>	Male	%	83	100	100
	Female	%	100	100	100
Number of employees on parental leave	Male	Persons	67	58	53
	Female	Persons	26	9	17
Return to work rate after parental leave	%	100	100	100	

<sup>1)</sup> Employees who began their paternity leave in 2019

<sup>2)</sup> Employees who began their maternity leave in 2019

<sup>3)</sup> Staff in Korea with children aged eight or under, or second graders in elementary school or below

<sup>4)</sup> Number of employees who began childcare leave in the base year

<sup>5)</sup> Number of employees who returned from childcare leave in the base year

<sup>6)</sup> (12 months after the return to work) Number of current employees in 2019 from among employees who returned in 2018 / Employees who returned in 2018 \* 100. Calculation for 2019 is based on figures as of April 2020

Labor Union				
Classification	Unit	2017	2018	2019
Union membership rate	%	78.5	93.4	94.4

\* Based on technical staff (1,095 with membership out of 1,160 in total as of December 31, 2019)

Education				
Classification	Unit	2017	2018	2019
Average annual training hours per person	Hours	47.9	31.7	40.6
Average training expenses per person <sup>1)</sup>	KRW 1,000	383	663	750
Average annual training hours per person	Hours	17.1	17.3	14.9
Average training expenses per person <sup>2)</sup>	KRW 1,000	290	289	352

<sup>1)</sup> There was a change in the per-capita annual average training expense management standards in 2019. Accordingly training expenses per person for the past three years have been recalculated.

<sup>2)</sup> Korean won calculations are based on the average exchange rate of the year

Participation rate in education on human rights protection and sexual harassment prevention	%	96.7	96.0	95.8
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Community Involvement

Community Involvement Activities					
Classification	Unit	2017	2018	2019	
Number of employees who participated in CCI activities	Including double count	Persons	978	1,046	970
	Excluding double count	Persons	374	385	440
		Persons	595	1,696	1,892
Total hours of CCI activities	Hours	5,247	4,422	3,902	
Classification	Unit	2017	2018	2019	
CCI investment	CCI investment <sup>1)</sup>	KRW billion	6.85	7.73	8.64
	CCI investment per sales <sup>2)</sup>	%	0.26	0.25	0.28
	CCI investment <sup>3)</sup>	KRW 1,000	28,803	109,743	153,340

<sup>1)</sup> Used amount of donation

<sup>2)</sup> CCI investment / Sales of each year based on separate financial statements

<sup>3)</sup> Korean won calculations are based on the average exchange rate of the year

Classification	Unit	2017	2018	2019
Employee participation rate in the salary fraction donation campaign <sup>1)</sup>	%	75	75	73
Annual fund raised by the salary fraction donation campaign <sup>2)</sup>	KRW million	121	123	143

<sup>1)</sup> Excluding staff sent to overseas worksites

<sup>2)</sup> In 2019, a change was made to disclose the fund raised by employee donation (sum of funds from the Collecting Small Change from Employee Salary scheme, Employee Donation Accounts, and the company's matching grant), and accordingly, amount of fund raised for the past three years was revised.

# Independent Assurance Report

We were engaged by Doosan Infracore to provide limited assurance on the '2019 Doosan Infracore Integrated Report' for the year ended December 31, 2019 (further 'the Report').

## Context and Scope

Our engagement was designed to provide limited assurance on whether the Report is presented fairly, in all material respects, in accordance with the Sustainability Reporting Standards of the Global Reporting Initiative (GRI). We do not provide any assurance on the achievability of the objectives, targets and expectations of Doosan Infracore.

The scope of our engagement conforms to the KPMG Sustainability Assurance Manual™ (KSAM™), including the aspect of "materiality". With regards to financial data, our procedures were limited to verifying that they were correctly derived from audited financial statements. To obtain a thorough understanding of Doosan Infracore's financial results and position, the audited financial statements produced on 30 March 2020 should be referred to.

## Responsibilities

As stated in the 'Reporting Principles and Standard,' Doosan Infracore is responsible for all content within the Report in respect of the GRI Sustainability Reporting Standards. It is the responsibility of Doosan Infracore's management to establish and maintain appropriate performance management and internal control systems from which the reported sustainability information is derived.

Our responsibility is to perform a limited assurance engagement and to express a conclusion based on the work performed.

## Independence

In conducting our engagement, we have complied with the requirements of the International Federation of Accountants (IFAC) *Code of Ethics for Professional Accountants*, issued by the International Ethics Standards Board for Accountants. We do not engage in any and all activities that may influence our independence from Doosan Infracore. KPMG has systems and processes in place to monitor compliance with the Code, and to prevent conflicts regarding independence.

## Assurance Standards

We conducted our engagement based on the International Standard on Assurance Engagements (ISAE) 3000 *Assurance Engagements other than Audits or Reviews of Historical Financial Information*, issued by the International Auditing and Assurance Standards Board, and also AA1000AS. The standards require that we comply with applicable ethical requirements, including independence requirements, and that we plan and perform the engagement to obtain limited assurance about whether the Report is free from material misstatement.

## Limitations

A limited assurance engagement is substantially less in scope than a reasonable assurance engagement, and consequently does not enable us to obtain assurance on all significant matters that we may become aware of in a reasonable assurance engagement. Accordingly, we do not express a reasonable assurance conclusion.

This report has been prepared solely for Doosan Infracore in accordance with the terms of our engagement. We do not accept or assume responsibility to anyone other than Doosan Infracore for our work, or for the conclusions we have reached in the assurance report.

## Main Assurance Procedures

Our engagement was designed to provide limited assurance on whether the Report is presented fairly, in all material respects, in accordance with the reporting criteria. Procedures performed to obtain a limited level of assurance on a sustainability report consists of making inquiries, primarily of persons responsible for the preparation of information presented in the integrated report, and applying analytical and other evidence gathering procedures, as appropriate. These procedures included the following:

- Confirmation on whether the financial information presented in the Report was correctly derived from Doosan Infracore's audited financial statements
- Inquiries to gain an understanding of Doosan Infracore's processes for determining the material issues for key stakeholder groups
- Interviews with relevant staff at corporate and business unit levels responsible for providing the information in the Report
- Visit to Doosan Infracore's offices in Doosan Tower
- Comparing the information presented in the Report to determine whether it is in line with our overall knowledge of, and experience with, Doosan Infracore's performance on non-financial value creation

## Opinion

### Stakeholder Inclusiveness

- Doosan Infracore operates communication channels with key stakeholders such as shareholders/investors, customers/dealers, employees, suppliers, local communities (environment/NGOs), local/central government and media.
- We are not aware of any key stakeholder group that has been excluded from dialogue in the Report.

### Sustainability Context

- Doosan Infracore has established a process to incorporate CSR in management's decision-making and the business management plans of relevant teams, thereby securing continuity.
- We confirmed that Doosan Infracore recognizes general business management and social responsibility management comprehensively and applies such understanding within the Report.

### Materiality

- Doosan Infracore conducts a materiality test in determining material issues.
- We are not aware of any material aspects concerning its sustainability performance which have been excluded from the Report.

### Completeness

- Doosan Infracore applies reporting scope, boundary and temporal criteria.
- In terms of criteria mentioned above, we confirm that the Report is suitable for stakeholders to assess social responsibility performance.

Based on the procedures performed, as described above, nothing has come to our attention to indicate that the Report is not presented fairly, in all material respects, in accordance with the reporting criteria.

July 2020  
KPMG Samjong Accounting Corp.  
CEO Kim, Kyo Tai



# Global Network

● Headquarters ● Production Subsidiaries ● Sales Subsidiaries ● Parts Distribution Center



## Headquarters

Doosan Infracore Co., Ltd.  
489, Injung-ro, Dong-gu, Incheon, Korea

Doosan Infracore(China) Investment Co., Ltd.  
19th Fl., Tower B., Gateway, No. 18, Xiaguangli, North Road, East Third Ring, Chaoyang District, Beijing 100027, China

Doosan(China) Financial Leasing Corp.  
20th Fl., Tower B., Gateway, No. 18, Xiaguangli, North Road, East Third Ring, Chaoyang District, Beijing 100027, China

## Production Subsidiaries

Doosan Infracore Co., Ltd.  
489, Injung-ro, Dong-gu, Incheon, Korea

Doosan Infracore Co., Ltd.  
185, Dongjangan-ro, Gunsan-si, Jeollabuk-do, Korea

Doosan Infracore China Co., Ltd.  
No. 28, Wuzhishan road, ECO & Tech. Development Zone Yantai, Shandong, China

Doosan Infracore Norway AS.  
Varholvegen 149 N-6440 Elnesvågen, Norway

## Sales Subsidiaries

Seoul, Korea | Yantai, China | Beijing, China | Chennai, India | Americana, Brazil | Santiago, Chile | Elnesvågen, Norway | Groot-Ammers, Netherlands | Suwanee, U.S. | Prague, Czech Republic

## Parts Distribution Center (PDC)

Ansan, Korea | Yantai, China | Halle, Germany | Dubai, UAE | Singapore | Americana, Brazil | Miami, U.S. | Atlanta, U.S. | Seattle, U.S | Cardiff, U.K.

## UN Global Compact – 10 Principles

### Human Rights

Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and  
Principle 2: make sure that they are not complicit in human rights abuses.

### Labour

Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;  
Principle 4: the elimination of all forms of forced and compulsory labour;  
Principle 5: the effective abolition of child labour; and  
Principle 6: the elimination of discrimination in respect of employment and occupation.

### Environment

Principle 7: Businesses should support a precautionary approach to environmental challenges;  
Principle 8: undertake initiatives to promote greater environmental responsibility; and  
Principle 9: 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 Infracore supports the Ten Principles of the UN Global Compact.



The paper used in printing the 2019 Doosan Infracore Integrated Report is certified as an environmental-friendly product by the Forest Stewardship Council®. In addition, the report was printed at an FSC-certified print shop using soy oil ink which drastically reduces the emissions of air pollutants.

## Business Locations in Korea

<b>Seoul Office</b>	Doosan Tower, 275, Jangchungdan-ro, Jung-gu, Seoul +82-2-3398-8114
<b>Incheon Plant</b>	489, Injung-ro, Dong-gu, Incheon +82-32-211-1114
<b>Gunsan Plant</b>	185, Dongjangan-ro, Gunsan-si, Jeollabuk-do +82-63-447-3043
<b>Ansan Parts Service Center</b>	48, Yongdam-ro, Sangnok-gu, Ansan-si, Gyeonggi-do +82-31-400-2114
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Planning and Design Talantone Creative Group

