



# INTEGRATED SOLUTIONS FOR A BETTER LIFE

2019 Integrated Report of  
Doosan Heavy Industries & Construction



## ABOUT THIS REPORT

### FEATURES OF THE REPORT

This is the Integrated Report of Doosan Heavy Industries & Construction(DHIC) introducing the various systems, activities and accomplishments pursued by the company for the purpose of enhancing its social and financial sustainability. The report includes not only a detailed description of DHIC's business strategies and the new businesses regarded as future growth drivers, but also the activities and performance results related to the company's sustainability efforts in the areas of environment and society. DHIC has published the said report annually as a way to continuously communicate with our stakeholders.

### CRITERIA OF REPORT

This report has been prepared based on the Core Options in GRI(Global Reporting Initiative) Standards which is the global standard for report preparation. Through the verification by a third party, it has been confirmed that the report has met the corresponding requirements. The details of how the GRI standards were met can be checked through the GRI Index in Appendix. In addition, the industry standard data that is required by the Sustainability Accounting Standards Board(SASB) has been adequately reflected in the report, while the principles of the UNGC CoP(Communication on Progress) have also been adhered to.

### PERIOD AND SCOPE OF THE REPORT

The report was prepared on the basis of financial and non-financial performances from January 1, 2019 to December 31, 2019. The significant matters that could affect the decision-making of stakeholders were covered for the period up to the first half of 2020. Some quantitative performance data show the data for three years so that the recurring trend may be observed. The financial performance data has been prepared using consolidated financial statements based on the K-IFRS(Korean International Financial Reporting Standards). In addition, if the information presented in the previous report is either corrected or rewritten, its contents are explained with footnotes. The scope of the report includes all projects of DHIC, and domestic and overseas projects. If necessary, it includes the activity and performance of overseas subsidiary companies.

### REPORT VERIFICATION

To ensure the reliability and quality of the contents of this report, the non-financial information has been verified by an external agency. The financial information has been reviewed by an external auditor, with the audit results being correspondingly reflected. The non-financial information was verified by KMR(Korea Management Registrar). Each verification opinion can be checked from page 94 to page 99.

### ADDITIONAL INFORMATION

The report will be published and distributed in Korean and English languages. It is available for downloading in PDF format from the website of DHIC. Any opinions or comments can be conveyed through the contact number listed below.

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#### Dear Esteemed Stakeholders,

I sincerely appreciate the steady support you have provided to Doosan Heavy Industries & Construction(DHIC) throughout these difficult times, thereby helping us to overcome operational challenges and prepare a foundation for new growth. Through this Integrated Report, we would like to update you on our current status and plans, as well as demonstrate our resolve to taking a new leap forward toward future growth.

#### DHIC has taken decisive, yet painstaking measures to overcome the current day difficulties and establish a foundation for new growth.

Last year the world economy continued to experience low growth, while the power generation industry also suffered from a continuous slump. This has resulted in an increasingly fierce market competition, while factors like the U.S.-China trade dispute, geopolitical risks and coronavirus outbreak have caused the world economy to become plagued by rising uncertainties.

At this critical juncture, DHIC has also been undergoing its own share of challenges. Sales has dropped from 7.7 trillion won in 2012(based on separate financial statements) to about 3.7 trillion won in 2019. In order to bolster our weakened financials, we have been going through the painstaking process of implementing aggressive measures aimed at recovery.

Even under such difficult circumstances, we were able to lay the foundation for future growth through the cultivation of innovative new projects. We have completed the final assembly of a gas turbine for power plants, which is being developed as a government-backed project. We have also acquired international certification for a 5.5MW wind turbine. Projects have already been successfully secured for commercialization of these products. Doosan Babcock has the significant accomplishment of having been awarded a contract to participate in the decommissioning of a nuclear power plant.

#### We will step up our efforts to restructure our business portfolio around environment-friendly technology, through which we expect to drive strong financial results.

DHIC is pursuing the mid-to-long term strategy of expanding our business portfolio by winning increasingly more new projects leading up to the year 2024. To this end, DHIC has been actively pursuing not only environment-friendly energy projects involving gas turbines and renewable energy, but also new businesses, such as power plant services, hydrogen and 3D printing related projects.

The company is scheduled to deliver Korea's first locally-manufactured gas turbine to the Gimpo Combined Heat & Power(CHP) Plant of Korea Western Power Co. Moreover, DHIC is also a member of the "Task Force for Development of Korean Standard Gas-Fired Combined Cycle Power Plant," a task force that was launched last February by the Ministry of Trade, Industry and Energy. DHIC, along with fellow members that include five other power generation companies and the Korea Institute of Energy Technology Evaluation and Planning, are taking part in the development of a Korean standard gas-fired combined cycle power plant model and the execution of several demonstration projects. Having also won several contracts for the maintenance of domestic gas turbines, such as the Hallim Combined Cycle Power Plant and Ulsan Combined Cycle Power Plant, DHIC is also expanding its services business.

DHIC has been selected as the preferred bidder for the 100MW Hallim Offshore Wind Farm Project on Jeju Island and expects to soon sign the

contract to supply our 5.5MW wind turbine for the project. We have also been developing a 8MW model as a national project, which will enable us to expand our product lineup. We expect to see significant growth in the gas turbine and wind power markets once the 9th Basic Plan for Electricity Supply & Demand is released by the Korean government this year.

DHIC is also participating in a demonstration project for Korea's first hydrogen liquefying plant. We will build a plant to produce and liquefy hydrogen at our Changwon headquarters in cooperation with Gyeongnam Province, City of Changwon and the Korea Industrial Complex Corporation; and by doing so, we seek to actively contribute to the government's plans to shift to a hydrogen economy.

We aim to apply our self-developed digital solutions, such as the power plant optimization solution and early warning system for power plants, to a wider range of projects that include wind power and water projects, and leverage this to win a larger number of new projects. As for the 3D printing business, we plan to foster growth of this area by developing new lightweight materials applicable to the aviation and national defense industries.

We will do our utmost to expedite our business development efforts to ensure that these new businesses can emerge as new growth engines for DHIC and ultimately produce financial results in the near future.

#### We will diligently and steadfastly fulfill our social responsibilities as a corporate citizen.

As a member of society, we will faithfully carry out our responsibilities to contribute to a better world. To achieve this goal, DHIC has established strategies and policies based on the ESG(Environmental, Social and Governance) criteria and applied this across our entire business. Owing to such efforts, as of 2019, we were included in the list of DJSI(Dow Jones Sustainability Indices) Korea companies for six consecutive years. We also received an "A-rating" for eight consecutive years in the ESG assessment by the Korea Corporate Governance Service. DHIC is also actively contributing to the fulfillment of the United Nations' 2030 SDGs(Sustainable Development Goals) through our core projects related to sustainable energy and clean water.

Though it has not always been smooth sailing, DHIC has been able to overcome many hardships and build a solid market presence as a competitive enterprise in the global power industry. While we may still face numerous challenges, I am confident that with the combined efforts of all our DHIC people, we will be able to successfully stabilize the business. We will seize this opportunity to re-emerge as a sustainable company that is equipped with sufficient capabilities to persevere even in the face of rapid environmental changes and multiple crises.

I trust that we can look forward to your continued interest and support. Thank you.

Chairman & CEO **Geewon Park**



# GLOBAL LEADER IN POWER & WATER

Doosan Heavy Industries & Construction's business vision, "Global Leader in Power & Water," expresses the company's willpower to become an enterprise that leads the global power generation and water markets. In order to become an innovative global leader that offers services that improve the customers' quality of life, we strive to meet the highest standards in all aspects, such as cutting-edge technology, competitive costs, quality, sales and profitability, cultivation of global talents and corporate culture, all the while putting the Doosan Credo into practice. In addition, as a global leader, we strive to effectively respond to the rapidly changing global technology trends and lead the market changes.

<b>Company Established</b>	September 20, 1962
<b>Representative Directors</b>	Geewon Park, Yeonin Jung, Hyounghee Choi
<b>Business Type</b>	Manufacturer of Machineries and Equipment
<b>Location</b>	<b>Headquarters</b> 22 Doosan Volvo-ro, Seongsan-gu, Changwon City, Gyeongnam Province <b>Seoul Office</b> 465 Gangnamdaero, Seocho-gu, Seoul

**Total Assets**  
KRW 24.8 trillion

**Revenue**  
KRW 15.6 trillion

**Number of Employees**  
6,721

**Operating Profit**  
KRW 1.07 trillion

**National Quality Meisters**  
21

**Korea Meisters**  
10

\*Consolidated Accounting as of the end of 2019

\*As of the end of 2019

## Global Network

### Overseas Subsidiaries/Branches/R&D Center

Classification	Count	Entity / Branch Name
● Overseas Subsidiaries	12	<b>Asia</b> Doosan Power Systems India(India), Doosan Vina(Vietnam)
		<b>Europe/Africa</b> Doosan Power Systems(UK), Doosan Babcock(UK), Doosan Enpure(UK), Doosan Lentjes(Germany), Doosan Skoda Power(Czech Republic), Doosan IMGB(Romania)
		<b>America</b> Doosan Power Services America(U.S), Doosan HF Controls(U.S), Doosan GridTech(U.S), Doosan Turbomachinery Services(U.S)
● Overseas Entities, Branches/ Offices(Sales Office/ Other)	24	<b>Asia</b> Riyadh, Dubai, Abu Dhabi, Kuwait, New Delhi, Mumbai, Hanoi, Jakarta, Taipei, Manila, Bangkok, Tokyo, Beijing, Shanghai, Doosan Power Systems Arabia(Saudi Arabia), Middle East O.C
		<b>Europe/Africa</b> Cairo, Frankfurt, Johannesburg
		<b>America</b> New Jersey, Newington(U.S.), Pittsburgh, Corvallis, Santiago
● R&D Center	5	Dammam R&D(Saudi Arabia), Boiler R&D Center(UK), Turbine R&D Center(Czech Republic), ATSE(Switzerland), ATSA(U.S)

## Doosan History

### The Beginning & Challenges 1962~1980

1962 Foundation of company

### Growing & Developing 1981~2000

1982 Completed construction of Changwon General Machinery Plant (the world's largest)

### Growth into a Global Enterprise 2001~2011

2001 Became privatized and name changed to Doosan Heavy Industries & Construction

2006 Acquired Mitsui Babcock and secured boiler technology

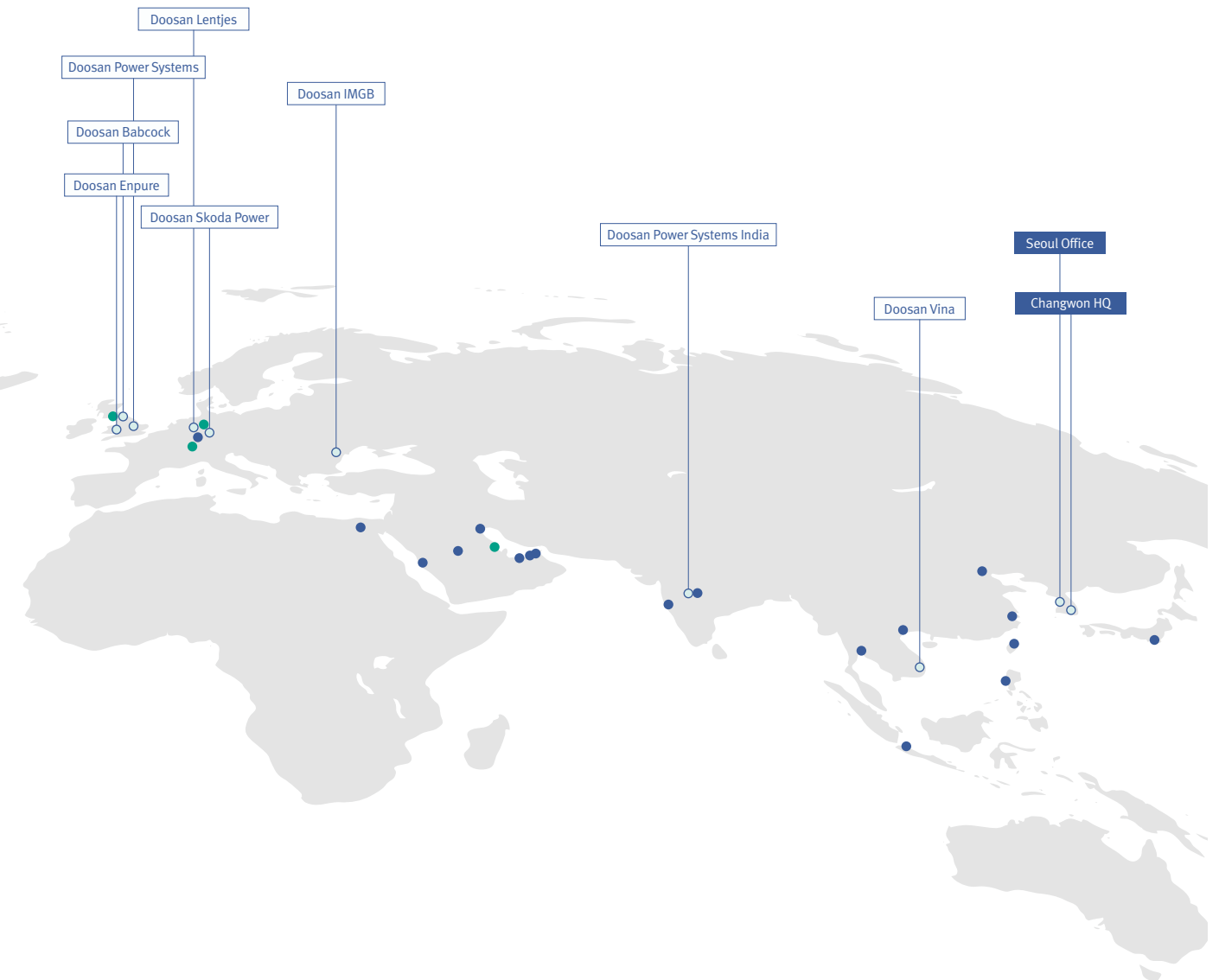
2009 Acquired Skoda Power and secured steam turbine technology. Completed construction of Doosan Vina Manufacturing Plant in Vietnam

2011 Acquired AE&E Lentjes and secured CFB technology. Acquired the water treatment solution provider Enpure Limited. Declaration of the Doosan Credo

### Reinforcement of Eco-Friendly Portfolio 2012~

2016 Acquired the U.S.-based ESS(Energy Storage System) specialist Energy Systems(Currently Doosan GridTech)

2017 Obtained 5.5MW wind turbine technology. Acquired the U.S.-based gas turbine service provider ACT(Currently DTS)



# **BUSINESS** **STRATEGY**

With the shift to green energy, such as gas-fired power and renewable energy, picking up speed at both home and abroad, DHIC has been continuously focusing its efforts on the R&D and commercialization of related technologies.





# Market Changes & Response

## ENVIRONMENTAL CHANGES IN GLOBAL ENERGY INDUSTRY

The international community is increasingly focused on preventing the hazards of global warming and climate change through measures that include reduction of greenhouse gas emissions. Based on the 2015 Paris Agreement, renewable energy shall lead the global power generation market, conforming to the new climate regime which will start from the year 2021. In addition, it is forecasted that the demand for gas will rise, given that it is regarded as an alternative fuel to substitute coal and will be a complementary energy source for renewable energy.

Korea has made an international commitment to reduce greenhouse gases by 37% from BAU levels by 2030; and is preparing to submit the 2050 Long Term Low Carbon Power Generation Strategy by the end of 2020. Accordingly, the government announced the energy transition policy in October 2017 and relevant supporting policies aimed at gradually transitioning to clean and safe energy. As such, the country will phase-out coal and nuclear power and dramatically increase the share of renewable energy. Hydrogen is also being considered as a next generation energy source.

## STRATEGIC DIRECTION OF DOOSAN HEAVY INDUSTRIES & CONSTRUCTION



### Reinforcement of New Growth Portfolio

DHIC has made continuous efforts to convert our business portfolio in response to the climate change and greenhouse gas reduction agenda of the international community and the shifting energy policies of the government.

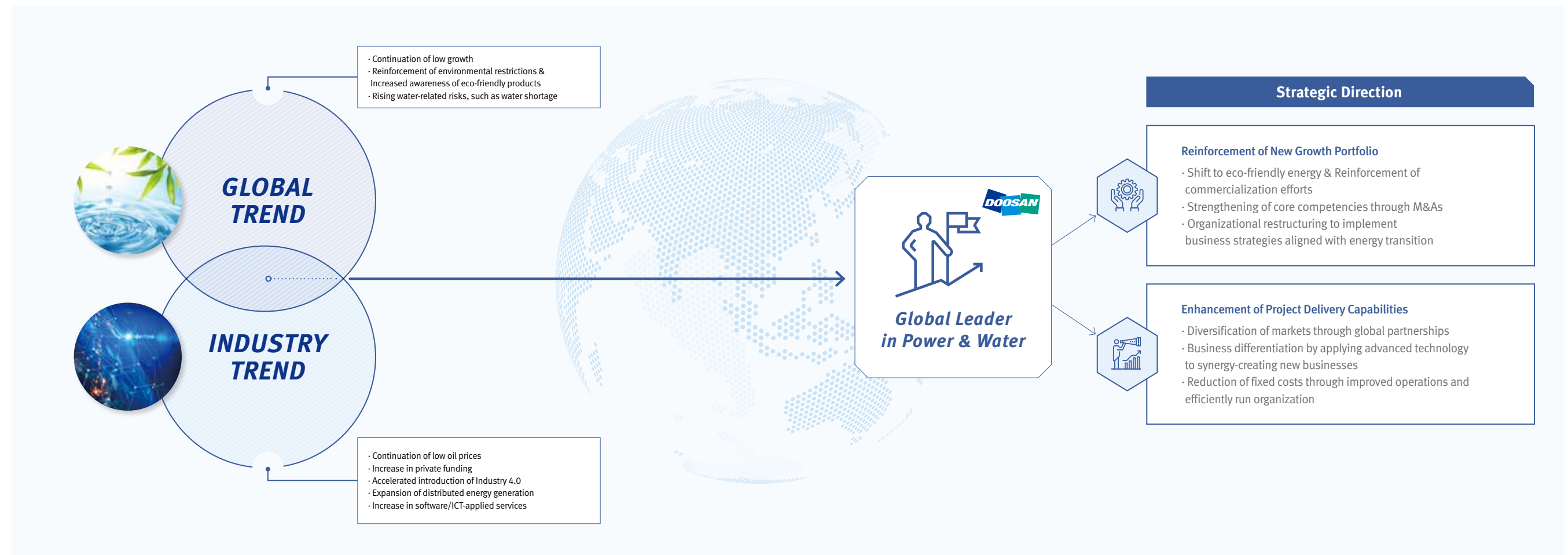
To preemptively respond to the environmental changes in the energy sector, DHIC has expanded R&D efforts and investments in new projects that support the energy transition policy of the government; closed M&A deals and business agreements, and performed organizational restructuring. As a result, DHIC is about to become the fifth company in the world to have accomplished developing a gas turbine model and has already signed a contract for a demonstration project. DHIC is aiming at dramatically increasing its new project wins by 2024, particularly centering around gas turbines and new renewable energy (i.e. wind and solar power).



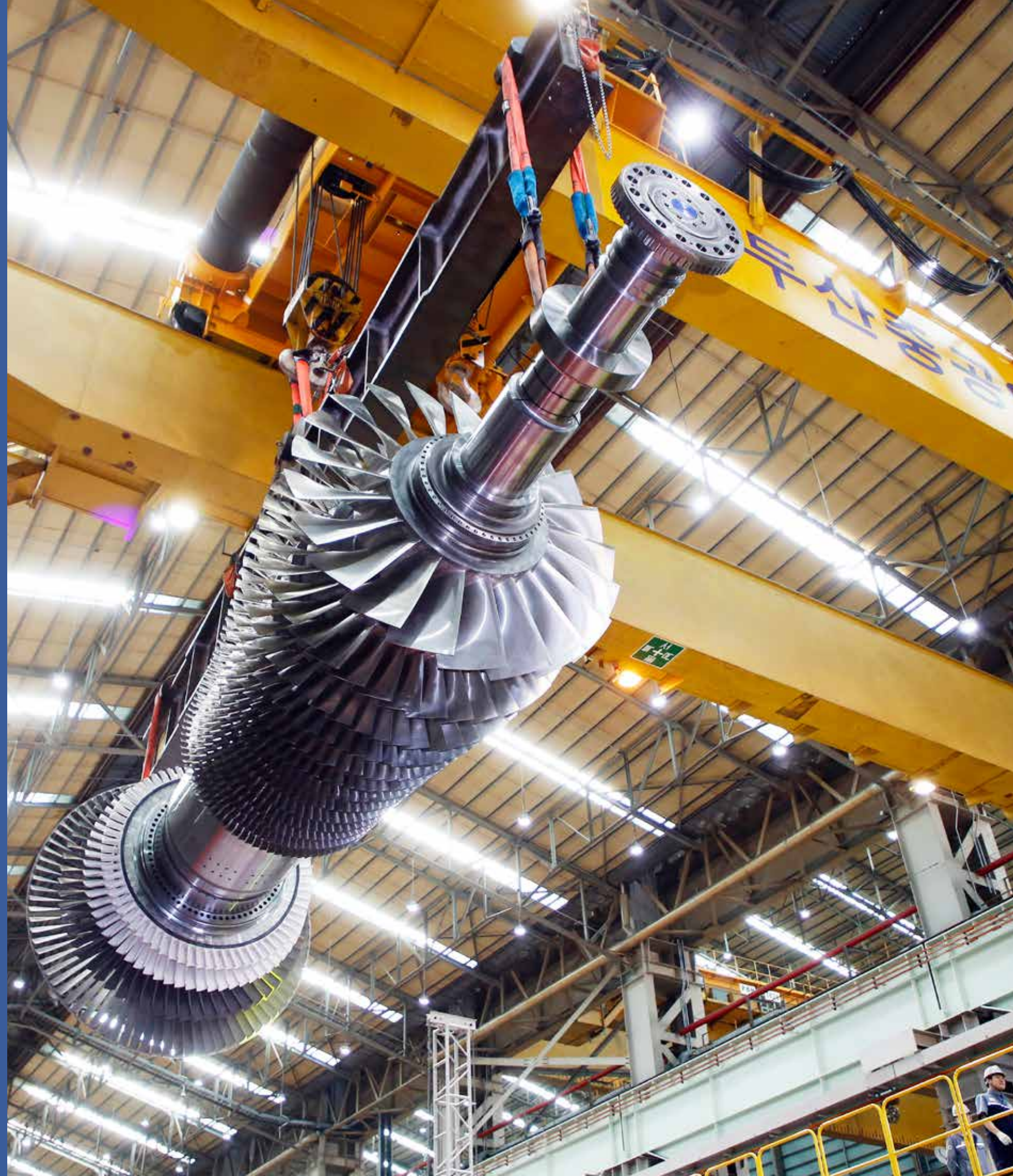
### Enhancement of Project Delivery Capabilities

DHIC has been restructuring its business in line with the trends of the global power industry and the energy transition policy of the government. From the casting and forging of basic industrial materials to the manufacturing and supply of power generation facilities and seawater desalination plants, DHIC has taken proactive efforts to strengthen its competitiveness in its existing business areas as well, such as construction, EPC and Water. In particular, existing DHIC technology is being leveraged and applied to new businesses to differentiate the DHIC business from that of others. DHIC has also continuously built up its competitiveness in winning new orders through the diversification of the global market, improvement of operations, and increased efficiency of the organization.

Strategic Direction of DHIC







## Gas Turbine

### KOREA'S FIRST DOMESTICALLY MANUFACTURED GAS TURBINE MODEL FOR POWER PLANTS

DHIC has accomplished the feat of developing Korea's first independently-manufactured gas turbine model. This means that Korea will become the fifth country in the world, following after the U.S., Germany, Japan and Italy, to own technology for manufacturing large-size gas turbines for power plants. All the gas turbines currently being operated in the existing domestic power plants were procured from overseas. As such, when problems arise, it is difficult to obtain a quick response and service. Moreover, in consideration of the future market for gas turbines and the cost of procuring equipment and materials from overseas and their services(reached 36 trillion won as of 2018), securing domestic technology for gas turbines has long been an important national priority. In 2005, DHIC successfully completed the government-led project of developing a 5MW high-efficiency gas turbine for power plants, which it had designated as a new future business. In 2013, DHIC embarked on the development of a large-capacity, high-efficiency gas turbine, and thus, equipped itself with its very own design system, testing infrastructure and manufacturing process. Subsequently, DHIC has been working on the development and testing of a 270MW gas turbine in collaboration with 22 domestic colleges and research centers(with governmental support) and 230 small to medium-sized companies. DHIC completed the basic design in July 2017; the detailed design in 2018; and construction in 2019. DHIC will continue to develop gas turbine products which boast of top-tier performance and efficiency.



Gas Turbine Model Developed Independently by Doosan



Maintenance Service for DTS Gas Turbine in U.S.

### MAJOR ACCOMPLISHMENTS CONCERNING GAS TURBINE

After the design and manufacturing of the 270MW Gas Turbine, the final assembly was completed on November 2019. The next step will be a testing of the performance and reliability at the company Test Shop. After the testing, it is scheduled to be installed at the Gimpo Combined Heat & Power(CHP) Plant of the Korea Western Power Company, where a demonstration run will take place. In addition, DHIC is now capable of supplying locally-manufactured large-size gas turbines and performing maintenance and the replacement of parts. DHIC has received orders for the fuel conversion project of the Hallim Combined Cycle Power Plant and the maintenance of Ulsan Combined Cycle Power Plant.

The maintenance of the exhaust cylinder of three gas turbines installed at Ulsan Combined Cycle Power Plant Units No. 4 to 6, another project won by DHIC, was the first case in which a local Korean company had emerged victorious over global competitors in winning a maintenance service contract. In addition, in May 2019, through the signing of an MOU with an independent power producer(IPP) named Midland Cogen Venture(MCV) in the U.S., DHIC began cooperating with MCV on various areas, such as on the operating time improvement/ maintenance of MCVoperated gas turbines, as well as in the area of hybrid power generation, which involves combining renewable energy(wind power and ESS) with gas-fired power generation, and also in the area of repowering services, where new gas turbines developed by DHIC are installed at existing power plants.

### FUTURE PROSPECTS FOR GAS TURBINE BUSINESS

DHIC is in the process of developing a gas turbine model which has been upgraded from the initial model currently being tested. The upgraded model will be a 380MW gas turbine model boasting of a world-class performance. In the future, DHIC is scheduled to conduct several demonstrations and pilot projects on the latest gas turbine and the Power Package Solution developed for combined cycle power plants. As part of the government-led project of promoting the domestic production of materials, parts and equipment, DHIC will be working on the development of technology related to high temperature parts and steam turbine parts used in combined cycle power plants and continuously seek to enhance the performance. Additionally, DHIC aims to increase its share in the services market through the expansion of the services and performance upgrades offered on gas turbine products manufactured by other global OEM companies.





Jeonnam On Land Wind Power Complex

## New Renewable Energy & Zero Emission Power Plant Projects

### TOTAL SOLUTION PROVIDER FOR WIND POWER

The domestic wind power market is forecast to grow to the scale of 17.7GW(4.3GW for onshore, 13.4GW for offshore) over the next 30 years in accordance with the Korean government's Renewable Energy 3020 Implementation Plan. The global wind power market is also expected to grow from 694GW in 2020 to 1,341GW by 2030, thereby recording an annual growth rate of 6.8% on average.

DHIC is a Total Solution Provider that can provide customers with the best solution based on a proven track record. As part of the 30MW Tamra Offshore Wind Farm project, DHIC was involved in the analysis of wind conditions, selection of site, provision of materials and equipment, the EPC and O&M(Operation & Maintenance) services, review of project feasibility and stakeholder investments for the project development. In addition, DHIC has acquired competitiveness in offshore wind power projects, having been recognized as the sole Korean company with EPC project delivery experience for offshore wind farms(i.e. 60MW Southwest Offshore Wind Farm).

### MAJOR ACCOMPLISHMENTS AND FUTURE PROSPECTS FOR WIND POWER BUSINESS

In 2018, DHIC won the contract for the 18MW Jangheung Onshore Wind Farm project using its 3MW wind turbine model after completing construction of the 46MW Yeongheung Wind Farm II in 2013. This brings DHIC's total onshore wind power portfolio size to 141MW. DHIC also received an order for the 60MW Southwest Offshore Wind Farm project, which brings our total accumulated offshore wind power portfolio size to 96MW. In 2020, DHIC anticipates winning a contract for a large wind farm on Jeju Island. DHIC has acquired competitiveness in the offshore wind power sector by obtaining the DEWI-OCC(Germany) international certification for its 5.5MW offshore wind turbine model. DHIC has already developed a 3.3MW model derived from this model. DHIC is planning to introduce the 5.5MW model to the 100MW offshore wind farm project on Jeju Island. In addition, DHIC is striving to develop a 8MW model, following the recent market trend favoring large-size wind turbine models optimized for Korea's low wind speed environment. DHIC aims to apply it to large wind farms after improving the annual power generation amount and operational efficiency to be superior over that of overseas companies.

### THE NEW FUTURE OF POWER GENERATION, ESS & SOLAR POWER

DHIC has been providing a total technology solution, including platform-based control system software to ESS(Energy Storage System) and DER(distributed energy resources), so that customers are able to convert crisis to opportunity and generate profit in the rapidly-evolving energy industry. Based on the project delivery capabilities acquired through technology development efforts and the establishment of companies, such as Doosan GridTech, DHIC has been handling the overall implementation of ESS projects with a combined installed capacity of 106MWh(including an interlinked 4MW PV). These projects include the systems used for the purpose of frequency control, connecting with solar power systems and peak power reduction. DHIC has been raising its competitiveness in the area of ESS through the interconnection of such technologies with large-scale solar power generation. At the 5<sup>th</sup> Global Energy Storage Conference held in June 2019, DHIC was recognized for its successful implementation of a10MWh ESS at the Beacon Solar Plant in California(the largest of its kind in the State) back in 2018 by being awarded the 'Energy Storage Project of the Year' award. This demonstrated the innovation, safety, and operational efficiency of DHIC's ESS System to the world.

### MAJOR ACCOMPLISHMENTS AND FUTURE PROSPECTS FOR ESS & SOLAR POWER BUSINESS

DHIC expects to win a project order to install and deliver Korea's largest solar power plant and a connected ESS facility on Anmyeondo Island in Taean County of the Chungnam Province. With the application of DHIC's ESS control technology, DHIC plans to establish a stable and efficient PV + ESS renewable energy complex. Using the performance of the Anmyeondo Island facility as a reference project, DHIC aims to present an ESS-linked renewable energy model to the domestic solar power businesses. In 2020, DHIC won a contract for a 150MWh ESS project in Wandoan, Queensland in Australia and will be starting on the construction in the latter half of the year. DHIC also expects to implement a solar power plant-linked ESS in Florida and supply a control system software based on the contract it signed with 8 Minute Energy, the largest solar power developer in North America. DHIC aims to further expand its ESS projects both at home and abroad, taking advantage of new renewable energy trends and leveraging our innovative software and verified performance competency.



In June 2019, at the 5<sup>th</sup> Global Energy Storage Conference held at the Seoul Grand Hilton Hotel, DHIC received the 'Energy Storage Project of the Year' award in recognition of its successful implementation of a 10MWh ESS at the Beacon Solar Plant in California(the largest of its kind in the State) back in 2018.



### RESPONSE TO THE EMERGING HYDROGEN ECONOMY

In 2019, the government announced a roadmap for pursuing a hydrogen economy at the national level. The government suggests domestic measures such as establishing hydrogen infrastructure and recharging stations and creating a technical development road map. Each province is also taking steps to comply with national government directives, such as constructing recharging stations and securing funds to stimulate the supply of hydrogen in the transportation sector. Recognizing that the emerging hydrogen business is a potentially good new business opportunity, DHIC has set up a task force to review the business feasibility and technologies of the hydrogen business from various angles.

#### MAJOR ACCOMPLISHMENTS & FUTURE PROSPECTS FOR HYDROGEN BUSINESS

DHIC has developed the capacity and competitiveness on a wide range of energy projects, including nuclear power, thermal power, desalination, wind power and ESS. This accumulated experience and related networks are a great advantage for the company as it enters the hydrogen market. As the leading company of the Changwon Industrial Complex, DHIC is participating in a project to construct and operate a 5-ton liquefied hydrogen production facility in cooperation with the Industrial Complex Corporation and the City of Changwon (total project worth 90 billion won). As part of this project, DHIC is scheduled to build stable infrastructure to enable the supply of hydrogen sufficient enough to operate approximately 13,000 hydrogen vehicles.

Through the successful implementation of the Changwon Hydrogen Liquefaction Project, DHIC will be able to emerge as the market leader that has established Korea's first hydrogen liquefaction facility. DHIC aims to supply both liquefied hydrogen for the transport sector and industrial hydrogen. DHIC plans to continue expanding into this project area in line with the national hydrogen roadmap.



MOU Signing Ceremony for Hydrogen Liquefaction Project in Changwon



Above. Signing Ceremony for "Vision Proclamation of Republic of Korea's Hydroelectric Power Industry"  
 Below. Signing of Business & Technology Cooperation Agreement with ANDRITZ of Austria



### HYDROELECTRIC POWER

In 2019, Korea Hydro & Nuclear Power Co. held the 'Hydroelectric Industry Vision Proclamation' ceremony at which it announced a large-scale investment plan of about 7 trillion won. Investments over the next 10 years include projects to modernize aged hydroelectric power plants (1 trillion won), the construction of new pumped storage hydroelectric plants (3 trillion won), and overseas hydroelectric power plant projects (3 trillion won). Korea Hydro & Nuclear Power Co. also announced their plan to collaborate with local companies. For example, they will seek to promote domestic manufacturing of hydroelectric power plant components, build demonstration power plants in Korea and convert the bidding process for the supply of hydroelectric power plant components to a competition among local vendors, all for the purpose of promoting mutual growth with the local Korean companies and gain global competitiveness together with the local hydroelectric power industry. DHIC is the sole company in Korea that has proven competency and technology to manufacture and supply major components for large hydroelectric power plants and pumped storage hydroelectric power (e.g., pump turbine, generator), as well as instrumentation & control systems for hydroelectric power plants. Thus, DHIC expects to participate actively in the expansion of the hydroelectric power market.

#### MAJOR ACCOMPLISHMENTS AND FUTURE PROSPECTS FOR HYDROELECTRIC POWER BUSINESS

Since supplying the main components for the Gangneung Hydroelectric Power Plant (41MW x 2 Units), DHIC has successively participated in the modernization projects and new construction projects of all the domestic hydroelectric and pumped storage hydroelectric power plants, including the one at Mujoo (300 MW x 2 Units), Samyangjin (300 MW x 2 Units), Sanchung (350MW x 2 Units), Yangyang (250 MW x 4 Units), and Yecheon (400 MW x 2 Units). In addition to the domestic modernization and construction projects, DHIC is now focusing on advancing into the overseas hydroelectric power plant markets in Southwest Asia and Europe. Furthermore, to enhance its competitiveness, DHIC has a business & technology cooperation agreement with ANDRITZ HYDRO GmbH, which retains world-class technology and project experience in the area of hydroelectric power generation. The Cooperation Agreement includes collaborating on modernization of aged domestic hydroelectric power plants and construction of new pumped storage hydroelectric power plants, working together on Korea Hydro & Nuclear Corporation's overseas hydroelectric power projects, supporting the development of technical competency to enable the independent design of hydroelectric power systems, and training to improve competency in hydroelectric power engineering. Through this agreement, DHIC will procure independent hydroelectric power system design technology, whereas it has had to rely on overseas technology before. DHIC expects to actively participate in the modernization of domestic hydroelectric power plants and in supplying (independently) major components for the construction of new pumped storage hydroelectric power plants.



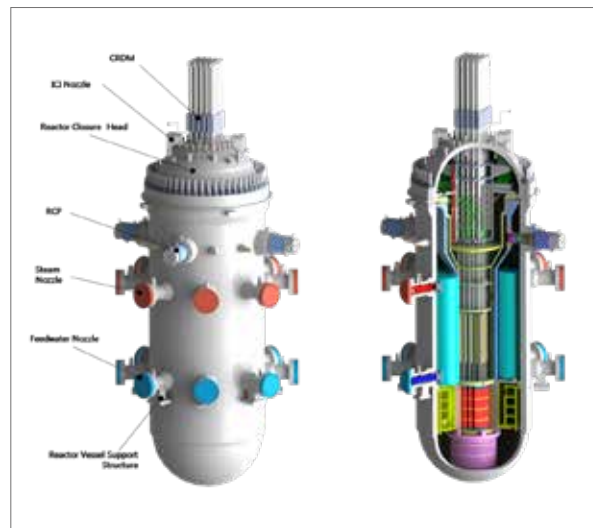
**NEW OPPORTUNITIES FOR NUCLEAR POWER PLANTS, SMR(SMALL MODULAR NUCLEAR REACTOR)**

As SMR is gaining worldwide attention, many countries and utilities are actively showing their interest in it. It is because SMR nuclear power plants generate clean energy without emission of carbon, contributing to preventing global climate change. In addition, with drastically improved safety and economic advantages, they take up less site area, and can replace existing coal and gas power plants as well as large-scale nuclear power plants. As load follow is available, they can be operated in harmony with new renewable energy plants. Another advantage is that they can also be utilized in various areas, such as desalination and hydrogen production.

**MAJOR PERFORMANCE AND FUTURE PROSPECTS FOR SMR BUSINESS**

DHIC has rich experiences and technology in the area of nuclear power including the supply of 32 nuclear reactors and 116 steam generators domestically and overseas(to China, UAE, etc.), and Vogtle nuclear power unit 3 and unit 4 which are currently being constructed in the U.S. by NuScale Power. Highly evaluating DHIC's manufacturing competency and technology, NuScale Power engaged DHIC to supply core equipment to the first-ever SMR nuclear power plant in the U.S. To strengthen this strategic cooperative relationship, DHIC participated in the investment in NuScale Power together with domestic investment companies; and completed the first equity investment tranche on July 2019 and the third equity investment tranche on December 2019. This business cooperation will allow DHIC to supply equipment worth a minimum of 1.3 billion dollars, starting with modules and other equipment for the SMR project and further expanding to other follow-up projects to happen in the U.S and the world's nuclear power market. In addition, DHIC participated in the development of SMART, the next generation domestic SMR technology, leading the design and manufacturing of major SMR equipment. It is currently discussing the possibilities of exporting SMR technologies to Saudi Arabia in cooperation with the Korea Hydro & Nuclear Power; and pursuing business expansion into the next generation nuclear power market with high growth potential, through joint efforts with other SMR developers.

**SMART Nuclear Reactors**



New Scale Power Share Investment MOU

**DECOMMISSIONING NUCLEAR POWER PLANT AND NUCLEAR FUEL AFTER USE**

DHIC has been developing nuclear power plant decommissioning technology since 2015 in order to respond to the need for transportation and storage of nuclear fuel after its use. Demand for such technology is expected to expand due to the increased global aging of nuclear power plants. DHIC has been striving to become the global leader of the market for decommissioned nuclear power plant waste management. In 2017, DHIC developed a cask design technology to transport and store nuclear fuel after its use.



# Reinforcement of Service Business Competitiveness

## DHIC COMPETENCY-BASED SERVICE BUSINESS

DHIC has been pursuing service projects drawing on its competencies as an OEM provider of main equipment for power plants, such as sales & marketing/design/procurement/fabrication/project management/quality-related technologies as well as plant engineering(PE) and construction competencies. DHIC competencies enable it to specialize in providing the following services: Diagnosis and Evaluation of Power Plants, Reverse Engineering of other OEM-supplied major components, Field Engineering, Local Operation, and RMS(Remote Monitoring Service). DHIC has been successful in winning service orders for the upgrading of Eraring Power Station in Australia, Renovation & Modernization (R&M) of Bandel Power Plant Unit 5 in India and retrofitting of the Morupule A Power Plant in Botswana, which was won through the project of Sabarmati in India, the fuel conversion of Yeongdong Power Plant Unit 1, and Barh Project in India. Based on these successive project wins, DHIC effectively established itself as a R&M service provider. DHIC has continuously won orders such as the performance improvement of Boryeong Power Plant Unit 3 and the fuel conversion of Yeongdong Power Plant Unit 2. Through these domestic and overseas project experience, DHIC has been able to gain a competitive edge over other OEM companies. In addition, DHIC will likely be able to establish a stable portfolio of service and maintenance projects by targeting power plants for which it delivered main components, by offering its routine/scheduled maintenance services and expanding its supply of spare parts.



Yeongdong Power Plant in Korea



Eraring Power Station in Australia



UAW, Jebel Ali M Combined Thermal Power Plant

## EFFORT TO REINFORCE COMPETITIVENESS IN THE SERVICE BUSINESS

### LAUNCH OF TECHNICAL ADVISOR GROUP FOR SERVICE BUSINESS

The service business line aims to secure orders to provide maintenance on clients' power plants, and to ensure successful maintenance services by supplying and applying DHIC-designed and manufactured parts in the maintenance process. An important element of successful implementation of service projects is the competency of the professional TAs who serve as contact points with customers. Accordingly, DHIC has established the TA Academy Center and developed an education curriculum to foster professional TAs for the service business. DHIC is also developing additional training programs together with overseas subsidiaries such as DTS. Through these efforts, DHIC has been improving the competency of existing manpower and cultivating new talents.

### DIGITAL SOLUTION

DHIC has been developing digital solutions for the various business areas in order to maximize the operational performance of power plants. A demonstration project was completed at the Sasan Coal-Fired Thermal Power Plant #1 in India for our combustion optimization system. The early warning solution has been recognized for its commercial value as made evident when we successfully sold our shares for the license to Korea East West Power. DHIC won orders from Indonesia and Chile for combustion tuning projects. Such projects will help DHIC to successfully enter a wider services market.

### EXPANSION OF SERVICE MARKET

DHIC won a maintenance contract for UAE BNPP Nuclear Power Plant through collaboration with Doosan Babcock(which has long experience and know-how in the area of servicing power plants); and thereby, establishing the basis for advancement and expansion of service projects for nuclear power plants. After confirming the needs for the fuel conversion (Coal/Petroleum → Gas) at thermal power plants in the Middle East and South America, DHIC is actively leveraging its fuel conversion technology and advanced into relevant markets.



# Technology Development and Demonstrations for Business Diversification

## EXPEDITING INNOVATION OF R&D PORTFOLIO

DHIC continuously seeks to innovate its R&D portfolio in order to develop competitive, cutting-edge technologies which align with the rising global trend for eco-friendly and new renewable energy. As part of these efforts, DHIC has been reinforcing its project competitiveness for large-size gas turbines and securing technology in the area of new renewable energy (e.g., wind power, ESS, hydrogen, battery recycling). DHIC has been accelerating the development and commercialization of environmental solution technologies such as EME and CDI, as well as the discovery of new projects to foster next generation business competitiveness. DHIC introduces below the major technologies that have been developed, commercialized and demonstrated for these areas of new businesses and environmental solutions.

## SECURING INNOVATIVE MANUFACTURING TECHNOLOGY

### 01 THROUGH 3D PRINTING

DHIC has succeeded in developing and obtaining manufacturing technology for 3D printing which is critical for the 4th industrial revolution. 3D printing technology is based on 3D modeling that accumulates metal powders by layers and melts special areas with a laser to manufacture parts. 3D printing can be used to realize innovative designs which cannot be produced using general processing technology. It can also drastically reduce manufacturing time and cost. Through technology development efforts, DHIC has been able to secure the technology for the entire cycle of 3D printing from the design of parts to the quality inspection of finished parts. In particular, DHIC has established itself as being the best in Korea in regards to innovative design and process development in the area of 3D printing for metal powders.

DHIC has applied 3D printing technology to manufacture parts for the gas turbine, which is one of the company's key businesses, and verified their performance through testing of the 3D-printed parts. In 2020, DHIC is scheduled to carry out a demonstration on the 3D-printed gas turbine parts. Moreover, DHIC has been making an effort to strengthen the future competitiveness of 3D-printed gas turbine parts by also applying the technology to its services business. In addition, based on its excellent technical competitiveness in 3D printing, DHIC has been exploring expansion into 3D printing of parts for the aviation and national defense industries. DHIC has acquired the international certification (AS9100) to enter the areas of national defense and aviation through participation in national projects carried out in cooperation between the military and private sector. DHIC is scheduled to establish a mass production line in 2020 together with the introduction of the world's largest 3D printer.



Utilizing 3D Printing to Manufacture Parts

### 02 DEVELOPMENT OF MATERIALS FOR NEW BUSINESSES

DHIC is a recognized expert in the field of materials and process engineering, as it has the engineering capabilities to cover the entire process starting from development of materials to the production and testing. DHIC has the capability to develop a range of materials, including steel, super heat-resistant alloys and composite materials, for use in the industry and power generation. DHIC earned its reputation as a recognized expert as it has abundant development experience under its belt and owns a wide-ranging database. In order to develop and design new products as an OEM company, it is necessary to have a database on the materials' physical properties and this data is also needed to solve the issues of design and quality.

Based on the GRANTA database, DHIC has established a new in-house system that can stably provide relevant information regarding the materials necessary for an entire business process, e.g., material development, design, manufacturing & construction, and operation & services. DHIC continuously upgrades its unique database system of materials for design and lifespan evaluation (including material damage) for each major product. Based on accumulated competency in materials engineering, DHIC will expand this business area through the discovery of new projects and new technologies, e.g., materials for new renewable energy; materials for the production, storage and transportation of hydrogen; and alternative lightweight materials.



500TPD CDI System

### 03 ENVIRONMENTAL SOLUTION – FINE DUST REDUCTION TECHNOLOGY

The problem of fine dust has recently emerged as a societal challenge. The government has enacted a comprehensive measure for fine dust control with the goal of reducing domestic emission of fine dust by 30% by 2022 (compared to the emission level in 2014). DHIC has made continuous R&D investment efforts to develop technology to reduce emissions. Recently, DHIC developed the world best high-efficiency EME (Electrostatic Mist Eliminator) which removes both fine dust and white smoke from thermal power plant emissions.

EME is one of the treatment systems for emissions by thermal power plants. It is an eco-friendly process applied at the last stage before emissions are discharged through the chimney. The recently developed EME shall be installed above the FGD (Flue Gas Desulfurizer) of the power plant. The EME is able to reduce fine dust and super fine dust below 0.5mg/Nm<sup>3</sup>, which is 4% of the standard limit (12mg/Nm<sup>3</sup>) and 10% of the emission standard in the Seoul Metropolitan area (5mg/Nm<sup>3</sup>). By just installing an EME at an existing facility, this will have the effect of reducing white smoke discharge by 50%.

DHIC has installed a real life-size Pilot EME at its Changwon Plant and successfully completed the pilot run of the EME, which was developed to be applicable at any domestic standard coal-fired thermal power plant. DHIC has completed the design for a 500MW EME and planned for a demonstration project at a standard coal-fired thermal power plant to be jointly carried out with a major power generation company. In 2020, DHIC is scheduled to complete the demonstration run of a 10,000CMH Pilot EME installed at the Hadong Coal-Fired Power Plant Unit 3 of the Korea Southern Power Co.

### 04 ENVIRONMENTAL SOLUTION – ECO-FRIENDLY WATER TREATMENT TECHNOLOGY

DHIC has developed a new CDI (Capacitive De-Ionization) technology for water treatment which is more eco-friendly than the conventional reverse osmosis membrane-based method. CDI reduces the use of chemicals and increases the efficiency of the coolant and circulating water treatment processes, which has the effect of reducing negative environmental impacts. DHIC successfully conducted a pilot test together with the Korea District Heating Corp. on a facility with the capacity of treating 100 tons of water per day over the course of one year to verify its feasibility. Then, a large-scale CDI demonstration plant with a 500 tons per day capacity was set up at the Hwaseong branch of Korea District Heating Corp and successfully operated. DHIC's CDI technology is able to reduce not only the processing costs, but also the facility space by 60%, and the cost of chemicals for water treatment by more than 90%. It has been proven to reduce operating costs by more than 50% as compared to previous ionization exchange facilities (with a 2,000 tons per day capacity). Based on the results of the demonstration project at the Hwaseong branch of KDHC, DHIC plans to develop CDI water treatment methods for various power generation facilities. The CDI technology is eco-friendly and meets government standards set forth in the Chemical Control Act and PSM (Process Safety Management), which is to be reinforced in the future. Thus, DHIC expects CDI to become a viable water treatment alternative.



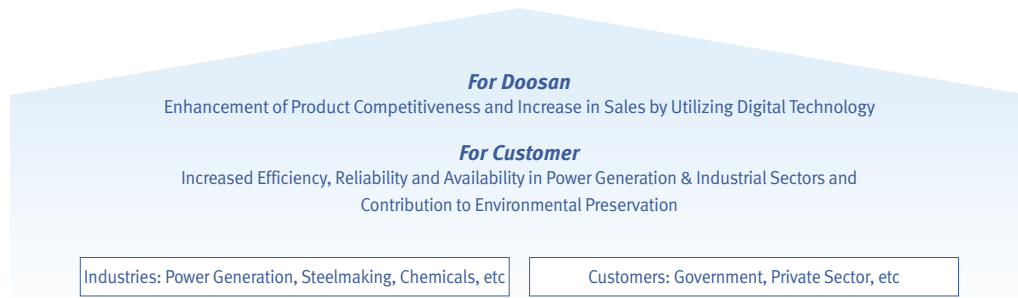
Water Treatment System



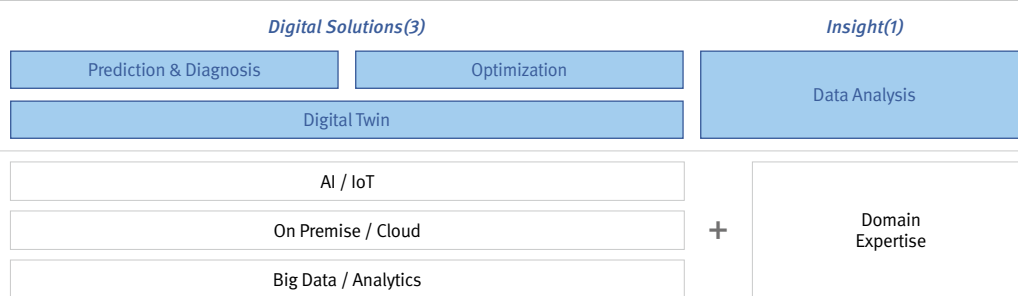
# Digital Transformation

DHIC will be commercializing the output of our Digital Transformation efforts, and will be focusing on developing digital solutions to secure competitiveness in future businesses.

## VISION



## CORE VALUE "3+1"



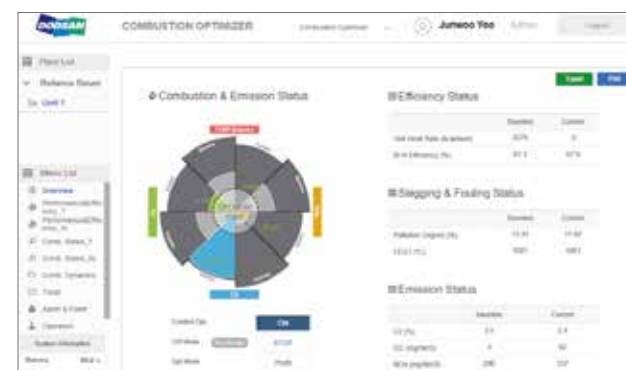
### COMMERCIALIZATION OF DIGITAL SOLUTION

DHIC plans to commercialize Digital Solutions, which are products developed by aligning the competencies held by DHIC with various IT technologies(e.g. AI, Cloud, Big Data). Digital Solutions can largely be divided into the following: 1) Prediction & Diagnosis, 2) Optimization, 3) Digital Twin, and 4) Data Analysis Solution.

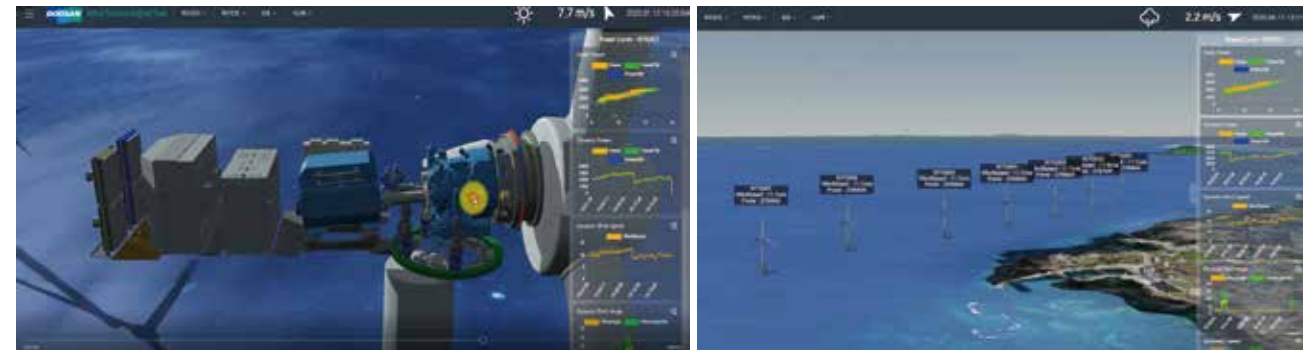
**Prediction & Diagnosis** | The digital solution is not a data-based solution that can only be applied to specific equipment in power plants. As it has an advantage of universal usage, once it has been established that it can be widely applied to various plants and equipment, the utilization rate will likely rise even further. Based on the commercialization results secured at the end of last year, DHIC has been promoting its application to various plants and equipment within independent power plants(IPP), manufacturing plants and the Doosan Group.

**Optimization Solution** | Three types of solutions - combustion optimizer, optimized soot blower and coal blending advisor – have been combined into one solution, which DHIC has been busily promoting to domestic and overseas power generation companies. The combustion optimizer solution was proven to minimize the emission of NOx and other pollutants as shown in a demonstration on the Sasan Power Plant in India in 2019. This solution not only minimizes simple pollutants, but also presents various operation methods,~ such as a fuel reduction mode. For water projects, DHIC has developed an optimized Energy Management Solution that minimizes the electric consumption in desalination plants. DHIC is scheduled to apply this solution to the Doha desalination plant in Kuwait.

**Digital Twin & Data Analysis Solution** | The Digital Twin is a solution to monitor and predict the performance of equipment and to detect and diagnose equipment anomalies by utilizing IoT and AI. DHIC has completed the compatibility test for wind turbines. This solution can be applied to analyze RT(Radiographic Test) images, and then to eliminate defective products based on the analysis. DHIC expects to commercialize the Digital Twin for various suitable purposes when DHIC expands its sales of wind turbines and gas turbines.



Combustion Optimizer



Wind Power Digital Twin

### DEVELOPMENT OF DIGITAL SOLUTION FOR VARIOUS FUTURE BUSINESSES

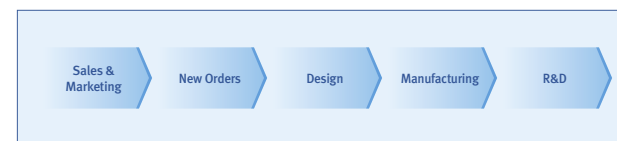
DHIC plans to make investments to enhance its competitiveness in various future businesses (Gas Turbine, Wind Power), which includes commercialization of Digital Solutions.

**Gas Turbine** | DHIC plans to enhance the competitiveness and differentiate DHIC's gas turbines by increasing efficiency and improving reliability through the development of a digital solution. The digital solution package will optimize and monitor the performance of DHIC's gas turbine. It consists of combustion automatic tuning(DCAT), performance diagnosis, and prediction diagnosis.

**Wind Power** | In order to generate additional profit and enhance the competitiveness of the service business, DHIC has been developing digital solutions for power-up, smart maintenance, and failure prediction and diagnosis. DHIC is also exploring a digital solution to strengthen competitiveness in solar power and ESS businesses.

### WORK EFFICIENCY THROUGH DIGITALIZATION

DHIC has been exploring digital solutions to improve work efficiency, the corporate culture, and work methods. The company has been pursuing a Digital Transformation initiative and applying this across all the stages of the value chain.



**Sales & Marketing** | DHIC has developed the MI(Market Intelligence) Navigator Tool which analyzes market trends and develops strategies based on the acquired data. Drawing on internal and external market data that DHIC has collected and digitized, MI Navigator can identify project trends of local competitor companies. In addition, MI Navigator can analyze the order intake and market share for each region and competitor.

**New Orders** | The ITB & Contract Review System enables DHIC to review bid documents(ITBs) and contracts for unfavorable clauses and issues that require mutual consultation between the related parties. After winning an order, DHIC utilizes a drone to assess the required civil engineering work. Drone assessments were conducted for the Samcheok Thermal Power Plant project in 2019. DHIC plans to utilize the drone to assess the civil engineering work needed for the Van Phong Project in Vietnam. In addition, since the end of 2018, DHIC has been using an e-Logistics system during project implementation to organize and arrange various logistics documents. Finally, DHIC plans to expand the use of smart solutions to include not only the EHS(Environment, Health & Safety) sector, which already utilizes digital technology to ensure workers' health and safety on construction projects, but to other sectors as well.

**Design** | DHIC has been promoting the digitalization of the historical design data and adopting an integrated design process. As increasingly more areas are being analyzed and the range of application becoming wider, DHIC aims to improve the efficiency of the analysis processes by implementing a high-performance cloud computing system.

**Production** | Through the Smart Factory initiative that has been pursued by DHIC over the past few years, DHIC has reinforced interconnectivity with automated design data and promoted the digitalization of manufacturing data. Representative cases are the automation of the welding process for boiler headers and smoothing of turbine blades, and the PLM/MES adoption for the turbine/generators and castings & forgings. In addition, through the virtual plant modeling analysis, DHIC has been troubleshooting using the prediction feature and maintaining an optimal plant operation.

**R&D** | DHIC is utilizing AI analysis of data and past company experience to upgrade its competency in designing and developing alloy materials.

**Application of Robotic Process Automation to Simple Repetitive Works** | To increase work efficiency, SW Robots are used to execute simple repetitive tasks, allowing the employees to focus on higher value added work, thus helping them achieve a better work-life balance. DHIC is planning to apply the RPA and AI technologies to expand into more areas for possible collaboration between employees and robots.



## Power Generation EPC

DHIC has experience implementing various international projects and has demonstrated its EPC competency across the entire value chain – from the design of power plants to the supply of materials and equipment, as well as construction and commissioning. Based on its EPC competency, DHIC has been diversifying its business portfolio. Leveraging proven competencies in civil engineering, architecture (environmental certification), and public SOC projects, DHIC has expanded its architecture and civil engineering services beyond power plants. Domestic private sector projects include Sooncheon City development project; Anyang Knowledge Industry Center; and Deungchun-dong multipurpose building. Domestic public sector projects include the Sejong-Ansung Highway; Pyeongtaek-Godeok Group Energy project; and Wanjoo-Sambong Project.

In the overseas market, DHIC successfully completed construction of the Vinh Tan 4 Thermal Power plant in Vietnam, thereby helping to relieve the power shortage in southern Vietnam. Now, DHIC plans to reduce its involvement in coal-fired power plant projects and instead increase its share of sustainable energy projects in line with the shifting global power market trends.

### Effort to Strengthen Competitiveness

In the design sector, digital design technology has been actively adopted, design errors minimized and optimal delivery date pursued for the designs. On the procurement side, we adopted the global sourcing method to ensure we can supply our clients with the appropriate products. In the construction sector, we ensure our projects are executed by skilled, experienced personnel, while also running various career development programs aimed at discovering and cultivating talents in the field of construction and commissioning. Being a specialist on overseas construction projects as well, DHIC also offers a wide range of training programs aimed at helping the overseas site workers build up their capabilities.

DHIC continuously manages risks that may occur during the operation of projects, through measures such as prior review of potential risks in the project cycle and preparation of countermeasures for identified risks. Based on a systematic EHS system, DHIC implements autonomous safety activities with partner companies. DHIC has accomplished zero-accident performance on many overseas projects. In the Saudi Arabia Fadhili project, DHIC achieved 15 million hours of accident-free operation. By implementing early risk management measures and adopting various processes aimed at strengthening on-site safety, DHIC has been able to effectively build up its competitiveness in project delivery.



03.

### Reinforcement of Business Competitiveness

Business Strategy





Saudi, Jeddah RO

## WATER EPC

DHIC ranks first in market share of seawater desalination using thermal and SWRO (Seawater Reverse Osmosis) methods. DHIC has successfully delivered on 30 projects which together can produce 7 million tons of fresh water for daily use by 24 million people. DHIC aims at providing customers with maximum satisfaction through various business models ranging from a simple supply of systems to Turnkey Projects and the provision of operation and maintenance services after the construction of plants.

### Effort to Strengthen Competitiveness

As a leader of the desalination business, DHIC has constantly been working on developing related technologies and strengthening our competitiveness by engaging in joint research and technology exchanges with our global R&D centers and overseas subsidiaries. Through our efforts to upgrade our desalination technology, such as improving the performance of our thermal and seawater reverse osmosis pretreatment processes, we have been able to successfully secure new orders and build up our competitiveness in this field. Furthermore, by improving the operational efficiency of our water treatment systems and developing environment-friendly products, we have been able to preemptively respond to customer needs and develop new business opportunities.

By applying the O&M expertise it had acquired over the years, DHIC developed technology for digital O&M services, something that would prove essential in improving the operational efficiency of desalination facilities. In addition, by leveraging the knowhow DHIC had acquired from years of successfully developing desalination systems, the company was able to successfully commercialize a zero-liquid discharge (ZLD) system after working on the development for four years since 2012. The zero-liquid discharge (ZLD) is an eco-friendly water treatment method which can produce reusable water while completely blocking the discharge of waste. DHIC has been supplying this technology to power plants in Korea, India and other Southeast Asian countries for treatment of wastewater generated in the desulfurization system. The company has signed a technology license agreement with some Korean SMEs working in the water treatment sector for the purpose of promoting mutual growth with local companies and have also been introducing advanced water treatment technologies to the local industry to help enhance Korea's overall competitiveness in the water business.

## Power Plant Equipment & Materials

DHIC has the competency to design, manufacture, and install the core components for boilers. In 2006, DHIC secured competency to self-design and produce boilers through the acquisition of Mitsui Babcock (currently Doosan Babcock), a company that owned boiler technology. DHIC's heavy oil combustion boiler and 1000MW USC boiler have been selected as world-class products. Through the acquisition of AE&E Lentjes (currently Doosan Lentjes) in Germany, DHIC obtained the technical competency to develop environmental facilities and CFB boilers. DHIC is working with our Czech subsidiary Doosan Skoda Power to enhance the competitiveness of flagship products like the steam turbine and generator, which would help to secure a stable pool of new orders and profits. At the same time, based on a solid track record for domestic and overseas Combined Cycle Power Plant (CCPP) Projects, DHIC aims to offer solutions that are applicable to a wide variety of gas turbines, and thereby, continue to win new orders in the gas-fired power generation sector.

### Effort to Strengthen Competitiveness

**Boiler Business** | As the market for thermal power was reorganized from being centered around large size products to the small to medium-size boiler products, DHIC has sought to strengthen its competitiveness in small to medium-size boilers. DHIC has developed a standard model targeting the market for 50MW coal-fired thermal power generation in Indonesia. Also, DHIC has been expanding this business area through the development of an industrial boiler model which is a refined version of the previous model procured from Doosan Babcock developed by reflecting the latest market trends. To maintain cost competitiveness and increase its market share in the Southeast Asian market, DHIC plans to utilize the manpower and production facilities of its Vietnamese entity, Doosan Vina.

**Steam Turbine Gas (STG) Business** | Through the combined cycle power package solution projects, DHIC seeks to secure technology for high-efficiency STG, BOP and systems for domestic combined cycle power plants. Using the Fujairah F3 combined cycle power plant project that had been won together with local EPC partners as leverage, DHIC aims to build up on its partnerships with local companies to effectively win even more STG projects for large combined cycle power plants. Furthermore, DHIC had also won the Korea Hydro & Nuclear Power Company's TCS replacement project owing to its competitive technology and costs. In 2019, DHIC also won an order to improve the performance of at the aging Busan Combined Cycle Thermal Power Plant Units 1 and 3 by replacing the high and medium pressure steam turbines. Through these projects, DHIC was able to confirm its outstanding technology and project competitiveness.



Shin Boryeong Power Plant



## Nuclear Power

For the past 30 years, DHIC has been the world's top supplier of major components for nuclear power plants. The company is recognized for its world-class expertise in designing and manufacturing nuclear power plant components.

In particular, DHIC has the track record of having supplied the main components of the first commercially operated 3rd generation nuclear power plant (AP1000). DHIC is also the sole company that has the record of manufacturing major components for AP1000 of the U.S.

DHIC has manufactured major components for domestic nuclear power plants and received recognition for safety through U.S. and European design certifications. DHIC has demonstrated competitiveness in cost, delivery period, and quality through the successful implementation of the UAE Barakah Nuclear Power Plant. And through the supply of a man-machine interface system(MMIS) and a reactor coolant pump(RCP) to Shin Hanul Power Plant Unit 1 and Unit 2, DHIC has successfully accomplished 100% domestic manufacturing of core components.

DHIC has been pro-actively seeking new orders targeting large nuclear power plants in India, Saudi Arabia, Poland, the Czech Republic, and the U.K. DHIC competes based on its ability to supply major components for nuclear power plants, as well as through collaboration with the Ministry of Trade, Industry and Energy(MOTIE), Korea Hydro & Nuclear Power Co.(KHNC) and Korea Electric Power Corporation(KEPCO) ("Team Korea"). DHIC continues to try to diversify its target markets by expanding from the traditional U.S. and China markets to the European market.



Shinkori #5 Nuclear Reactor Shipping



Shinhanwul #1 & #2 Unit Nuclear Power Plant



Forging PBR Product at Forging Factory

## Casting & Forging

DHIC began its casting and forging business in 1973. Based on accumulated technology know-how and production experience, DHIC has been manufacturing and supplying cast and forged products of the highest quality to customers. DHIC is proud of its large-scale steelmaking plant, casting shop, forging shop and processing plant for their latest automated system, optimized digital convergence process system, and strict quality assurance system which is backed by various quality certifications. The steelmaking plant utilizes a 100-ton electric furnace; and its annual production capacity is 250 thousand tons and maximum 650 tons of ingot. The forging shop utilizes a 17,000-ton press; and its annual production capacity is 140 thousand tons and maximum 290 tons of large forged product.

### Effort to Strengthen Competitiveness

In order to strengthen competitiveness in this era of industrial advancement, DHIC has endeavored to create value for customers. Its investment in optimum infrastructure, e.g., the remelting system, enables DHIC to produce high clean steel and highly-functional metal materials. Moreover, DHIC has discovered new products to add to its project portfolio which will contribute to external growth and profitability. Based on such competency, DHIC has been exporting products to China, Southeast Asia, Japan, Europe, and the U.S., as well as supplying to the domestic market. DHIC has been recognized by MOTIE for its product manufacturing technology and export competitiveness; and has acquired a total of eight world-class product qualifications, including for a crankshaft for vessels, a work roll, and a low-pressure turbine rotor shaft.

PCHE(Printed Circuit Heat Exchanger) is a new project being promoted by DHIC. PCHE is a high efficiency heat exchanger that is reduced to one-tenth of its previous size. As this enables the heat exchange effect to be maximized even in limited spaces, PCHE has been widely applied to hydrogen recharging stations, carrier vessels for LNG, and parts for power generation. In addition, DHIC is scheduled to complete the installation of Hot Press(High Temperature Diffused junction Reactor) — the necessary facility for PCHE — by the end of October 2020. As DHIC has obtained the core technology of Flow path Design Capability, it expects growth in orders for hydrogen recharging stations, ship building, offshore plants, and power generation.

### DHIC World-Class Products

DHIC has been recognized by MOTIE for product manufacturing technology and export competitiveness and retained a total of eight world-class product qualifications, as set forth below.

	World-Class Products	Years
1	C/S(Crankshaft for Large Engine)	2003
2	W/R(Work Roll for Cold Rolling)	2004
3	MOLD STEEL(Die Steel)	2004
4	Cast Steel for Ship's Stem	2007
5	Cast Steel for Runner in Hydroelectric Power(Turbine)	2007
6	LP Rotor(Thermal Power Low-Pressure Turbine, Rotor Shaft)	2010
7	Gen. Rotor(Rotor Shaft for Turbine Generator)	2011
8	Built-in End Plate(major component in nuclear power plant)	2013

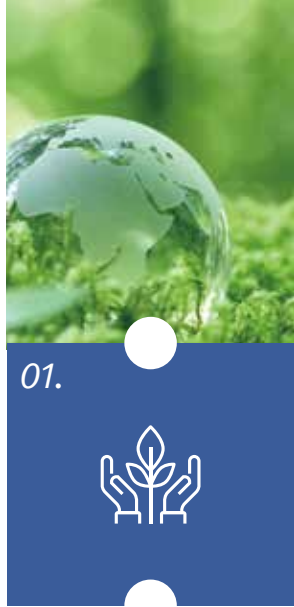




# **CSR** **FOCUS AREAS**

DHIC conducts sustainable business activities based on stakeholder priorities. Stakeholder priorities have led DHIC to focus on enhancing environmental sustainability and social values for customers, employees, and local community.





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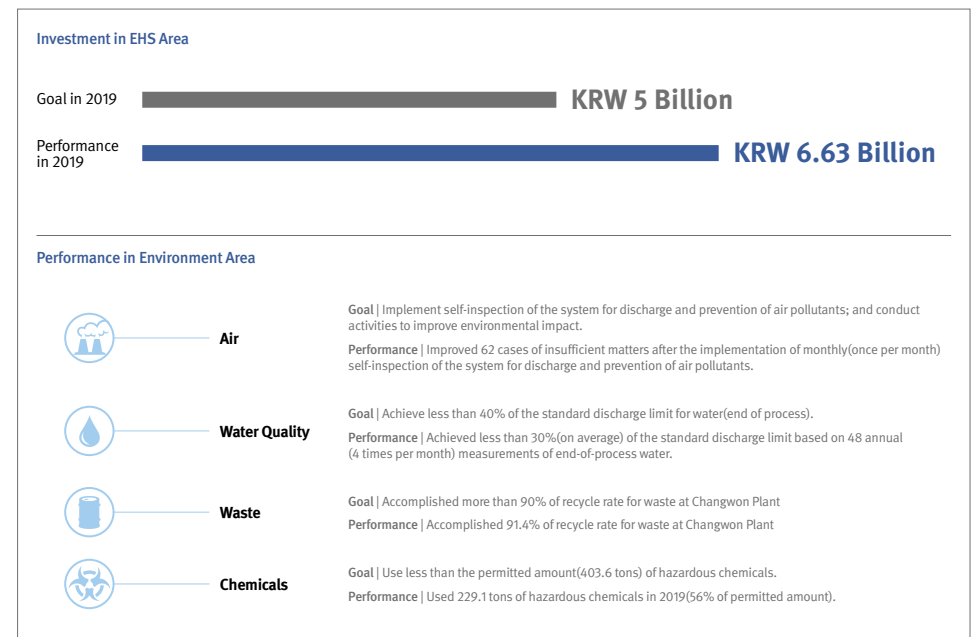
# Reduction of Environmental Impact of Business Activities

Environmental issues have become increasingly global due to continuous expansion of enterprises' business activities. Globally, factories' release of hazardous substances and greenhouse gases is leading to air pollution and climate change. Countries with advanced CSR regimes, including EU countries, have been gradually expanding the scope of environmental restrictions. Environmental information disclosure requirements, such as TCFD, have been increasing continuously. In order to manage environmental risk, DHIC expanded its EHS investment and selected core KPIs to be addressed systematically. Also, through activities such as the evaluation of environmental effect on the surrounding area and protection of biodiversity, DHIC endeavors to minimize environmental impacts on local communities.

## Expansion of Environmental Investment & Setting of Core KPIs

In order to achieve the Global Top-Tier of 'Energy & Environment', DHIC has established an EHS unit under the chief operating officer(C.O.O); and has implemented various activities to reduce the environmental impact of business activities. In particular, DHIC has introduced eco-friendly facilities which continuously invest in ways to reduce environmental pollution. Moreover, in 2019, DHIC adopted the following core KPIs: reduce air pollutants, water pollutants, waste, and chemicals. These KPIs have been adopted by 4 territories, which have conducted various activities to accomplish the KPIs.

### 2019 KPI and Performances in Environmental Area



EHS Award for Construction

## Participated in Demonstration Project for the Use Approval System of Renewable Energy

DHIC participated in 'the Demonstration Project for the Use Approval System of Renewable Energy' conducted by the KEPCO and the Korea Energy Agency in 2019 in order to participate actively in the 'Introduction of Purchasing System of New Renewable Energy' that encourages the voluntary consumption of renewable energy by an enterprise, which is one of the several government policies to reduce greenhouse gas emissions. The use approval system of renewable energy is the system for a user of renewable electricity to apply for an approval of use amount and receive the approval through the issuance of Renewable Energy Guarantees of Origin(REGO) and utilize it for various purposes such as the participation in RE100 Campaign. DHIC has participated in the demonstration project as a part of 'Approval of Use Amount by Utilizing Self Renewable Energy System' and received the approval of using imaginary renewable energy to contribute to the simulation of demonstration project of the government and express active will of the company for using renewable energy.

## Effort to Reduce Environmental Impact on Local Community and Ecosystem

DHIC has been primarily assessing environmental impact in order to minimize the environmental impact of business activities on local communities and the local ecosystem. DHIC is implementing a project to assess compliance with environment-related laws and restrictions in business activity areas. DHIC will then conduct continuous management activity in areas where improvement is needed.



### Assessment of Compliance with Environmental Regulations at Business Sites

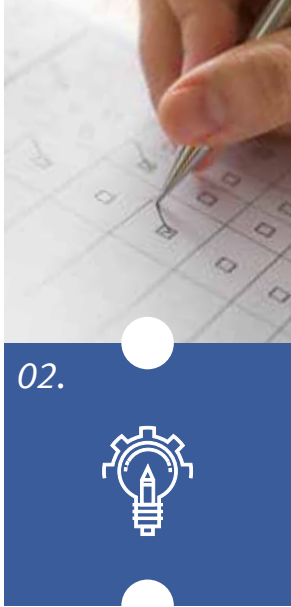
In order to minimize environmental impact of business activities on local communities and ecosystems, DHIC has assessed compliance with environmental regulations by all domestic and overseas business sites. Through this assessment, DHIC has also observed the environmental impacts on local society, such as air, water quality, waste, and hazardous materials. Based on assessment results, DHIC has conducted continuous improvement activities to minimize environmental impacts of business activities. DHIC has created a conducive environment to minimize environmental impact by appointing a main person-in-charge to undertake improvement activities for each business site. DHIC has updated(as of September 1, 2019) a ledger of environmental laws and regulations; and prepared separate improvement plans for relevant instances of non-compliance. Through such regular EHS diagnosis, DHIC monitors compliance with environmental laws and regulations and prevents and/or addresses case of non-compliance.



### Biodiversity Management

DHIC has reviewed the situation of and conducted protection activities to effectively preserve biodiversity. Before full scale launching of a project in biodiversity areas, DHIC identifies plants and animals to be preserved as part of the local ecosystem and implements relevant protection activities. In particular, in order to fulfill local ecosystem protection obligations, DHIC prepares environmental impact assessment reports before the project and notifies details about the species to be protected. In 2019, a total of 175 species of organisms were identified for protection in areas of DHIC business activity. DHIC has conducted monitoring and environmental improvement to protect the diversity of these identified organisms.





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# Maximization of Customer Satisfaction through Upgraded Quality Control

DHIC provides an integrated system of technology and relevant services throughout its business activities – from basic casting and forging to gas turbine and ocean desalination. Quality control is classified as a very important management task. To deliver the best quality and guarantee customer satisfaction, DHIC continuously improves the systems of zero-defect quality innovation and quality assurance. DHIC has been upgrading competency in quality control by adopting an international standard quality certification system and by procuring excellent manpower. These quality control measures have maximized customer satisfaction with regard to quality.

## Maximization of Customer Satisfaction through Quality Control

Leveraging experienced technicians of the highest level in their industrial fields, DHIC provides the best products and service in areas of business activity. Through continuous preventive quality control and quality innovation, DHIC maintains world class competency in engineering and product manufacturing.



### Reinforcement of Competency in Quality Based on Quality Meister

The Human Resources Development Services of Korea and the Korean Standards Association have designated Meister technicians who retain the highest-level techniques in various industrial fields. As of 2020, DHIC has 28 national quality meisters and 14 Korean meisters.

With access to meisters in the areas of can welding, processing, non-destructive processing, steel making, and casting & molding, DHIC provides the highest-level products and services in these areas. DHIC has composed the Meister Consultation Group to transfer skills from meisters to general technicians, with a particular focus on training talented core personnel. Through technical support for partner companies, DHIC fosters mutual growth to strengthen the competitiveness of the value chain.



### Preventive Quality Control

DHIC has systematized preventive quality control throughout the industrial process – from the inventories of necessary materials for product manufacturing through to after-production shipping. Shipped-in materials are tested and analyzed by DHIC laboratories before they are sent for use in production. Only strictly-verified and approved materials are sent to the production field. DHIC carries out joint inspection of entire production and quality before shipping, such as preventive quality monitoring for the production process. DHIC has made an effort to establish a preventive quality management culture centered on the field.

Recently, DHIC launched the Doosan Quality Control System to manage digital quality information and documents; and established a system for preventive quality management. Based on this, DHIC has digitized quality control information throughout the industrial process, from inspection plan to inspection results.

## External Recognition of Quality Control System

The excellence of DHIC quality control competency has been recognized by external stakeholders. On the basis of the Supply Chain with refined quality competency, DHIC conducts quality control that meets international standards from material ship-in to product ship-out.



### Acquisition of International Standard Certification for Quality

With constant quality innovation, DHIC has secured world class competency in engineering and manufacturing. Based on the Supply Chain with refined quality competency, DHIC implements a complete quality assurance system from material ship-in to product ship-out.

To upgrade quality control, DHIC has adopted a quality assurance system and an environment & safety management system that conform to global standards. DHIC has acquired and maintained 50 relevant certificates from officially approved international agencies, such as ASME(The American Society of Mechanical Engineers, KEPIC(Korea Electric Power Industry Code), ISO 9001/14001, and OSHAS 18001.

#### Acquisition Status of Quality Certificates

Area of Certification	Type of Certificate	Qty.
ASME(Nuclear Power/Non-Nuclear Power)	N/NPT, U/S, etc.	17 types
KEPIC(Nuclear Power)	MN, SN, etc.	3 types
ISO	9001, 14001, etc.	3 types
Others	PED H, Shipping Register, etc.	37 types



### Winner of National Quality Management Convention

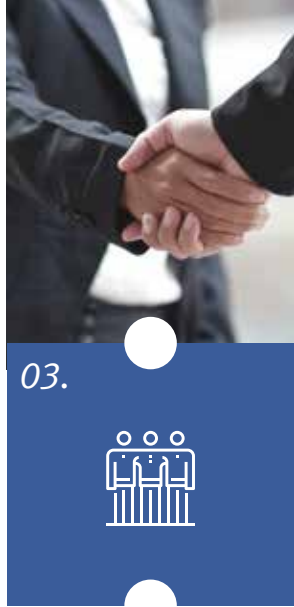
DHIC has the distinction of winning the Presidential Golden Award for 10 consecutive years, most recently in the 45th 2019 National Quality Management Convention held by the MOTIE and the KATS.

The Production Equipment Engineering Team of DHIC selected the activity theme as ‘The Reduction of Cost and Standby Time through the Improvement of the Steam Generator Manufacturing Process’; and established its measure to conduct the activity of standardization. The team showed the performance of successful post-management. Most importantly, the team has improved the quality of and increased customers’ trust in the steam generator manufacturing process.



Winning the Presidential Golden Award for 10 Consecutive Years in the 45th National Quality Management Convention





## Fostering Healthy Corporate Culture and Talented Personnel

Recognizing that the employees embody the heart of an enterprise, DHIC has been making efforts to foster an in-house culture where all the employees are happy. In particular, DHIC conducts various activities to internalize the Doosan Credo which sets forth the goal and core values of Doosan. DHIC has introduced a Smart Office in order to improve the work environment for the employees. DHIC also aims to enhance the satisfaction of employees through increased and improved communication. In 2019, DHIC collected opinions from 2,521 employees via an 'Open Communication Survey' and used the results to improve various in-house systems.

### Internalization of Doosan Credo Culture

The Doosan Credo is the managerial philosophy which has guided Doosan's successful business activity over the past 100 years. DHIC conducts various activities to disseminate and internalize the Doosan Credo.



#### CA Operation

DHIC's CA(Change Agent) is a team composed of outstanding, talented personnel who have been recommended by executives. Equipped with a deep understanding of the Doosan Credo, CA carries out the core role of establishing an organizational culture based on the Doosan Credo. CA keeps an eye on every corner of the organization and listens to the needs of employees. They contribute to fostering a healthier organization by serving as a regular channel for communication between the management and executives. Moreover, the CA directly participates in the resolution process of diverse issues in the organization and carries out a core role of establishing the organization culture based on Doosan Credo.



CA Meeting



#### Improvement of Working Environment

DHIC has been making efforts to create an environment that enables employees to demonstrate their capabilities freely, and to achieve Work & Life Balance. DHIC operates various systems to increase work efficiency, including 'PC Off System' which establishes a 52-hour work week. DHIC also has in place a code of conduct on 'Desirable Report Culture by Doosan People' which aims to establish a reporting culture which is fit-for-purpose and free from formalities. For example, the system limits the use of PowerPoint presentations to prevent unnecessary and burdensome use.

### Fostering Healthy Organizational Culture

Doosan has a goal of creating 'Proud Doosan' in the world. 'Proud Doosan' means that all stakeholders, including employees, feel proud of Doosan and have self-respect for themselves as Doosan stakeholders. DHIC has conducted various activities to understand the needs of employees and foster a healthy organizational culture.



#### Implementation of 'Open Communication Survey'

The 'Open Communication Survey' was launched in April 2018. Through this survey, the executive group listens to and directly responds to the questions and suggestions of employees. The survey began in April, 2018 and has been conducted once every two months. Survey is conducted every two months. To date, 3,600 questions and suggestions have been received and the survey has been established as the key communication channel between employees and company executives. The survey has become a method to address issues of concern and interest raised by employees. In addition, it has been utilized to actively share the business status and company strategies. Constructive suggestions and ideas raised by employees are actively reflected to refine systems. Through the 'Open Communication Survey' DHIC has improved the work environment and maintained the Work & Life Balance of employees.

Total Participants	Questions	Suggestions	Systems Introduced by Survey*
2,521 Employees	1,770 cases	1,865 cases	'Casual Days' introduced '1/4 Day Off System' introduced to improve domestic & overseas field workers' conditions Improvement of Congratulation & Condolence Support System 'Flexible Working Hour System' introduced to take care of families

\*Accumulated Performance from April 2018 to the end of 2019



#### Operation of Team Up Program

To foster performance enhancement, mutual understanding, and improved communication by each team unit, DHIC has been operating a 'Team Up Program.' The aim is to align common team goals and individual team member goals to reinforce collaboration. Birkman Diagnosis tools are applied so that individuals can understand his/her own characteristics and team dynamics. Ultimately, the aim is to reach consensus on the team goal, strengthen teamwork through mutual understanding, and change ways of working based on the strengths of teams and individual employees. DHIC prioritizes implementation of this program for new teams, merged teams, or teams that need to enhance collaboration. DHIC is scheduled to expand this program gradually.



Team up Program

### Fostering Talented Personnel

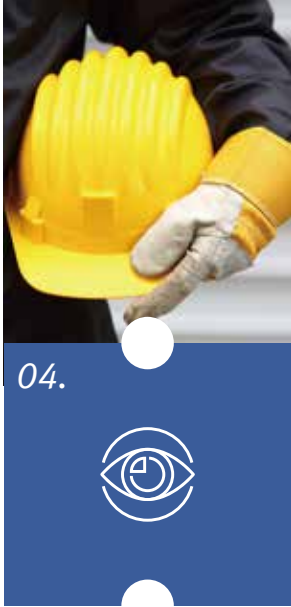
DHIC implements several education courses to foster talented personnel. For example, there is an Academy for each job to strengthen job competency; the WIN Academy to strengthen negotiation competency for successful project order intake and implementation and the Technology Management School to strengthen technical competency.



#### Operation of WIN Academy

In order to ensure successful project order intake and implementation, DHIC operates a program to strengthen negotiation competency. The program is composed of three modules: (i) strategic understanding of negotiation designed to meet in-house negotiation needs; (ii) creative negotiation methods; and (iii) responding to claim situations. The WIN Academy program has strengthened employee competency in the areas of marketing, project management, procurement and design. The program covers Win-Win negotiation, negotiation psychology, the principle of persuasion, and EPC Case Study.





## Upgraded Safety Management for Employees and Partners

The reinforcement of field safety management is an area of business management which requires special management as it is directly connected to the life and safety of employees. DHIC has taken steps to systematically manage and reinforce field safety management. DHIC eliminates field safety risks through the MSLT(Management Safety Leadership Tour) led by executives and managers and the 9-Theme Inspection. DHIC has been making an effort to internalize safety management culture through the expansion of IoT-based education on safety & health and EHS. In addition to the safety & health management for employees, DHIC endeavors to assure safety management by partner companies. DHIC plans to strengthen the safety & health management system continuously through upgraded systematic management in corresponding areas.

### Creation of Culture to Prevent Safety Accident

To prevent the occurrence of severe disaster and major accident, DHIC reinforces safety management around major risk processes. To enhance safety management culture, executives and managers have been voluntarily conducting management activities for severe risk elements on the basis of MLST(Management Safety Leadership Tour). In addition, DHIC has been taking steps to prevent safety accidents in the field, including the introduction of various systems to eliminate the causes of safety accident in the field.



#### Management of Safety Accident Risk Factors Based on MSLT

To manage risk at worksites of manufacturing, construction, and service, executives and field managers have been operating MSLT(Management Safety Leadership Tour) to enhance safety. In 2019, targeting high-risk construction sites, a total of 1,156 MLSTs were implemented. The corresponding activity consists of various programs for the safety management. Through MSLT, DHIC executives are able to identify field safety challenges and risk factors and then use that information to enhance the effectiveness of safety management activities.

#### Major Programs in MSLT

Executives	Field Sites
Prevention & Role of Voluntary EHS by Employees	Check Fulfilled Condition of TBM(Check safety work binder)
Discovery & Elimination of EHS Risk in Business Sites	Check the compliance of Golden Time & 9-Theme
Inspection & Confirmation of Suggestions from Field	Check Fulfilled Result of Daytime Site Cleaning Day
	Check the Compliance of Golden Safety Rules



#### Elimination of Field Risk Factors through 9-Theme Inspection

Through case analysis of all safety accidents at construction sites, DHIC has identified common risk types and factors. To eliminate risk types that cause major safety accidents, DHIC has selected 9 core themes. Around these 9 defined themes, DHIC and managers of partner companies conduct field safety inspections with the aim of eliminating all risk types. Theme inspections are theme-by-theme, with one week dedicated to each theme. In 2019, a total of 4,149 risk factors for safety accidents were discovered; and activities were conducted to eliminate these risk factors.

#### Major Themes of 9-Theme

- |   |  |
|---|--|
| 1. Installation on Life Line for Fall Prevention & Inspection on Safety Hook        | 5. Inspection on Fulfillment of Work Schedule  |
| 2. Inspection on Installation Condition of Work Plate                               | 6. Inspection on Sling(wire rope, chain sling, etc.)                                     |
| 3. Inspection on Portable Scaffold and Ladder                                       | 7. Inspection on Lift Tools(shackle, clamp, etc.)  |
| 4. Inspection on Abnormal Condition of Protection System for Construction Equipment | 8. Inspection on Preparation of Structural Review and Assembly Diagram before Work Start |
|   | 9. Review of Safety in Installation of Temporary Facility                                |

Discovered Total 4,149 Cases of Risk Element and Eliminated Corresponding Risk Elements

### Prevention of Safety Accidents Based on Advanced Technology

The safe work instruction is a document which provides instructions on how to carry out safe works for utilization on construction sites. Previous safe work instructions were disseminated via printed copies or document files. DHIC has developed and applied a mobile safe work instruction which can be shared directly with construction sites. Workers and managers in the field are able to receive the mobile safe work instructions regardless of where they are located. Thus, workers can always be informed and keep in mind how to carry out their work safely. In 2019, a total of 4,317 cases of safe work instructions were written and utilized effectively. DHIC has plans to increase its utilization.

### Establishment of System to Enhance the Safety of Employees in Partner Companies

DHIC reinforces the management of safety and health for partner companies as well as its own employees. In particular, to improve the level of safety and health management in partner companies, DHIC implements a Win-Win Cooperation Program which evaluates risk levels and provides technology and education. In 2019, DHIC conducted discovery and improvement activities for safety and health risk causes in worksites targeting 53 partner companies through the Win-Win Cooperation Program. In addition, targeting 21 partner companies, DHIC selected risk processes and provided field feedback on observed risky behavior(of workers) and risk elements. DHIC conducted other activities to support partner companies to establish systems for autonomous safety management. For example, DHIC assisted 24 partner companies to maintain KOSHA 18001 and OSHAS 18001 certifications to establish the independent management system for safety and health. DHIC has also conducted training to strengthen the safety and health management competency of presidents and managing supervisors of partner companies.



Bongdam - Songsan MSLT



Mobile Safe Work Instructions





## Contribution to Local Communities through Talent Sharing

DHIC believes that an enterprise grows together with the local communities. Thus, DHIC seeks to grow together with the local communities where it conducts business activities. For example, employees provided voluntary services to share their own talents, technical skills, and knowledge with communities. These efforts yielded positive societal outcomes, such as improvement of the housing environment of vulnerable people; promotion of safety culture within the local communities; protection of youth; and opportunities for career education. DHIC plans to seek solutions for various problems together with local communities; and continuously promote social contribution.

### Technical Staff Volunteer Group

The volunteer service group for technology consists of professionals in electricity, system operation, and maintenance of the company. It is the first professional volunteer service group organized voluntarily to share the talents of employees. In 2007, it repaired the town hall and houses of underprivileged elderly people in Buk-myeon village of Changwon City. This DHIC volunteer service group has expanded their contributions to target the alienated social classes, farming villages, and a children welfare centers. DHIC regularly implements a clean house program specialized in house repair and environmental improvement, such as inspection and repair of electrical facilities, papering walls, replacement of flooring, and painting. One thousand and eleven(1,011) volunteers have participated over the last 13 years in over 200 activities benefiting 46 children welfare centers, 13 social welfare centers, 108 houses in farming villages, and 33 vulnerable households. DHIC has been recognized for its consistent contributions to local society.

### Volunteer Group for Promoting Safety

This group is a representative talent sharing volunteer service group that utilizes human resources and material resources such as EHS professional manpower and fire fighters to bolster national safety awareness and prevent disasters and accidents, something that is being pursued in parallel with the government's campaign to promote safety.

This volunteer service group has conducted training on the theory of environmental safety targeting children's welfare centers since 2011. It has now been reorganized as the safety promoting volunteer group and has expanded training to participants and children in social welfare centers and the underprivileged. This service group provides training that is professional and practical, focusing education mainly on disaster response, fire drill, and CPR.

Since 2017, through 8 sessions, 615 people have completed the course, including 437 in children's welfare centers, 126 in social welfare centers, and 52 multicultural households. Participants have commented favorably on their training experiences.



Safety Experience Education for Elementary Students by Volunteer Group for Safety Promotion

### Volunteer Group for Career Education

The volunteer group for career education is a professional volunteer group which consists of the job training consortium project group, the Meister Consultation Committee, and employees from relevant departments which operate the 'My Dream Career & Engineering Experience Class.' 'My Dream Career & Engineer Experience Class' targets youth who lack the opportunity to explore and experience in accordance with the policy of free semester system in middle school implemented by the Ministry of Education.



#### My Dream Youth Career Experience Class

This program encourages and supports youth to consider and plan for their own careers earlier in life. In accordance with the enactment of the free semester system in middle school, DHIC has been implementing this program for middle school students in Changwon City (under a MOU with the Changwon Office of Education). The program is comprised of 3-stages: (i) explore; (ii) experience; (iii) design. Since its launch in 2015 through 2019, 346 students from 17 middle schools have completed the course. In 2019, targeting 80 students in 4 middle schools, DHIC provided more than 20 experience activities to introduce students to prospective occupations such as drone operator, coding professional, Youtuber, and psychological counselor.



#### My Dream Youths Engineer Experience Class

This experiential education program utilizes DHIC core business (engineering) characteristics and competency to foster talented youth in Natural Science and Engineering. The program consists of a special career lecture by a Meister (who represents the talented personnel of DHIC); a field trip to a factory where actual products are manufactured; and experience of working with an engineer. Through this program, youth are able to experience the actual duties of engineers, such as engineering design, processing, and assembly.

Since the program launch in 2017, the number of participating schools has increased annually. In 2019, 936 students in 16 middle schools of Changwon City visited the company and participated in the program. As of 2019, a total of 1,703 have participated in the program.



Design Experience through Engineer Experience Class



Field Trip to Factory through Engineer Experience Class

### Youths Hazardous Environment Surveillance Group

The Youth Hazardous Environment Surveillance Group was launched in 2000 as part of the efforts to create a safe and healthy society and provide protection to youngsters. The group has focused on the following issues: safe transportation to school for children; campaign for the eradication of drinking and driving together with Changwon City, Changwon Local Prosecutor's Office, and Changwon police department; and various campaigns for youth protection (e.g., prohibition of employment of youth in entertainment outlets, prohibition of sale of liquor to youth) jointly with Changwon Public Health Center and Changwon YMCA.

Over the past 20 years, the group has implemented a total of 504 activities with a total of 4,908 participants.



# Creation of Social Value by DHIC

## Preparation of Governance to Create Social Value

Based on the commitment of the executive group to create social value, DHIC has established a CSR Committee under the Board of Directors. DHIC CEO serves as the chairman of the CSR Committee. The CSR Committee consists of three divisions: (i) environment; (ii) society; (iii) and governance. and the CSR Committee has conducted in-depth discussions regarding social responsibility and management.

Composition of CSR Committee



## Major Strategy to Create Social Value

### Realization of Social Value Based on New Growth Project Portfolio

DHIC is scheduled to reorganize the core business structure drastically as a professional energy company. With a project portfolio focusing on gas and new renewable energy, DHIC will be reinvigorated as a leading enterprise that creates social value through its core business. DHIC's core business – technologies that maximize energy efficiency and reduce greenhouse gas – will contribute to making a clean earth.

### Realization of Social Value through Upgrading CSR Management

For effective management of social responsibility, DHIC has been upgrading the CSR management system. In particular, DHIC has identified and systematically addressed the following major CSR priorities: reduction of environmental impact through business activities; enhancement of employees' safety and health through the reinforcement of field safety management; and contribution to local society.

### Fulfillment of Socially Responsible Management Based on UN SDGs

The UN General Assembly adopted the Sustainable Development Goals (UN SDGs) as an international commitment to sustainable development. UN SDGs consist of 17 goals and 169 detailed sub goals covering sustainable management of the economy, society, and environment. In order to contribute practically and concretely to fulfillment of UN SDGs, DHIC prioritizes and systematically implements activities related to 5 of the 17 goals: water, energy, climate change, health, and education.

## System Upgrade to Measure Social Value

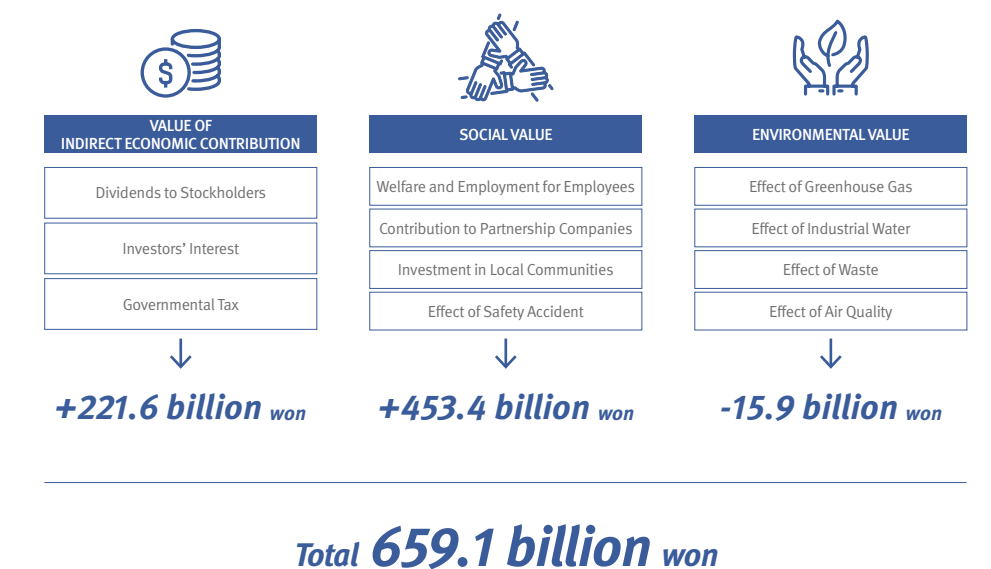
DHIC aims to understand its contribution to social value not only in terms of the financial value of projects but also with regard to social and environmental impacts of business activities. For this purpose, DHIC has been upgrading the system to convert social and environmental impacts to financial value. The resulting value computed through the measurement of social value is defined as the social value created by DHIC. Measurements of social value shall be utilized as a reference to business activities of DHIC. DHIC will expand those business activities with positive effect continuously and seek to reduce the negative effect caused by other business activities.

Items to Measure Social Value

Classification	Major Items of Social Value
Positive Effect	<ul style="list-style-type: none"> <li>· Contribute to economy through employment</li> <li>· Support mutual growth with partnership companies</li> <li>· Support local society</li> </ul>
Negative Effect	<ul style="list-style-type: none"> <li>· Environmental effect</li> <li>· Safety accident</li> </ul>

### Measurement Result of Social Value

Measured social value of DHIC has been computed by the sum of values with positive impact from business activities and the sum of values of negative impact from business activities. DHIC tried to reflect comprehensive social and environmental causes, but due to the limitation of survey on some data, this is a limited measure of social value. DHIC calculates that it created social value of 659.1 billion won in total in 2019.







## CSR Aligned with UN SDGs

Among the 17 UN SDGs, DHIC has decided to focus on five core areas (water, energy, response to climate change, health, and education) in order to fulfill the company's CSR obligations as envisioned by the SDGs. DHIC's core business is directly relevant to the SDG goals on water and energy. DHIC's social contribution is to expand the reserved quantity of water resources for regions with severely depleted water resources and to raise the accessibility of reliable and sustainable energy. In addition, DHIC makes social contributions in the areas of health (reinforcement of medical conditions), education (training of talented personnel based on the characteristics of each country and the demand of local society), and climate change (voluntary reduction of greenhouse gas in line with national reduction goals).






### Implementation Status of 2030 Commitment

DHIC has been implementing activities to accomplish goals since it adopted SDGs Commitment in 2017. By 2019, DHIC was scheduled to establish an activity plan to monitor and accomplish the goals, including confirmation of implementation performance and accomplishment rates for each goal. In particular, DHIC will raise the access guarantee to sustainable and modern energy through the expansion of business activities to supply sustainable energy together with the business conversion focusing on gas turbines and new renewable energy.

### Creation of Social Value through Implementation of SDGs

DHIC sets forth in the table below its performance towards fulfilling each target SDG commitment (implementation performance), social effect (outcome), and social value (valuation). Social effect has been classified to the production of clean water, the supply of energy, the reduction of greenhouse gas, the improvement of health level through medical support, and the contribution to the development of local society through high-quality education. The social effect from the promotion performance has been computed by political numeric values to convert them to financial values. As of the 2016 General Report, the total social value created by DHIC was estimated at about 1578.9 billion won (over the past three years).

\*Measured promotional performance and social value are current accumulated numerical values in 2019

	Link to SDGs	Commitments	Promotion Performance (Output)	Social Effect (Output)	Social Value (Valuation)	
	<b>Commitment 1</b> Increased & Reserved Quantity of Water Resources	<b>SDG 6. Clean Water &amp; Sanitation</b> Guarantee usability of water and sanitary facility and sustainable management for all people 6.1/6.3	By 2030, through the Water Project, increase the reserved quantity of water resources in the region of Arabian Peninsula by more than 10% from BAU level (2 billion tons). and expand the supply of water resources continuously to regions of the world in shortage of water.	Based on the technology of ocean desalination, the supply of water resources to Arabian Peninsula <b>1,275,204,431 tons</b> Accomplished 64% of the goal by the year 2030	· Increased reserved quantity of water resources to Arabian Peninsula through the production of water · Supplied sustainable living water to local residents in Arabian Peninsula	Annual Water Supply by Ocean Desalination Plant under Construction of DHIC x Social Value for each 1 ton of Water (Average fee of drinking water per 1 ton in 370 cities in the world) <b>= 1,566.9 billion won</b>
	<b>Commitment 2</b> Guaranteed Access to Sustainable Energy	<b>SDG 7. Sustainable Energy</b> Guarantee the access to reliable, sustainable and modern energy with optimum price to all people 7.1/7.2/7.3	By 2030, increase the supply of power generation to new markets throughout the world with high-efficient eco-friendly power generation technology comprising more than 6% (40GW) of BAU level; and contribute to the diversification of energy mix through the enhancement of energy technology such as high-efficient gas turbine, wind power generation, and ESS.	Energy supply based on the technology of power generation of sustainable energy, <b>5.9GW</b> Accomplished 15% of the goal by the year 2030	· Supplied energy to local society through power generation using sustainable energy · Strengthened the access guarantee to energy through the provision of high-efficient power generation technology	Electric Power Supply by Energy Power Plant of DHIC x Social Value of 1MW Electricity (Average fee of 1MW electricity for household in major 28 countries in OECD) <b>= 1.3 billion won</b>
	<b>Commitment 3</b> Reduction in Emission of Greenhouse Gas	<b>SDG 13. Climate Change &amp; Action</b> Implement emergency action in response to climate change and its effect 13.1	By 2030, reduce the emission of greenhouse gas generated during the process of businesses in Korea by 20% (70 thousand tons) from BAU level; and develop greenhouse gas reduction technology to respond to climate change continuously.	In 2019, reduction of greenhouse gas from BAU level <b>48,358 tons</b> (16% reduction to BAU) Accomplished 99% of the goal by the year 2030 *BAU 300 thousand tons in 2019	· Reduced environmental effect through the reduction in the emission of greenhouse gas · Contributed to the reduction in the greenhouse effect, prevented global warming	Reduction Amount of Greenhouse Gas from BAU level x Social Value for each 1 ton of Greenhouse Gas (Korean Energy Economics Institute study estimate of social cost of carbon) <b>= 3.9 billion won</b>
	<b>Commitment 4</b> Expanded Prevention & Treatment of Diseases	<b>SDG 3. Health &amp; Welfare</b> Guarantee healthy life and enhance welfare for all ages 3.4	By 2030, supply basic medicines to 80 thousand residents of alienated social class in Vietnam and India; and support local medical services to contribute to improvement of the world health level.	Medical support <b>9,368 people</b> Accomplished 9% of the goal by the year 2030	· Improved the level of health in underdeveloped areas and developing countries · Provided basic medicines for alienated social class	Number of Beneficiaries x Social Value to Create the Supported Medicines (Cost to pay to purchase retail medicines in OECD) <b>= 6.5 billion won</b>
	<b>Commitment 5</b> Training of Local Talented Personnel	<b>SDG 4. High Quality Education</b> Guarantee comprehensive high-quality education with equal opportunity and enhance the opportunity of lifetime learning to all people 4.4	By 2030, provide for each growth stage an opportunity of customized education and career experience for 50 thousand children and youths in alienated social class through the representative social contribution program, 'Young Adult Energy Project.'	Provided the opportunity for educational support & career experience <b>9,329 people</b> Accomplished 19% of the goal by the year 2030	· Contributed to the development of local society through high-quality education · Provided various information & experience for future generation to select the career	Number of Beneficiaries x Social Value of Education Program (Direct support of scholarship, local children centers and convenience provided to create the support of reference books, Social Value of Career Experience Education Program) <b>= 300 million won</b>

Total Sum

**1,578.9 billion won**



# CSR FOUNDATION

In order to raise mid- to long-term value, DHIC has making efforts to grow continuously through collaboration with stakeholders with whom DHIC has established a long-term win-win relationship, while taking on prior and post responsibilities to support major stakeholders.





# Governance Structure

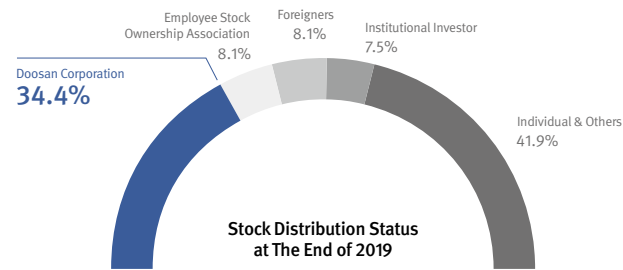
DHIC has taken various steps to advance the governance structure. In order to activate the governance structure based on outside directors, DHIC has maintained a majority of outside directors. For governance activities based on the committee, DHIC has strengthened institutional fairness and prepared a foundation for transparent management of an enterprise.



## POLICY & STRATEGY

### GOVERNANCE OF BOARD OF DIRECTORS

- The Board of Directors operates the governance based on the 4 operation principles of responsible leadership, efficient operation, fair salary, and stakeholder-centered.
- For fairness in the operation of the Board of Directors, the voting right shall be restricted to directors with special interest regarding the vote by the Board of Directors. In principle, the vote of the Board of Directors shall be the majority of directors in presence and majority of directors in attendance.
- It is possible to hold a meeting when more than one third of registered directors jointly specify the purpose of a meeting and the desired date to convene the meeting, and request that the meeting be convened.



### COMPOSITION OF THE BOARD OF DIRECTORS

- As of March 2020, the Board of Directors is composed of a total of 7 directors, of which 3 are inside directors and 4 are outside directors.
- In order to raise the efficiency of managerial judgment and to realize responsible business management, CEO serves as the chairman of the Board of Directors. To guarantee the role of check and balance and to raise the transparency of the Board of Directors, an independent senior outside director is appointed.
- At the time of appointing the directors, DHIC strives to form a board of directors in consideration of various perspectives, including gender, industrial experience, religion, major, race, disability, origin and political orientation, along with independence and expertise.

#### Current Composition of Board of Directors

Position	Name	Major Career
Inside Director	Park Geewon	(Currently) Chairman & CEO of DHIC (Currently) CEO(Chairman of Board of Directors)
	Jung Yeonin	(Currently) Head of Management in DHIC / President & CEO (Former) Head of Doosan Vina
	Choi Hyounghee	(Currently) Head of Financial Management in DHIC/ Executive Vice President & CEO (Former) Executive Vice President of Doosan Infracore
Outside Director	Kim Dongsoo <sup>1</sup>	(Currently) Chair Professor in Korea University (Currently) Head of Institute for Future growth (Former) Member of Fairtrade Committee
	Nam Ickhyun	(Currently) Professor of Graduate School of Management in Seoul National University (Former) Director of Graduate School of Management in Seoul National University
	Kim Daeki	(Former) Director of Policy in the Executive Office of the President (Former) Secretary to Economic Policy in the Executive Office of the President
	Lee Junho	(Currently) Lawyer in Kim & Jang Law Firm (Former) judge at Seoul District Court

<sup>1</sup> Senior Outside Director

### OPERATION OF THE BOARD OF DIRECTORS

- When an important management issue arises, including economic, environmental and social issues, the Board of Directors shares the corresponding matter and seeks a solution.
- According to the Articles of Association, for fast and efficient decision-making, a committee is installed to operate inside the Board of Directors.
- To protect the right of shareholders and stakeholders, information on the composition and operation status of the Board of Directors is disclosed through the company's website, the business report, and the governance structure report.

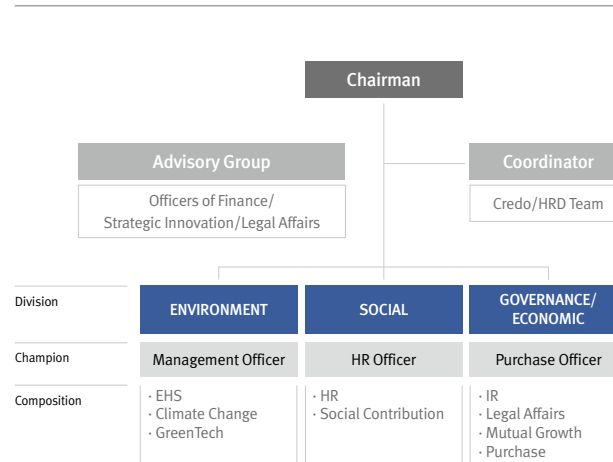
#### Status of Committee inside Board of Directors

<b>Recommendation Committee for Outside Director Candidate</b>
Recommend a candidate for outside director appointed in the general meetings of shareholders
<b>Audit Committee</b>
Carry out audit for the accounting and works of the company
<b>Internal Transaction Committee</b>
Carry out the evaluation & approval of the internal transaction with a person of special relation

### CSR GOVERNANCE

- The Board of Directors operates a separate CSR Committee to manage sustainable management and social value creation.
- The CEO shall serve as the chairman of the CSR Committee. The CSR Committee is comprised of three divisions: (i) environment; (ii) society; (iii) and governance structure. This will facilitate prompt handling of issues and decision-making.

#### Composition of CSR Committee



## ACTIVITY & PERFORMANCE

### LEADERSHIP & ACCOUNTABILITY

- To check and balance between in-house management and outside directors, 4 outside directors are appointed which is 57% of entire membership of the Board of Directors.
- Fairness and transparency are enhanced as outside directors are appointed in the general meetings of shareholders through recommendation by the Recommendation Committee for Outside Director Candidate.
- To help outside directors improve their understanding of the company and secure expertise, the presentation of company overview and the headquarters & Changwon plant Shop Tour are conducted for newly appointed outside directors.
- During July 8 and 9 in 2019, all outside directors visited Changwon headquarter and participated in the presentation of major products, plant status and facilities to increase the understanding of the company.

#### Status of Convening Board of Directors

Classification	2017	2018	2019
Number of Times to Convene the Board of Directors	9	11	11

#### Status of Outside Directors in Presence

Classification	2017	2018	2019
Attendance of Outside Directors(%)	97.1	97.8	95.5

### REMUNERATION

- Salaries for outside directors and inside directors are paid within the limit of directors' remuneration approved by the general meetings of shareholders.
- Information about individual officer salaries, including that of non-executive directors and the CEO, are disclosed through the business report.

### RELATIONSHIP WITH SHAREHOLDERS

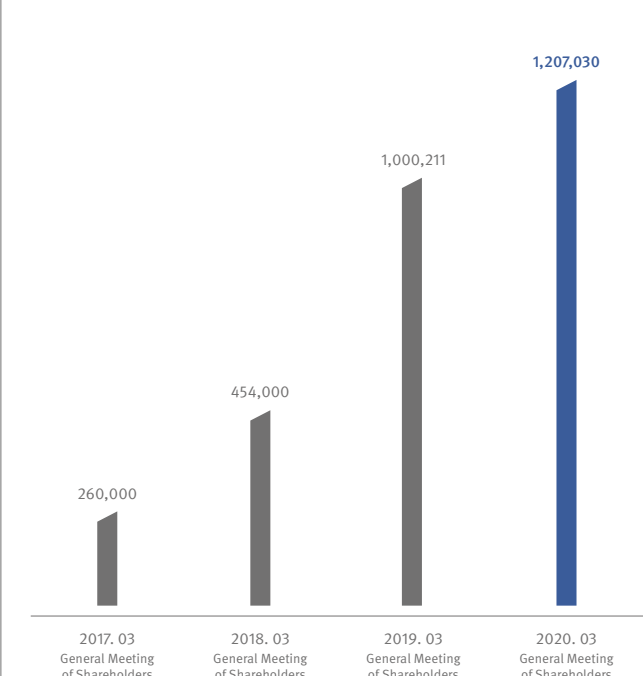
- To protect the right of minority shareholders, the rights of independent and minority shareholder are recognized under the relevant laws such as Commercial Act.
- The general meetings of shareholders is held annually to report the business management status and listen to opinions of minority shareholders.
- An electronic voting system was introduced from 2017 to protect the voting right of minority shareholders.
- Major information regarding business management is disclosed transparently through various communication channels such as the Corporate Disclosure System and the company's website.

### ACTIVATION OF ELECTRONIC VOTING SYSTEM & WRITTEN BALLOT

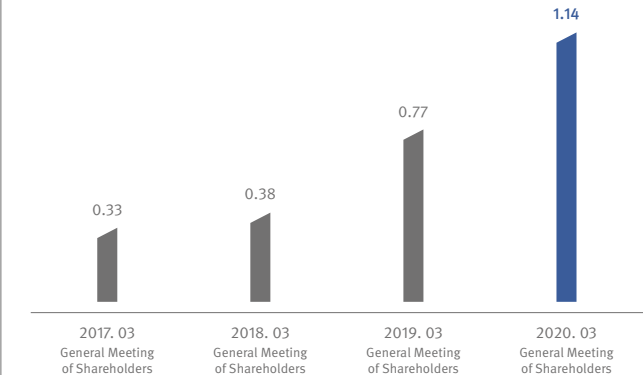
- The electronic voting system enables shareholders to exercise their voting rights online(e.g., via computer or smartphone) without direct participation in the general meetings of shareholders.
- To extend shareholder's right, DHIC has introduced the Proxy Solicitation and 2017 Electronic Voting Proxy Statement System and implemented the written ballot.

#### Result from the Implementation of Electronic Voting System

##### Number of Stocks Participated in Electronic Voting(Unit: Stock)



##### To Entire Voting Rights(Unit: %)





# Ethical Management

DHIC has been creating a corporate culture based on ethical responsibility such as honesty, transparency, and fairness throughout management activities. Around the activity based on the principle and strategy of ethical management, DHIC has been strengthening a company-wide system to prevent the risk of ethical management and making the best effort to prevent unethical action and corruption in the supply network by employee through the systematization of ethical management system.

## POLICY & STRATEGY

### IMPLEMENTATION PRINCIPLE

· Through compliance with laws and principles and fair business operations, DHIC conducts ethical management activities based on a vision of becoming a leading ethical enterprise with respect and pride.

### IMPLEMENTATION SYSTEM

· DHIC established the basic principle of job performance through the Group-Level Code of Conduct, which was adopted in 2002 and recently revised in December 2019. Through the Code of Conduct, ethical management targets and is applied to all employees who are active in domestic and overseas business sites. DHIC also recommends that the supply network of partner companies observes the Code of Conduct.

· To comply with the Code of Conduct throughout its supply network, DHIC has proceed with an Oath of Compliance with the Code of Conduct for partner companies. To prevent corruption by overseas agents, DHIC manages third-party anti-corruption risks by linking ethical management to the supply chain operating system, such as strengthening Compliance Regulations under standard contract conditions.

### IMPLEMENTATION STRATEGY

· Based on the commitment of executives to ethical management, DHIC has established anti-corruption implementation infrastructure on the basis of the Code of Conduct, the Cyber Report System, and the operation organization.

· Based on the company-wide system, DHIC has established a PDCA(Plan-Do-Check-Action) virtuous cycle to enhance ethical conscience of employees and to prevent unethical conduct.

#### Implementation Strategy of Ethical Management

VISION



Become a leading ethical enterprise with respect and pride through compliance with laws and principles and fair business operations.

#### IMPLEMENTATION STRATEGY

Building the right way to increase the value of DHIC with the technology to increase the value of the earth



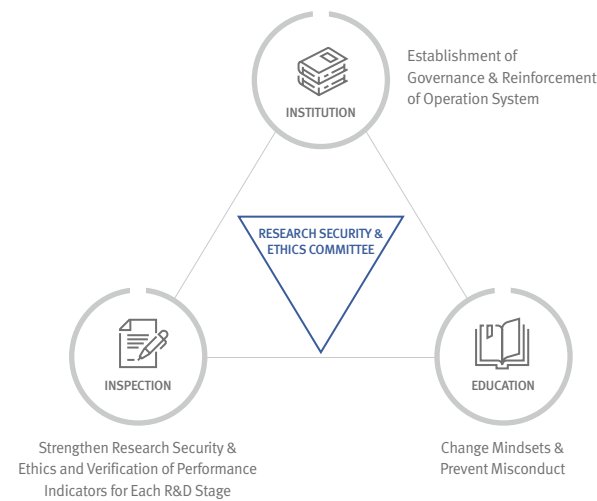
### COMPOSITION OF RESEARCH SECURITY & ETHICS COMMITTEE

· The technical competitiveness of DHIC has increased its value, and thus so has the significance of research security to prevent misconduct and technology leakage.

· A Research Security & Ethics Committee has been established – with the CTO(Chief Technology Officer) serving as the chairman – to secure research ethics and reinforce research security.

· The Research Security & Ethics Committee is fostering a transparent R&D atmosphere and seeks to prevent misconduct in research.

#### Implementation Direction for Research Security & Ethics



### PREPARATION OF A PROCEDURE FOR AN OATH OF COMPLIANCE TO THE CODE OF CONDUCT BY SUPPLY NETWORK

· According to the new system of an Oath of Compliance for the Code of Conduct launched on January 2020, all DHIC partner companies have an obligation to sign an Oath of Compliance for the Code of Conduct in the bid procedure.



## ACTIVITY & PERFORMANCE

### INTERNALIZATION OF ETHICAL MANAGEMENT

#### In-House Employees

· Ethics education has been implemented for all employees, including new and career employees.

· Additional ethics education has been implemented for each job group(Conduct ethics education that considers situations and circumstances, such as education to prohibit illegal solicitation and bribery as set forth in the Anti-Graft Law).

· In order to strengthen the observation of the Anti-Graft Law that prohibits illegal solicitation and bribery, a self-administered check list has been prepared and distributed to employees.

· In order to respond preemptively to unfair transactions, training is provided to marketing employees to prevent collusion.

#### Global Business Sites

· Ethics education has been implemented for all employees in overseas subsidiary companies in India, Vietnam, and Europe.

· To manage ethics risk in global business sites, compliance units have been established in overseas subsidiary companies; and compliance units regularly communicate and collaborate to share knowledge and strengthen the ethics compliance competency of subsidiary companies.

· To prohibit illegal acts and manipulation of laws in the supply chain, a compliance regulation is specified in DHIC contracts with agencies that represent the local works of overseas projects.

#### Status of Ethics Education

Classification	Unit	2017	2018	2019
Education Target	People	6,969	6,611	5,624
Education Completed	People	6,701	6,404	5,318
Completion Rate	%	96	97	95

\*The performance of enrolling the ethics education includes the employees of overseas subsidiary companies

#### Status of Unfair Transaction Education

Classification	Unit	2017	2018	2019
Number of Employees Participating in Education	People	2,654	2,730	1,956

### PARTNER COMPANIES

· An ethics education has been implemented for employees of partner companies to introduce the DHIC Code of Conduct and provide guidance on how to report violations.

· A new provision has been adopted to assess the risk of corruption of new DHIC partner companies.

#### Support to ethical management and prevention unfair trade to Partner Companies



### REPORTING AND MONITORING

· DHIC operates a cyber report center and an internal report box to facilitate internal and external reporting about the violation of ethics.

· DHIC has introduced an internal reporting system operated by a third party for overseas subsidiaries to report violation of ethics.

· The inner report system of overseas subsidiaries has been in service with 36 languages to secure the high access by stakeholders

### AUTONOMOUS EXPORT MANAGEMENT OF STRATEGIC MATERIALS

· DHIC has been recognized by MOTIE for its excellent fulfillment and observance of the autonomous export management of strategic materials; and has maintained the highest class certification of triple A since receiving it for the first time in April 2014.

· DHIC has received various benefits for special cases, such as the exemption of the assessment for export permit in those countries under the international export control system(including the U.K and the U.S).

· The acquisition of the highest class for the Compliance Program(CP) was a company-wide accomplishment. DHIC continuously pursue systematic fulfillment and compliance of autonomous export management.

#### Certificate of 'Triple A' in Compliance Program(CP)





Based on DHIC's foundational philosophy of advanced green management centered on people and nature, DHIC endeavors to reduce environmental impact of management activities. DHIC aims to establish an integrated system for risk management; expand distribution of green technology; and reduce energy to conduct relevant activities. In 2019, DHIC made an effort to minimize the environmental impact generated by business sites by drastically expanding investment in the area of environment.

**ZERO**

**Status of Violation of Environmental Law**

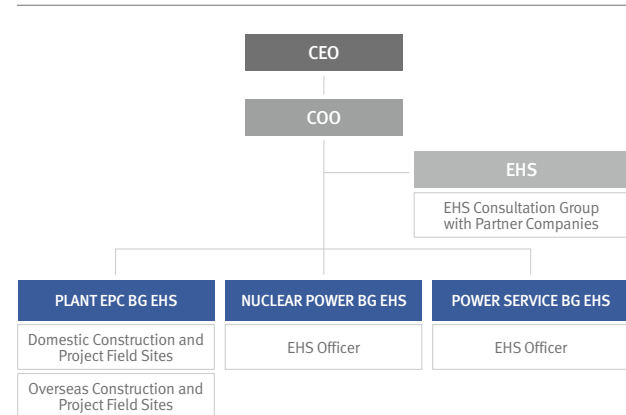
Regarding environmental laws, DHIC has had no violation, fine, conflict resolution, or debt related to the environment over the past three years.

## POLICY & STRATEGY

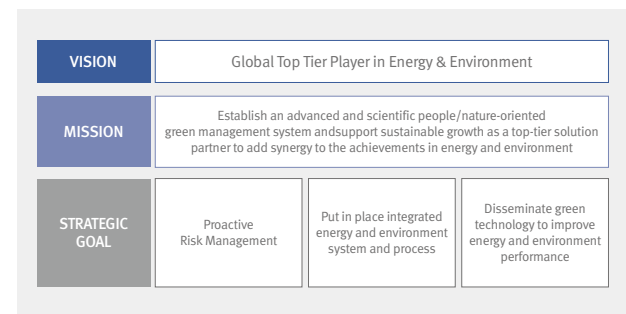
### IMPLEMENTATION SYSTEM

- DHIC implements green management under the COO(Chief Operation Officer). Green management activities are implemented across the entire value chain, including through a separate EHS consultation group with partner companies.
- In order to accomplish the 'Global Top-Tier Energy & Environment,' DHIC implements green management based on three strategies: (i) Preemptive Risk Management; (ii) Establishment of Integrated Energy/Environment System; (iii) Performance Creation through Expanded Distribution of Green Technology.

**Implementation Unit**



**Green Management Vision House**



### RESPONSE SYSTEM FOR CLIMATE CHANGE

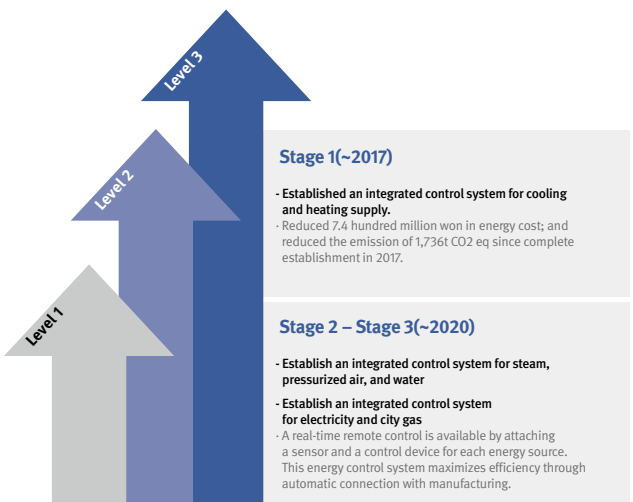
- DHIC has established a response system for climate change based on the application of new renewable energy and new technology.
- DHIC has established a goal of 20% reduction compared to BAU(Business as Usual)\* by the year 2030.
- DHIC has established an integrated energy system at the company-wide level to accomplish the corresponding BAU goal.

\*BAU: Expected amount of greenhouse gas discharged when a normal management activity is implemented without any reduction activity of greenhouse gas.

### ESTABLISH INTEGRATED ENERGY SYSTEM FOR EACH STAGE

- DHIC has been developing an integrated energy system for each stage based on the energy utilization efficiency and big data under factory load. In 2019, DHIC combined ICT technology with the energy consumption structure and developed a predictive model.
- Based on the established system, DHIC expects to reduce 2.3 billion won of annual energy costs and to reduce the emission of 8,500 tons of greenhouse gas.
- In collaboration with South Gyeongsang Province and a relevant agency of Korea Energy Agency, DHIC transferred relevant knowhow to SMEs in the province.
- DHIC improved the operation of large size high-pressure boiler to reduce 350 million won of fuel cost and reduce greenhouse gas emissions.

**Initiative to Establish Energy Integrated System**



### HAZARDOUS CHEMICAL MANAGEMENT SYSTEM

- DHIC has established a digitized management system for entire cycle management of chemicals, from the purchase of chemicals to their use.
- DHIC has established the DCIS(Doosan Chemical Information System) based on relevant laws(Chemical Substances Control Act, Occupational Safety and Health Act, Act on the Safety Control of Hazardous Substances).
- By entering the material health information of chemicals into the database, DHIC enables users to access the latest information safely.
- In accordance with the Act on the Registration and Evaluation, etc. of Chemical Substances, DHIC has developed the complete preliminary report in 2019, and plans sequential registration by 2030 for a total of 21 chemicals(which are imported in volumes exceeding 1 ton).

## ACTIVITY & PERFORMANCE

### MINIMIZATION OF ENVIRONMENTAL IMPACT IN BUSINESS ACTIVITIES

**Activity for Greenhouse Gas Reduction**

- DHIC has implemented two types of greenhouse gas reduction activities: (i) energy efficiency; (ii) procurement of Certified Emissions Reduction(CER) through external projects.
- DHIC has improved processes to reduce greenhouse gas emissions at business sites and factory facilities.
- DHIC has analyzed the fragmented risk cause and scenario of climate change to estimate the emission of greenhouse gas and measure the level of financial burden based on the estimation.
- DHIC has considered the cost and convenience of a CER transaction, deduced the priority for each countermeasure, and reflected this in management decision-making.
- DHIC has delivered professional education on energy control and Certified Emissions Reduction targeting the person in charge of each BG Plant. By targeting management, DHIC aims to strengthen internal competency in order to achieve the goal of shared amount of carbon emission for each BG.

Generate Profit based on Certified Emissions Reduction(Carbon Credits)

**145,000 tons**  
**about 2.7 billion won**  
(2017 - 2019)

Secured Certified Emissions Reduction of about 90 thousand tons until 2023 through the CDM project for overseas supply of cook stoves

**Management Activities for Air Pollutants**

- In order to check for generation of pollutants in the manufacturing process, DHIC conducts periodic inspections on the level of pollution and monitors changes in environmental impact around business sites.
- For transparent information disclosure, DHIC discloses the measured concentration of air pollutants discharged from company facilities to the website of the Korea Environment Corporation.(Limited to facilities that have installed TMS)
- Through the installation and operation of environmental facilities, such as air and water discharge systems, DHIC was able to acquire environmental liability insurance(30 billion won insured limit) will compensate for physical or property damages inflicted on third parties.

Investment for Reducing Emission of Air Pollutants

**Total 2.2 Billion Won**  
(Three Facilities of Discharging Pollutants)

**Activities to Reduce Fine Dust at Business Sites**

- DHIC has continued to implement activities to reduce fine dust through the conclusion of an agreement on Fine Dust Reduction(until 2024) with the Office of South Gyeongsang Province.
- DHIC has adjusted and shortened work hours for processes where fine dust is generated; and conducts continuous real-time monitoring between the headquarters and domestic construction fields.
- DHIC has identified the trend of governmental detail instruction to respond in advance. DHIC has reflected the eco-friendly condition at the time of replacing aged facilities and established the long-term countermeasure for find dust.

**Management Activities for Water Pollutants**

- DHIC has established a Rain Water Recycling System which can fundamentally stop the leakage of hazardous substances by combining an independent water treatment technology.
- The corresponding system recycles rain water normally and recovers entire hazardous substances in emergency situations.
- The water processed through in-house waste treatment plant is purified additionally at the local government water recovery center to minimize the risk of water pollution at nearby streams.

Capability of Waste Treatment Plant to Process Inflow Waste

**About 400 tons(Daily average)**  
**1,590 tons(Maximum treatment capacity)**

(Physical and chemical treatment process of condensation-deposit-filtering)

Strict Management of 17 Water Pollutants Compared to the legal limit for treated water

Strict Management within **30%**

**Business Sites of Overseas Subsidiaries with Certified Management System**

U.K(Doosan Babcock)	ISO 14001, ISO 14064
Czech(Doosan Skoda Power)	ISO 14001
Vietnam(Doosan VINA)	ISO 14001
Romania(Doosan IMGB)	ISO 14001

\*As of the end of year 2019



## ACTIVITY & PERFORMANCE

### MANAGEMENT ACTIVITIES FOR WASTES

- DHIC has rejected simple incineration and landfill for all wastes discharged from the company and instead pursues the waste management strategy of expanding recycling and/or reducing the discharge amount fundamentally.
- In accordance with the enactment of the Basic Resource Circulation Law, DHIC accomplished the goal of 5.9% usage outcome of scrap irons in 2019(Exceeded accomplishment 5%pt)

#### Excellent Case of Recycling of Construction Wastes from Construction Site

In accordance with the law enacted to promote recycling and optimum eco-friendly treatment of construction wastes, DHIC utilized aggregate wastewater sludge for soil material in the method to discharge through previous service company in compliance with the legal recycling standard. This led to a **cost reduction of 1.5 billion won** through the **recycling of 30,845 tons**.



#### Constant Improvement of Waste Recycling Rate

**77.1% → 91.4%**  
(2010) (2019)



#### Reduction of Generated Waste after Improvement of Waste Treatment Method in Changwon Plant

**About 500 tons(Annual)**

(Recycling after sorting refractories used in the electric furnace process)

**0**

#### Disposal Charges for Wastes from Domestic Construction Sites

**Zero Accomplished**  
(2019)

### EDUCATION FOR ENVIRONMENTAL MANAGER

- DHIC delivers competency education for environmental managers at construction sites. In 2019, the education was conducted for 23 persons in charge of environmental management.
- DHIC has been implementing OJT(On-the-Job Training) for new environmental managers at construction sites. In 2019, DHIC conducted training for new environmental managers based on practical cases of field environmental management and environmental laws.
- To establish the environmental management system, such as EHS Management System(ISO 14001), DHIC has established an annual environmental management plan and delivers competency education environmental managers based on excellent cases.



Competency Education for Environmental Management at Construction Sites

### STRENGTHEN MANAGEMENT OF ENVIRONMENTAL IMPACT ON LOCAL SOCIETY

#### Purification Activities for Environment of Masan Bay

- For the past 13 years, on Ocean Day, DHIC has conducted environment purification activities to improve water quality and preserve the ocean environment at Masan Bay.
- In 2019, 20 company employees, 150 people from Sungsan District Office of Changwon City, and various private groups worked together to collect and remove 30 tons of wastes(such as waste fishnet, buoys and waste ropes) from the ocean.



2019 Masan Bay Environment Sanitation Activity

#### Management of Biodiversity

- DHIC implements a survey to identify the diversity of organisms in the local ecosystem before the initiation of a project.
- In order to preserve the ecosystem and minimize environmental changes from the construction stage, DHIC conducts monitoring of atmosphere, water quality, soil, noise and vibration. DHIC shares the relevant results with the client to carry out systematic management.
- In 2019, in the local areas where DHIC implemented 20 projects, DHIC identified a total of 175 species.

#### Management of Biodiversity

Region	Project List	Management Area in Priority	No. of Species in Management	Details of Species in Management	Remarks
Saudi Arabia	Fadhili Combined Heat and Power Plant	Soil: Sand Sea	1	Amphibia: spiny-tailed Lizard - classified as VU	
Saudi Arabia	Shoaiba RO	Wetland	X	No effect on animal and plants in management target on ESIA, but list for 25 species of plants in entire region of Saudi Arabia	
Oman	Sharqiyah	Water: Red Sea	9	Turtle, whale, dolphin, fox, lizard(35), gazelle, camel, goat, bird(94 species including eagle & seagull)	
Vietnam	Song Hau 1 TPP	Water: Sea	X	Types of ecosystem identified in EIA as below, but no type of management target of plants in EIA Report. No mention about the management targets of animals and fish(154). No precious plant species in the Red Book of Vietnam and the IUCN(Refer to data) animals(53), fish(35).	
India	Obra C	Soil: Agricultural land	X	Types of ecosystem identified in EIA as below, but no type of management target of plants in EIA Report. No mention about the management targets for plants(References). No mention of animals and plants that correspond to IUCN Risk of Extinction Plants(255), Animals(287), Fish(21).	
India	Jawaharpur	Water: River, canal	X	No mention of management target for plants in EIA Report.	
Vietnam	Nghi Son2	Soil: Soil Forest, Jungle	X	There are no endangered species in the project site but Ben En national park is 40km away from Nghi son 2 TPP project to the north west. Ben En national park is an important habitat for mammals of Vietnam; the habitat of 20 species is listed in the Red List of IUCN under threatened species in 1996. Ben En national park has at least 737 plants, 64 animals, 194 birds, 30 amphibian and 58 fish species, high diversification.	2019 Added
Saudi Arabia	Ras Al khair	Water: Rihand River, Son River	16	16 species of CR(Critically Endangered), 33 species of EN(Endangered), 107 species of VU(Vulnerable), 4 species of birds, 11 species of fish, and 1 species of reptiles among CR	2019 Added
	National Road Construction Office for Changwon Donggeup - Gimhae Hanlim	Soil: Agricultural land or Non-agricultural land	5	Buzzard, kestrel, Chinese Sparrowhawk, Eurasian Sparrowhawk, mandarin duck	
	Construction Office for Unit 1 and Unit 2 Samcheok Green Power		4	Otter, kestrel, mandarin duck, whooper swan	
	Construction Office for Changnyeong-Miryang Highway	Soil: Sand	6	Leopard Cat, mandarin duck, Eurasian Sparrowhawk, eagle, kestrel	
	Construction Office for Unit 5 and Unit 6 Shinkori Nuclear Power Plants	Water: Arabian Gulf	55	Conger eel, horse mackerel, rockfish, thomback ray	
	Construction Office for the road between Jeokseong and Duil		8	Mentioned the management of land animals, land plants, land and water organisms, species of legal protection in the environment impact assessment: leopard cat(13), eagle, kestrel(42), salamander(13), macromia daimoji okumura(24), common Korean bitterling, Korean spotted barbel, gobiobotia macrocephala(9)	
	Construction Office for Bongdam-Songsan Highway	Wetland	12	Mentioned the management in land animals, land plants, land and water organisms, and species of legal protection in the environment impact assessment: leopard cat, mandarin duck, goshawk, Chinese sparrowhawk, kestrel, eagle owl, black-capped kingfisher, salamander, narrow mouth frog, Korean frog, yellow-spotted snake, sharpbelly	
	Construction Office for Hamyang-Changnyeong Highway	Soil, Sky	11	Species of legal protection in environmental impact assessment: Otter, leopard cat, whooper swan, mandarin duck, eagle, Korean buzzard, kestrel, scops owl, long-billed plover, gobiobotia naktongensis, Microphysogobio korensis	2019 Added
Domestic	Construction Office for Samcheok Thermal Power Plant	Water	4	Animals: Small size birds and mammals such as chipmunk, squirrel, great tit, woodpecker	2019 Added
	Construction Office for the land development of Ulsan Down 2 Land Development	Soil, Water	5	Otter, leopard cat, scarlet dwarf, kestrel, long-billed plover	2019 Added
	Construction Office for Shamcheok Thermal Power Plant T/L		X	· Land under Transmission lines of cableway in No.70 transmission tower · Noise vibration of entire planned line · Nonpoint pollution in entire planned line	
	Road Expansion Construction for Galcheon-Gasoo	Soil, Water	22	Mentioned of the management in plants, land animals, land and water organism, and species of legal protection in the environment impact assessment 1) Local survey(7 species) : Leopard cat, mandarin duck, bean goose, white-tailed sea eagle, hen harrier, Chinese sparrowhawk, Eurasian hobby, white-naped Crane, Eurasian Sparrowhawk, kestrel, long-billed plover, cuckoo, scops owl 2) Literature Survey(15 Species) : leopard cat, bean goose, mandarin duck, osprey, hen harrier, Chinese sparrowhawk, Eurasian Sparrowhawk, kestrel, Eurasian hobby, white-naped Crane, long-billed plover, cuckoo, scops owl, narrow mouth frog	2019 Added
	Construction Office for Sejong-Ansung Highway	Soil, Water	17	Species of legal protection in environmental impact assessment: copper-winged bat, otter, flying squirrel, leopard cat, eagle, goshawk, Eurasian hobby, eagle owl, long-billed plover, Chinese goose, golden frog, narrow mouth frog, diving beetle, mandarin duck, kestrel, brown hawk owl, scops owl	2019 Added



# Safety & Health

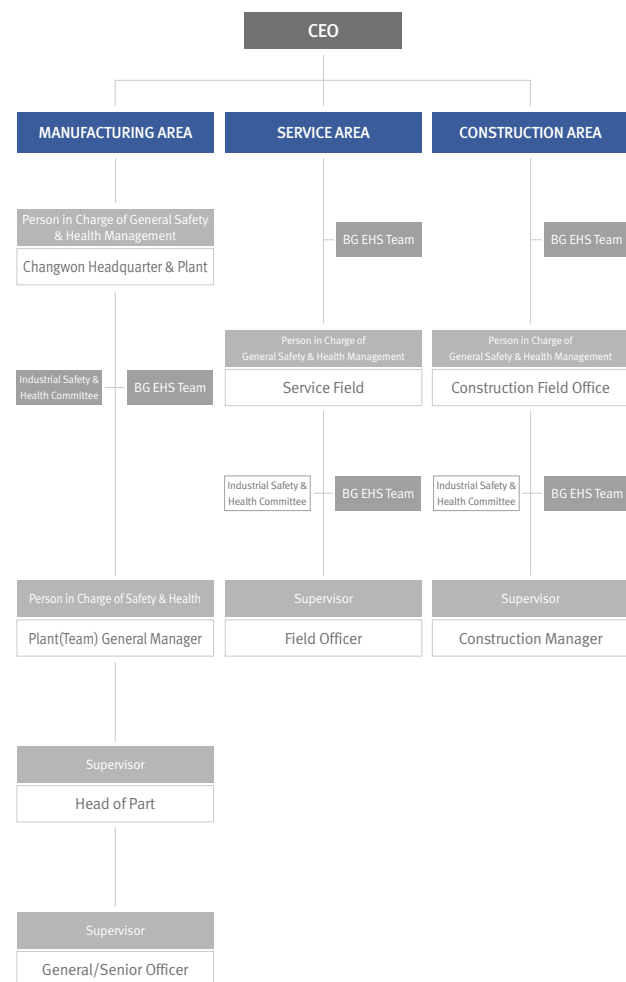
The area of safety management is very important to business management as it is directly connected to employees and stakeholders of DHIC. DHIC has adopted the major management goals of: preventing critical disasters; managing high-risk worksites and processes; improving safety management competency of partner companies; and implementing systematic management with a responsible attitude. In 2019, DHIC conducted a complete enumeration of safety accidents around major business sites, analyzed the cause of safety accidents, and focused on identifying ways to remove risk factors of safety accidents.

## POLICY & STRATEGY

### IMPLEMENTATION SYSTEM

- DHIC has appointed a person in charge of general safety & health under the CEO and composed an Industrial Safety & Health Committee to deliberate and decide major matters regarding industrial safety & health.
- The Industrial Safety & Health Committee consists of an equal number of employees and users; and conducts planning and inspection of various activities in relation to safety & health of employees.
- The committee conducts safety & health management activities on the basis of ISO 45001(the switch from OHSAS 18001 was completed in 2019). The committee also aims to enhance the management of safety & health for employees of partner companies – through a separate safety & health consultation group which supports partner companies to prevent the occurrence of industrial disasters.

### Promotion Organization



### Vision House

#### VISION

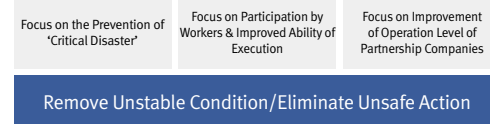


Created No-Disaster & Eco-Friendly Business Site

#### GOAL

Accomplish Zero Critical Accident

#### CORE PROMOTION STRATEGY



### Business Sites of Overseas Subsidiaries with Certificates of Safety & Health Management System

U.K(Doosan Babcock)	ISO 45001
Czech(Doosan Skoda Power)	OHSAS 18001
Vietnam(Doosan VINA)	OHSAS 18001
Romania(Doosan IMGB)	OHSAS 18001
Germany(Doosan Lentjes)	OHSAS 18001

\*As of the end of year 2019

### IMPLEMENTATION STRATEGY

- Based on the scientific safety & health management system, DHIC has continuously discovered the causes of hazardous risk in the field and focused on the prevention of critical disasters.
- DHIC strives to improve safety & health management competency, as well as disseminate a culture of safety, throughout the value chain of headquarter, business sites, and partner companies.
- DHIC has identified the safety & health risks for each business area and each country; and implemented effective management activities from the initial stage of the project.

### EXPRESSION OF COMMITMENT TO SAFETY & HEALTH OF EXECUTIVES AND MANAGERS

- DHIC implements regular MSLTs(Management Safety Leadership Tours) for executives and managers to disseminate a culture of safety and to identify risks, dangerous processes, and difficulties in the field.
- Based on MLST, DHIC has intensively managed critical risk factors by making weekly reports to the executives regarding safety activities and high risk work

## ACTIVITY & PERFORMANCE

### REINFORCEMENT OF FIELD SAFETY MANAGEMENT

#### Advanced Management of High-Risk Process

- DHIC has selected 5 types of critical disasters and 10 core inspection themes for Changwon Plant, including high fall, heavy object compression, electric shock, heavy equipment accident, fire and explosion, and systematized management of these risks.
- DHIC has conducted 3 cycles of inspection on aged facilities and equipment on a company-wide level and minimized blind spots related to risk factors through such company-wide inspection.
- In case of hazardous risk facilities(e.g., crane) that cause critical disaster, DHIC has secured the safety of the facilities through special precision diagnosis of a non-destructive test on the part of concentrated stress.



Inspection on Theme of 5 Critical Disaster Types

#### General Inspection on Safety Accident & Analysis on Generation Causes(As of 2019)



#### 9 Representing Themes of Safety Accident

9 themes are selected repeatedly after one cycle. Major themes are as follows (Conduct theme inspection for a week with one theme)

Install a lifeline to prevent the fall & inspect the wire rope	Inspect the installed condition of work plate
Inspect portable scaffold and ladder	Inspect abnormal condition of protection system of construction equipment
Inspect the fulfillment of work schedule	Inspect slings(wire rope, chain sling)
Inspect lift tools(shackle, clamp)	Inspect the preparation of structural review and assembly diagram before Work Start
Inspect the safety in the installation of temporary facility	

#### Status of Accomplishment Zero Disaster Hours in Overseas Business Sites

Classification	Unit	2019
India Jawaharpur	Hour	15 million
India Obra C	Hour	15 million
Kuwait Doha RO	Hour	9 million
Vietnam Vinh Tan 4 Ext	Hour	5 million
Vietnam Nghi Son 2	Hour	5 million

- DHIC received an award for EHS Excellent Management from a client(EVN) for Vinh Tan 4 Ext. (July 2019).
- According to the revocation of enactment instruction of Zero-Disaster Movement by the government since 2018, there has been no outcome of domestic zero-disaster.

### Inspection of Unsafe Actions Among Basic Causes of Safety Accidents

- From the result of safety accidents at Changwon Plant, about more than 80% were caused by unsafe actions of workers.
- To control the unsafe actions of workers, DHIC has taken videos of high-risk work processes, identified risks related to workers' actions, and endeavored to eliminate such unsafe actions.
- DHIC has conducted an effort to improve the process of accident survey to prevent the reoccurrence of same or similar accidents.

### Implementation of Operation Qualification System to Prevent Critical Accidents

- For Changwon Plant, DHIC operates an operation qualification system for operators of cranes or forklifts that are deployed for transportation or unloading of heavy objects which may cause critical accidents.
- The operator must complete the qualification program for operation. The operation qualification system consists of education on professional theory and practical application.
- A regulation has been specified for failed applicants to retake the education and the test.

### Strengthen Safety & Health Management by Partner Companies

- DHIC has implemented a Win-Win Cooperation Program for Safety & Health targeting 53 partner companies to discover and improve the risk causes inside Changwon Plant.
- Targeting high-risk processes, DHIC provides field feedback regarding unsafe actions after observing the entire process of works. This has been implemented in 21 partner companies.
- Some partner companies have received the benefit of reduction in occupational health and safety insurance based on certification of risk assessment. 22 partner companies maintain KOSHA 18001, 2 partner companies maintain OSHAS 18001.
- DHIC supports partner companies to establish autonomous safety management systems, including by training partner company CEOs and management supervisors on safety & health management competency.



Intensive Management in High-Risk Process of Partnership Companies



## ACTIVITY & PERFORMANCE

### INTERNALIZED CULTURE OF EMPHASIS ON SAFETY & HEALTH

#### Evaluation on EHS Performances

- DHIC has continued the development of a safety & health culture through the implementation of zero incident rewards across the Changwon Plant, the in-house partnership company, the EHS Internal Audit and the evaluation of management activities by partnership companies.
- DHIC has evaluated EHS activities and implemented the EHS award for outstanding performance.
- Following the EHS assessment, all field employees, managers of partnership companies and workers are now actively participating.
- While targeting domestic and overseas construction sites, DHIC has carried out a total of 45 EHS assessments which is reflected in the performance evaluation.



DHIC's Plant EPC BG '2019 EHS Awards'

#### Expansion of EHS Education

- Targeting executives and plant managers, DHIC has implemented a leadership education program to increase management competency in EHS risk.
- DHIC has implemented safety psychology training for supervisors at Changwon Plant. This has been conducted by an external professional lecturer.
- DHIC has produced a safety video to improve employee awareness.
- DHIC has installed safety training facilities on all domestic and overseas construction sites and expanded training to cover the entire workforce(Continued from 2016).
- DHIC has trained professional lecturers to deliver the exact method to use the safety experience facilities.
- In the case of Samcheok Thermal Power Plant(Giant Plant), a high-tech safety education center that combines various educational contents and IT technology is installed. And safety education for workers is provided to ensure safety.

#### Status of Education for EHS Managers

- 40 people including executives, team leaders and site managers have completed leadership education workshop in health & safety.
- 73 site managers of partnership companies have completed the workshop.
- 29 health managers and environmental managers have completed the workshop.
- 435 domestic supervisors have completed the workshop.
- 1,096 people have completed the workshop from 9 overseas sites, global construction projects by Doosan's partnership companies and EHS manpower.
- 122 domestic health and safety managers have completed the education.
- DHIC has implemented OJT for 25 new health & safety managers.

#### Reinforcement of Safety & Health Inspections During Vulnerable Periods

- DHIC has implemented safety checklists targeting new year's day, fall harvest holiday, summer & winter vacations, peak process and high-risk worksites.



### PREPARATION OF EMERGENCY RESPONSE SYSTEM & EXPANSION OF TRAINING

#### Implementation of Emergency Response Training

- DHIC has devised detailed response measures for a range of emergency situations.
- DHIC has produced case study videos such as building evacuation tips for emergency situations, how to respond to an earthquake, firefighting facility guidance and usage. DHIC has used this video as educational material.
- The response & rescue facility has implemented more than 60 emergency drills around sites and office buildings.

#### Expansion of Fire Response & Rescue Facilities

- DHIC has installed rescue towels for fire escape in office building and dormitory and supported the smooth escape plan when fire breaks out.
- DHIC has upgraded automated fire detection system which detects the fire automatically and tells it to the fire prevention center in real-time targeting entire area of Changwon Plant.

#### Monitoring Overseas Dispatched Employees

- DHIC has established a real-time system for centrally monitoring issues at overseas sites.
- DHIC has prepared a risk management process for evacuating overseas workers and their families during emergency situations such as war and epidemics.
- DHIC has installed satellite phones at work sites to ensure contact and coordination during emergency situations(such as recent instability in the Middle East region).

### REINFORCEMENT OF HEALTH MANAGEMENT FOR EMPLOYEES

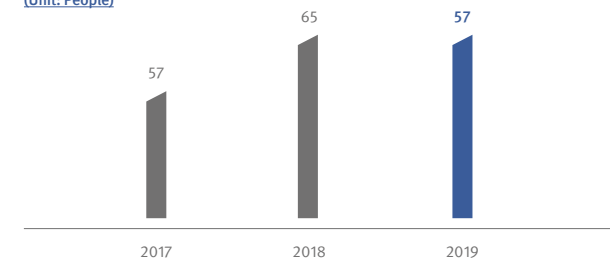
#### Healthcare Program for Each Employment Period

- DHIC provides a lifetime health program according to the age from the employment to the retirement of employees.
- DHIC conducts pre-employment health checkups for new employees. General health checkups are offered to employees over the age of 35(and their spouses) if they have worked with the company for more than five years.
- DHIC has an agreement with 5 general hospitals in Seoul and Pusan to provide medical treatment for employees and their families. The company has furthermore reached an agreement with 14 local clinics for the provision of orthopedic and dentistry services.
- In order to relieve the burden of personal medical expenses DHIC will provide up to 20 million won per person to assist with costs incurred during surgery or medical procedures. This benefit is applicable to employees and their families..

New Employees	<ul style="list-style-type: none"> <li>· Health Diagnosis before Job Arrangement(Technical position)</li> <li>· Hepatitis A Vaccine(First, Second)</li> <li>· Seasonal Flu Vaccine(Every year)</li> <li>· Acquisition of qualification to apply the support of surgery (Self, spouse, children)</li> <li>· Medical services through agreements with general hospitals</li> <li>· Complete first aid training</li> </ul>
1 Year in Employment	<ul style="list-style-type: none"> <li>· Implementation of regular health checkups</li> <li>· Office work: General health checkup(once every 2 years)</li> <li>· Technical position: Special + General health checkup(every year)</li> </ul>
Overseas Business Trip or Dispatching	<ul style="list-style-type: none"> <li>· EHS training before business trips or relocation</li> <li>· Insurance for employees travelling overseas</li> <li>· Vaccine for endemic and infectious disease</li> <li>· Subscription to SOS service</li> <li>· Provision of a guide for overseas safe living</li> <li>· Operation of a hotline for in-house clinics</li> <li>· Medical support service at overseas workplaces</li> </ul>
On Duty	<ul style="list-style-type: none"> <li>· Use of General Consultation Center(MISODAM)</li> <li>· Use of in-house clinics</li> <li>· Support of medical expenses(surgery fee)</li> <li>· Interconnection service of medical treatment in general hospital and clinics</li> <li>· Participation in Stop Smoking Classes and Aqua Aerobics</li> <li>· Support of a low sodium diet</li> </ul>
5 Years in Employment	<ul style="list-style-type: none"> <li>· Implementation of general health checkups</li> <li>· Prioritizing employees over the age of 35</li> </ul>
20 Years in Employment	<ul style="list-style-type: none"> <li>· Implementation of specific health checks(includingcardiovascular and cancer)</li> <li>· Prioritizing employees over the age of 45.</li> </ul>
After Retirement (for 3 years)	<ul style="list-style-type: none"> <li>· Support for discounted health checkups</li> </ul>

#### Management Performance of Disease in Musculoskeletal System

(Unit: People)



- Participants in the management program for a patient with musculoskeletal system disorder.
- From the analysis result of the effectiveness by utilizing the Visual Analogue Scale(VAS), it showed the reduction effect of pain with more than 77% of participants in the program.

#### Management of Patients with Musculoskeletal Disease

- DHIC has minimized the occurrence of musculoskeletal disease across the company following the implementation of a preventive program.
- In 2019 DHIC conducted an evaluation on the distribution and severity of musculoskeletal diseases within the company. DHIC subsequently implemented recommendations on the lifting and handling of heavy loads.
- Employees displaying symptoms of musculoskeletal disease are entitled to and physical therapy under the supervision of trained physicians.
- DHIC has implemented aqua aerobics classes using the in-house swimming pool. In 2019, 65 employees participated in the program.
- In departments which are particularly at risk from musculoskeletal disease, DHIC has introduced a workplace stretching program.



Musculoskeletal System Management Program – Aqua Aerobic

#### Medical Treatment Program through Psychology Consultation

- DHIC has installed and operates a general consultation center(MISODAM) in the company to relieve stress and provide consultation services to employees.
- To ensure an equitable level of service to both employees and their families, an external consultation center is also utilized.



754 consultations were conducted through the MISODAM consultation center(as of 2019)

#### Operation of In-house Annexed Clinics

- DHIC has been operating in-house annexed clinics with doctors, nurses, physical therapists and exercise trainers to provide a one-stop medical treatment facility.
- DHIC provides annual flu vaccines for employees and their families and employees of partnership companies. In 2019, DHIC provided vaccines for 25 thousand people.
- DHIC provides vaccinations for prevalent endemic diseases(Malaria, Typhoid Fever, Yellow Fever) in each country in which it operates. DHIC evaluates the capacities of in-house clinics in overseas countries and provides EHS training and medical supplies as required.
- Medical personnel conduct regular overseas visits to workplaces with poor medical infrastructure to ensure an adequate level of healthcare is available.



DHIC does not consider employees as instruments of performance but respects them as individual persons. DHIC is considerate to each individual of employees with sincere concern. DHIC has been expanding training to reinforce leadership and duty competency, as well as to foster talented personnel on both leadership and professional skills. DHIC also endeavors to foster a happy organization culture.

## POLICY & STRATEGY

### IMPLEMENTATION SYSTEM

- Based on Doosan Credo, DHIC defines the development of experts with natural competitiveness as a core goal of talented personnel management.
- DHIC has developed quantitative personnel management based on the Human Resources Information System(HRIS).
- Based on the HRIS(Human Resource Information System), DHIC has conducted competency assessments on 6,200 domestic employees and 6,000 overseas employees and established a Global One System fostering management, education and employment.
- DHIC has strengthened collection and analysis of human resources data to support strategic decision making according to the nature of business.

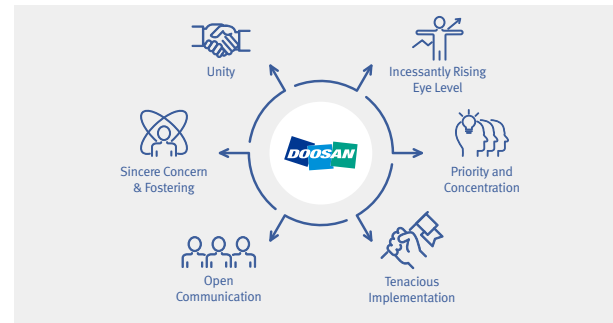
### IMPLEMENTATION STRATEGY

- Employees are our most valuable assets and are essential for the growth and development of the company. DHIC has developed a well-balanced strategy to foster talented personnel on an equal opportunities basis.
- DHIC encourages professional development within the workplace.

### DOOSAN'S IMAGE OF TALENTED PERSONNEL, 'DOOSAN PEOPLE'

- Doosan's talented personnel, 'Doosan People' refers to all employees who practically contribute to furthering the organization and continually developing their abilities.
- Doosan People is a person who makes much account of Doosan's fundamental values and image of talented personnel and practices them as an act.

Doosan People



### PRINCIPLES TO SELECT TALENTED PERSONNEL

- In order to employ talented personnel, DHIC conducts strict screening processes for new employees.
- DHIC is an equal opportunity employer and does not discriminate on the grounds of education, age, gender, ethnicity or nationality.

### PRINCIPLES TO EVALUATE TALENTED PERSONNEL

- DHIC operates an evaluation system based on the long-term development of individual employees.
- Identifying strengths and development needs of substrate characteristics that correspond to the Doosan's talented personnel, conducting fact-based evaluations and establishing detailed human resources development plans based on them.
- DHIC has implemented quantitative management based on the company's Human Resources Information System(HRIS).

### Human Resources Development Strategy



**Doosan Leadership College**  
"Foster Leaders who Epitomize the Doosan Credo"



**Doosan Professional College**  
"Foster Experts Equipped with Natural Competitiveness"

### 01

#### Expansion of Opportunities to All Employees

- DHIC focuses on further developing the skills of key leaders while offering all employees an opportunity for fair growth.
- DHIC has strengthened a practical leadership education through the Doosan Credo.
- DHIC has expanded management education to all employees.
- DHIC has established a 3-stage learning system of basic, intensive and professional courses to improve competency.

### 02

#### Provision of Opportunity for Customized Education in Each Growth Stage

- DHIC considers individual capability for each position and provides the opportunity of a systematic education.
- DHIC has been supporting a prerequisite learning of duty education in connection with education contents and circulating arrangement composed by the level of capability of a target for education.

### 03

#### Development through Self-Learning

- DHIC provides a book for efficient and systematic self-learning.
- DHIC supports various self-learning approaches such as a learning club and open courses for employees.

## ACTIVITY & PERFORMANCE

### REINFORCEMENT OF BASIC WORK COMPETENCE

#### Upgrade the System of Work Education

- To improve the competence of all employees, DHIC has been operating academies for duties based on the value chain.
- Each academy consists of a 3-stage learning system of Basic ▶ Advanced ▶ Expert based on the required competency for each position or year(s) of work.
- Employees can select the required education for each level.
- To provide education based on practical learning. Employees actively participate in classes to expand their professional knowledge in an applicable manner.
- To encourage high-quality in-house lecturers DHIC provides employees an opportunity to earn a payment for each class they conduct.

#### Expanding Training to Negotiation Skills

- To continue the successful reception and implementation of PJT orders, DHIC has developed and operates the WIN(Winning Intelligent Negotiation) process to strengthen Win-Win Negotiations.
- To assist with the teaching of negotiation principles DHIC has designed an education program which utilizes participation and case studies.
- For the purpose of using concept and terminologies of negotiation smoothly for the nature of works and communication in the company with the same language, DHIC has continued the education for all employees of duties to contribute to the enhancement of successful project and its profitability.

### EXPANSION OF EDUCATION IN TECHNOLOGY

#### Consortium Education

- To improve the technical competency of power generation clients, partner companies, and employees, DHIC delivers education to a national human resources consortium.
- DHIC has led the mutual growth of clients and partner companies and realized the improvement of overall productivity through the technical improvement of its employees.
- In 2019 DHIC delivered education to a national human resources development consortium of 512 people, including 131 people power generation clients and 253 employees.

#### Meister System

- DHIC has selected and fostered in-house Meisters to transfer knowledge accumulated through long-term experience.
- Since 2014, 18 Meisters have been designated to implement various production improvements such as technology transfer and standardization
- DHIC have been operating a systematic training process for employees to attain the role of Meister.

#### Technology Management Course

- DHIC has been operating the Technology Management School to improve the competency of employees in technical duties.
- DHIC has delivered the business cycle and accounting knowledge that built the value of the company and conducted the leadership education that led to development of a communication culture.
- DHIC has implemented education for 1,575 people through 58 sessions since 2014.

### CREATION OF A HAPPY WORKPLACE FOR EMPLOYEES

#### Retirement Support Program

- DHIC has been operating a customized retirement support program targeting employees before their retirement and supporting them in their post-retirement plans.
- The program consists of basic and intensive courses. DHIC provides tailored information through consultation in the year of retirement.

#### Club Activity Support

- DHIC supports club activities for the work-life balance of employees and developed club activities in diverse areas such as sports, hobbies and self-development.
- 2,000 employees have joined 50 clubs in Changwon, Seoul and Yongin.

#### In-House College

- For the self-development and growth of employees in technology, DHIC has been operating an Energy Convergence Engineering College in cooperation with Changwon University.
- Employees of DHIS who wish to enroll can apply to the courses as freshmen or transferring students and use their free time to learn and acquire an undergraduate degree in Engineering.
- To date, 106 employees have graduated and 18 employees are enrolled in the freshmen course.

### ESTABLISHMENT OF A SOUND LABOR-MANAGEMENT CULTURE

- Based on mutual trust between labor and management, DHIC has established a stable labor-management relationship.
- DHIC has concluded a no-conflict group agreement for 14 consecutive years.
- Through conference organizations between labor and management such as a negotiation group, a labor-management council and an institutional improvement committee, DHIC provides an opportunity for employees to participate freely in the course of decision making.
- DHIC has provides communication opportunities for each BG to reflect the opinions of employees on the operation of the company.



*Negotiation of No-Conflict Labor-Management for 14 Consecutive Years (as of 2019)*



# Business Management for Human Rights

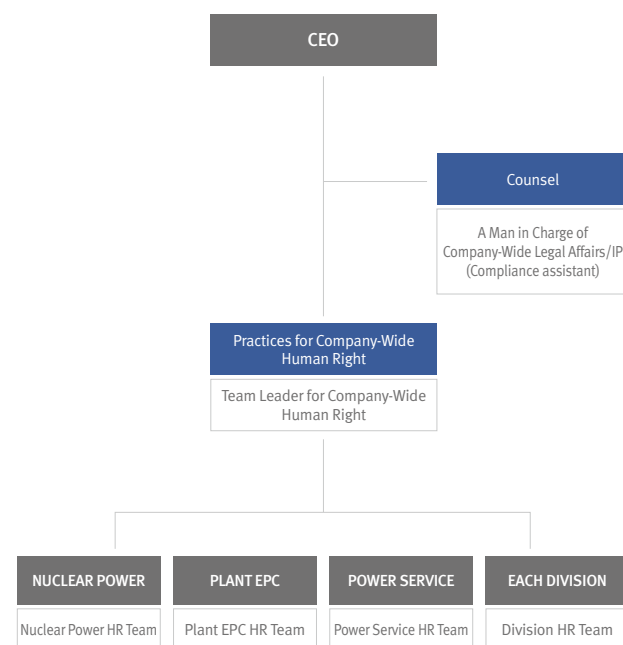
Social requirements in relation to the human rights aspects of international enterprises are of increasing importance. DHIC has prepared and implemented a system of human rights risk management across the company. All members and stakeholders have the right to dignity and value and DHIC has been made the best effort to respect and protect these rights.

## POLICY & STRATEGY

### IMPLEMENTATION UNIT

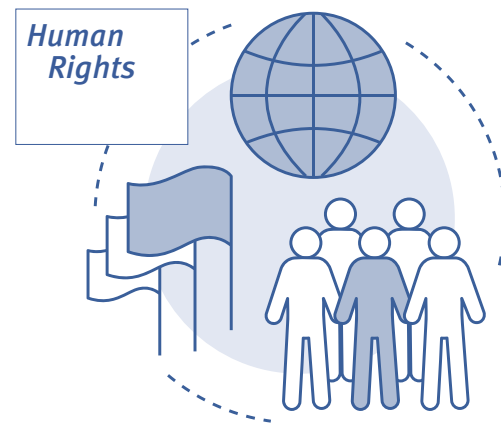
- DHIC has promoted the activity of human right business management on the basis of the Human Rights Committee.
- The Human Rights Committee employs an in-house assistant to advise the human resources and business departments in the planning, operation, and guidance on activities at a company-wide level.
- The Human Rights Committee conducts prompt review and response through immediate reports of human rights issues.

Organization Chart of Human Right Committee



### HUMAN RIGHTS POLICY

- The human rights policy specifies basic human rights which are secured regardless of origin, religion, gender, ethnicity or other conditions.
- DHIC, as a member of the UN Global Compact, observes 10 principles of the Global Compact regarding human rights, labor, environment and anti-corruption
- Based on the human rights principle recognized internationally such as 'The Universal Declaration of Human Rights' and 'The UN Guiding Principles on Business and Human Rights', DHIC respects the human rights of employees of DHIC and all stakeholders who have a relationship in the management activities of the company. DHIC recommends the same level of human rights management to business partners and supply network.

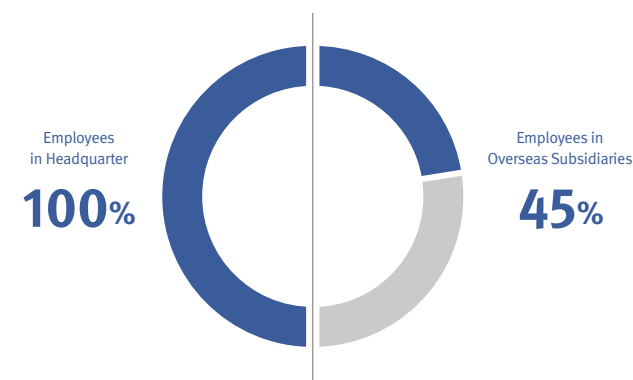


## ACTIVITY & PERFORMANCE

### ASSESSMENT OF IMPACT ON HUMAN RIGHT

- DHIC has proceeded with the regular assessment of effect on the human right targeting employees of the headquarter.
- DHIC has implemented the assessment of effect on the human right preemptively targeting the place of high human right risk among overseas businesses.
- DHIC has established a mid to long term plan to conduct the assessment of effect on the human right by expanding the evaluation range to entire overseas businesses and partnership companies.

Assessment Rate of 2019 Human Rights Risk



### DUE DILIGENCE OF HUMAN RIGHTS

- DHIC continues to conduct due diligence on human rights(DPSI : Doosan Power System India) for overseas business sites by utilizing a human rights management checklist.

Due Diligence of Human Rights: Conducted the due diligence of human rights at DPSI(\*19.07)

**DHIC surveyed and interviewed staff at two local DPSI subsidiaries in India regarding sexual harassment and violations of the Code of Conduct.**

Survey: 47%(117 people) answered  
(Interview: 5 employees in HR Team and 5 local Korean workers)

### IMPLEMENTATION OF HUMAN RIGHTS EDUCATION

- To prevent human rights violations, DHIC has implemented basic human rights education for all employees on domestic and overseas business sites.
- To minimize human rights risk on overseas business sites, DHIC has conducted global human rights education before dispatching employees.
- In 2020, DHIC is scheduled to promote human rights education for major partnership companies and additional education in human rights for leaders.

### EFFORT TO EXPAND CULTURE OF RESPECT FOR HUMAN RIGHTS

- To expand the awareness of human rights in business management, DHIC has implemented rules and processes for the prevention of and action against harassment in the workplace and made a presentation for team leaders and executives.
- DHIC has newly installed and operated a process to proceed the guide for relevant institution and welfare in a package at the registration of pregnancy by packaging maternal protection system.
- DHIC strictly prohibits child labor, employment of workers younger than the age of 18 and forced labor.(Immediate action for violations)

### PROCESS TO HANDLE HUMAN RIGHTS VIOLATIONS

- DHIC is introducing processes to deal with the prevention and relief of human rights issues.
- Issues regarding human rights received through the internal report center have been handled through the process of factual investigation, confirmation and review by the business department and the company-wide Human Rights Committee.
- In the process, DHIC strictly adheres to the principle of the confidentiality and protection for informants.

Number of Official Report of Handling Conflicts Regarding Human Right

Classification	2017	2018	2019
Official Report of Handling Conflicts	40 cases	14 cases	10 cases
Number of Resolution	40 cases	14 cases	10 cases
Resolution Rate	100%	100%	100%



# Mutual Growth

Through a virtuous circle of partnership with partner companies, DHIC is strengthening our competitiveness. DHIC fosters business competency of partner companies by supporting their overseas expansion, as well as by operating an academy and a CSR management system which evaluates partner companies on major issues such as environmental safety.

## POLICY & STRATEGY

### SUPPLY NETWORK MANAGEMENT SYSTEM

- DHIC has adopted the 「CSR Guideline for Suppliers」(CSR Guideline) to guide our relations with suppliers and partner companies.
- DHIC recommends all suppliers and partner companies to apply the written guideline, which has been disclosed through various communication channels.(http://www.doosanheavy.com/kr/csr/guideline/)
- This guideline has been prepared to align with the “Ten Principles of the United Nations Global Compact,” which covers human rights, labor, environment, and anti-corruption.

#### Major Contents of CSR Guideline for Partner Companies

Human Rights	Health & safety, labor conditions & wages, etc.
Labor	Freedom of association, child labor, forced labor, etc.
Environment	Environmental protection & pollution control
Anti-corruption	Corruption prevention, law compliance, etc.
Conflict Minerals	Conflict minerals, response status, etc.

### DEFINITION AND SELECTION OF PARTNER COMPANIES

- DHIC defines a partner company as a business entity that has maintained a long-term supply relationship and has consistently delivered on price, quality, and delivery date for strategic and cooperative items.
- In compliance with selection standards set forth in the CSR Guideline, DHIC evaluates the finance and governance structure of new partner companies, including through a credit assessment process.
- Partner companies are selected through fair and transparent procedures. Companies that have caused social disturbances shall be prohibited from registering as a new partner company.

#### Status of Suppliers(Number of Businesses)

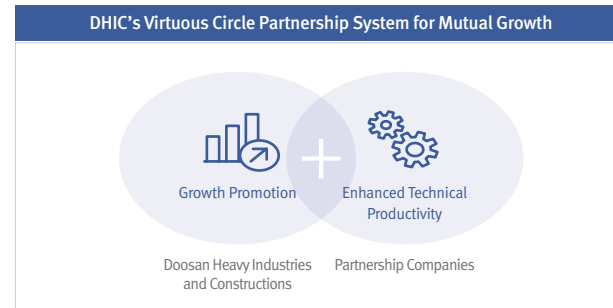
Classification	2017	2018	2019
Total	12,834	13,255	13,603
Republic of Korea	10,639	10,996	11,305
Japan	163	164	165
China	135	148	154
Saudi Arabia	107	119	121
U.S.A	352	353	354
Italy	87	90	92
Czech Republic	11	12	13
Germany	288	294	300
Romania	9	10	10
Others	1,043	1,069	1,089

#### Purchase Status through Supply Network(100 million won)

Classification	2017	2018	2019
Total Amount	25,582	22,592	23,459
Republic of Korea	18,911	16,839	20,084
Japan	1,090	1,704	459
China	323	313	279
Saudi Arabia	518	1,328	313
U.S.A	511	519	323
Italy	1,032	142	207
Czech Republic	868	1	162
Germany	594	571	452
Romania	260	360	225
Others	1,475	815	955

### PROMOTIONAL STRATEGY FOR MUTUAL GROWTH

- DHIC's has established a virtuous circle partnership system whereby all partner companies can benefit from DHIC technology and business systems to improve their management technical competency.
- Through this virtuous circle partnership system, DHIC aims to contribute to the mutual growth of DHIC and partner companies, as well as to growth of the local and national economy.



#### Major Promotional Activities in the Area of Mutual Growth

- Improving the Fundamental Competitiveness of Partner Companies
- Operation of a support program to strengthen competitiveness
- Operation of a management advisory group for partner companies
- Project on improving EHS Safety & Health through Mutual Cooperation
- Consortium of National Human Resources Project
- Performance-Sharing System
- Expansion of Direct Support to Partner Companies
- Direct Support Fund without Interest for Partner Companies
- Operation of Mutual Growth Fund(Combined Support)
- Loans & Network Loans for Partner Companies
- Mutual Partner Loan
- Support for Overseas Expansion by Partner Companies
- Joint Expansion to Overseas Construction Sites
- Support process of obtaining PQ(Pre-qualification) Approval of Overseas Clients
- Support Participation in Overseas Exhibitions
- Support Field Trips to Overseas Enterprises
- Reinforcement of Communications
- Establishment and Regular Meetings of DHIC Cooperation Committee
- Increased CEO and executives visits to Partner Companies
- Operation of Win-Win Call Center
- Support Participation in Job Fair for Partner Companies
- Invitation of DHIC Cultural Events and Support of Congratulations and Condolences

## ACTIVITY & PERFORMANCE

### ACTIVITIES TO SUPPORT FOR PARTNER COMPANIES

#### Partner Company Support Outcomes

- DHIC supported the Pre-Qualification process for 76 partner companies who trade with overseas companies; and helped them to achieve export performance of 37 billion won.
- DHIC supported in full the expenses of 4 partner companies to participate in the PowerGen International Exhibition in the U.S., through which they secured export orders of 13.5 billion won to 47 overseas companies.
- DHIC has an established quality assurance system and which enables it to instruct and evaluate partner companies according to the items in transaction. DHIC has acquired certificates of ASME, KEPIC and ISO from the relevant official, international agencies.
- In 2019, DHIC expended about 660 million won to support partner company production facilities. Fourteen(14) quality masters supported 2 partner companies to improve the quality of their production.

#### New Hire and On-the-Job Training

- DHIC implemented employment education for workers scheduled for hire through a national consortium for the development of human resources.
- DHIC supported on-the-job training for partner company employees, including all education expenses and training allowances/wages.
- In 2019, DHIC implemented on-the-job training for professional staff of partner companies(186 people in 26 companies); and new hire education and hiring for 31 people in 16 companies.

#### Operation of Academy for Partnership Companies

- To cultivate a network between DHIC and partner companies for mutual growth, DHIC annually operates an academy for partner companies.
- Through the academy, DHIC expanded information sharing(e.g., sharing benchmarking cases of advanced enterprises) to improve the performance of partner companies.

#### Reinforcement of Communication

- DHIC launched a DHIC Cooperation Body for mutual growth and mutual communication.
- DHIC has been operating a Win-Win Call Center to respond to challenges and problems of partner companies. The exclusive department for mutual growth is connected directly to solve those difficulties and problems immediately.
- Major challenges of partner companies are discussed through regular meetings and visits to partner companies by DHIC executives.
- In 2019, DHIC conducted 8 division meetings for each BG. 188 people including CEO, purchasing executive and purchasing team leader visited 74 partnership companies throughout the year.

### UPGRADED CSR MANAGEMENT FOR SUPPLY NETWORK

#### Fair Trade Self-Compliance Program

- DHIC has established an exclusive unit to manage the fair trade self-compliance program, including a manager for self-compliance, a person in charge of self-compliance for each BG, and a department for fair trade self-compliance.
- DHIC improved to the process for preemptively preventing violations of laws and supplemented the computer system.
- DHIC focuses on delivering Mindset Education to employees that manage relationships with partner companies in order to foster mutual growth and ensure fair trade. DHIC also investigates cases of unfair trade experienced by partner companies.
- DHIC regularly inspects all company subcontracts in order to identify violations of subcontract law; and implements self-corrective measures. To prevent recurrence, DHIC disciplines and educates employees who have violated fair trade principles.

#### Risk Management of Suppliers

- Based on annual trade performance, DHIC regularly assesses the general competency of suppliers, including: Cost, Delivery, Quality, Collaboration, CSR, and Environmental Safety, and Corporate Financial Statements. Based on evaluation results, high-risk enterprises are excluded from being designated as partner companies for mutual growth.
- DHIC employees and appointed agencies and auditors visit partner company business sites to conduct these assessments.
- By assigning points for compliance with the CSR Guideline and making this a major element of evaluations, DHIC has cultivated awareness and voluntary implementation of CSR by suppliers.

# Quality Management

DHIC prioritizes customer satisfaction and strives to create value for customers through high-quality, competitive power generation and water projects. We have acquired world-class engineering competency and manufacturing capability through constant quality and supply chain innovation. DHIC has achieved maximum customer satisfaction through a quality assurance system which ensures the best quality from inventory of materials to product shipping.

## POLICY & STRATEGY

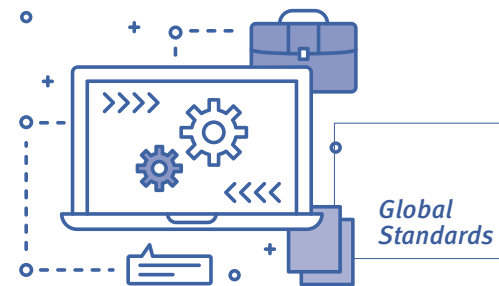
### POLICY

DHIC has realized a quality management system based on a foundation of Global Standards, as well as the commitment of DHIC's CEO to quality management.

#### DHIC Quality Management Policy

DHIC strives to acquire world-class power plant design, manufacturing, installation, and test drive capability in order to fulfill the management vision of being a 'Global Leader in Power & Water'. Based on the highest quality competitiveness, DHIC has been leading the markets for nuclear power, thermal power, desalination, and industrial plants. DHIC prioritizes management to contribute to achieving overall customer satisfaction and creating value for customer. DHIC maintains a well-structured and systematic quality assurance system that meets Global Standards. This ensures that DHIC can provide quality products and services without defect – the quality that customers desire and deserve. All DHIC units and employees of the company adhere to the provisions of the Quality Policy.

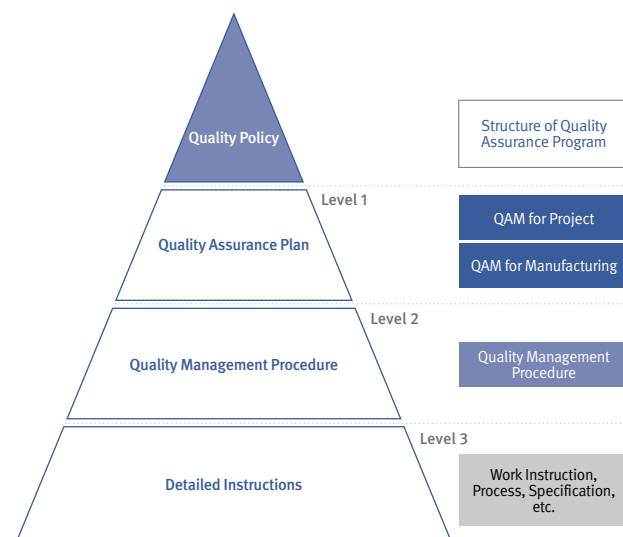
DHIC has established the DQMS(Doosan Quality Management System) which digitally manages quality information and documents, as well as risk prevention. DHIC has digitized all quality information – from inspection plan to assessment results. DQMS has raised the visibility of and fulfillment capability of the quality management process.



### IMPLEMENTATION SYSTEM

DHIC's quality management system covers the the entire project process – from the review of project contract to project warranty based on a quality assurance manual which reflects international best practice and provides the detailed procedures and instructions necessary for project implementation by employees.

#### Quality Assurance Program



### ACQUISITION OF QUALITY CERTIFICATES

DHIC has acquired and maintains 60 official certificates from international agencies in the areas of nuclear power, thermal power, wind power generation, and desalination. These certificates provide external validation of DHIC's quality competitiveness; and enable DHIC to gain the trust of customers.

#### Representative Certificates



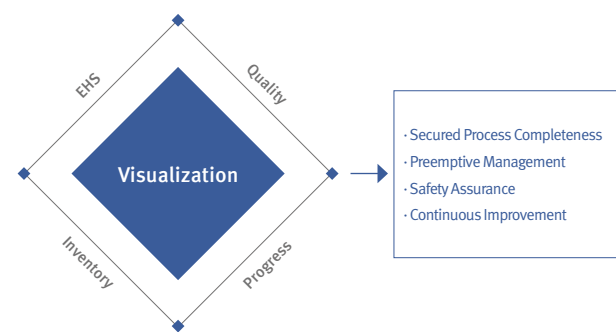
Clockwise from right top, ISO 9001 Quality Management System, ASME Nuclear Power Main Components Manufacturing, KEPC Nuclear Power Main Components Manufacturing, ASME Boiler and Pressurized Container Manufacturing

## ACTIVITY & PERFORMANCE

### QUALITY INNOVATION ACTIVITIES

DHIC has introduced the work strategy of "First Time Right," which establishes a virtuous circle of work methods and tasks. DHIC applies RCA\* to identify and proactively prevent potential quality failures in manufacturing. This system draws on past experiences and weak points to deduce potential critical quality failures.

\*RCA: Root Cause Analysis



### QUALITY PREVENTION MANAGEMENT

DHIC implements the 'Quality Visualization' system, which enables both workers and managers to determine at a glance whether work processes meet CTQ(Critical to Quality) standards. DHIC has discovered and applies 11 cases, such as refraining from welding dissimilar materials and ensuring uniform welding quality. DHIC encourages partner companies to apply these Best Practices in order to improve their quality management and productivity. DHIC implements preventive quality monitoring for manufacturing processes, joint inspections of production and product quality prior to shipping, and site-based preventive quality activities. To ensure the quality of purchased products, DHIC has reorganized CTQ for 32 major items and established new management processes for each unit. In order to conduct automated and digitized non-destructive testing, DHIC has established and is applying on a trial basis a UT cooperative robotic system for rotors to certify safety. DHIC has also developed software for automatic evaluation of small caliber Tube Weld RT Film, which is now being applied on a trial basis.



The color scheme for welding parts(parent material)/welding bar/welder) helps identification at a glance whether work meets the CTQ.

### CULTIVATION OF QUALITY MEISTERS

DHIC has produced 28 national quality masters and 14 Korean masters, and retains the highest- level technicians, in the areas of can welding, processing, non-destructive process, and steel making and casting. DHIC's Meister Consultation Group, which is composed of masters, has fostered talented personnel through technique transfer and strengthened the competitiveness of partner companies.

**Retained Highest-Level Technicians in the Areas of Can Welding, Processing, Non-Destructive Process, and Steel Making and Casting.**

National Quality Masters:	Korean Masters:
<b>28 People</b>	<b>14 People</b>

\*Accumulated as of the end of 2019

### AWARD FROM NATIONAL QUALITY MANAGEMENT CONVENTION

DHIC received the Presidential Golden Award for 'Reduction of Cost and Standby Time through the Improvement of the Steam Generator Manufacturing Process'. DHIC has realized quality improvements and secured customer trust in the manufacturing process of steam generators. Process duration has been shortened by 33.4% through strengthening welding materials through heat treatment, all-in-one block manufacturing for hole cleaning, and the development of a step over program.



45th National Quality Management Convention, 10 Consecutive Presidential Golden Awards



# Customer Satisfaction

DHIC ensures customer satisfaction not just by responding to complaints, but through proactive efforts to respect and listen to the opinions of customers, meet customers' expectations, and provide exceptional value to customers. To continuously improve products, DHIC has expanded communication with customers based on the 'CRM'(Customer Response Management) system, as well as through VOC response.

## POLICY & STRATEGY

### IMPLEMENTATION STRATEGY

- DHIC management prioritizes customer service and strives to create value for customers.
- DHIC's customer service system includes activities such as regular surveys of customer satisfaction; lifetime customer support for DHIC-supplied facilities, materials, and equipment; and operation of a technical support center for client companies.

#### Activities to Improve Customer Satisfaction

<b>Survey on Customer Satisfaction</b>	<ul style="list-style-type: none"> <li>· Regular survey of the level of customer satisfaction (interview-based)</li> <li>· Annual survey of customer satisfaction(domestic &amp; overseas)</li> <li>· Ongoing collection of VOC &amp; implementation of feedback</li> </ul>
<b>Lifetime Management of Supplied Facilities</b>	<ul style="list-style-type: none"> <li>· Prompt provision of support teams when power generation halts</li> <li>· Lifetime management of supplied facilities</li> <li>· Remote monitoring service for power plants</li> </ul>
<b>Technical Support Center for Power Generation Group Company</b>	<ul style="list-style-type: none"> <li>· Online technical support</li> <li>· Operation of call center</li> <li>· Trend analysis and feedback of technical support requested by each client company</li> </ul>
<b>Technical Cooperation with Client Companies</b>	<ul style="list-style-type: none"> <li>· Visiting technology exchange</li> <li>· Technical cooperation agreements with power generation companies</li> <li>· Factory field trips through the invitation of client companies</li> </ul>
<b>Establishment of Customer Management Procedure</b>	<ul style="list-style-type: none"> <li>· Customer Management Procedure</li> <li>· Customer Inquiry &amp; Complaint Handling Procedure</li> <li>· Customer Satisfaction Survey Procedure</li> </ul>

### CUSTOMER RELATIONSHIP MANAGEMENT(CRM)

- The customer management process is classified into 4 stages: (i) business & marketing; (ii) manufacturing, installation & test drive; (iii) post management(A/S); and (iv) improvement & after-marketing.
- Complaints that arise at each stage of CRM are managed systematically according to the CRM manual.

### ESTABLISHMENT OF CUSTOMER MANAGEMENT PROCEDURE

- DHIC has prepared and implements the 'Customer Management Procedure' to reflect and respond to customer requirements.
- DHIC has established sub-procedures, such as the 'Customer Inquiry & Complaints Handling Procedure' for efficient and customer-focused handling of inquiries and complaints in order to enhance customer satisfaction.

#### Customer Relationship Management(CRM)

Classification	Activity Details
Step 1. Business & Marketing	<ul style="list-style-type: none"> <li>· Various customer support</li> <li>· Constant VOC management</li> <li>· Establishment of CS standard work criteria</li> <li>· PAM(Pro-Active Marketing) activities</li> <li>· Technology exchanges &amp; seminars</li> <li>· Survey of customer satisfaction(annual, regular)</li> </ul>
Step 2. Manufacturing, Installation & Test Drive	<ul style="list-style-type: none"> <li>· Manufacturing(Design &amp; Engineering)</li> <li>· Installation(Quality &amp; Delivery)</li> <li>· Test Drive(Performance &amp; SPEC)</li> </ul>
Step 3. Post Management(A/S)	<ul style="list-style-type: none"> <li>· Operation of strategic warranty system</li> <li>· Establishment of overseas warranty work system</li> <li>· Creation of new business opportunities through lifetime management of facilities</li> <li>· Operation of technical support center for power generation group companies</li> <li>· Prompt response to power generation interruptions</li> </ul>
Step 4. After Marketing	<ul style="list-style-type: none"> <li>· Reflection of feedback</li> <li>· Discovery of business opportunities through business support for client companies</li> <li>· Management of database for each region and customer</li> <li>· Creation of new business opportunities through lifetime management of facilities</li> <li>· Implementation technical cooperation agreements with power generation companies</li> </ul>

## ACTIVITY & PERFORMANCE

### LIFETIME MANAGEMENT OF SUPPLIED FACILITIES

#### Remote Monitoring Service for Power Plant

- Based on ICT(Information and Communication Technology), DHIC has established a remote surveillance system which can monitor the operation data of power plants in real-time.
- DHIC opens a Remote Monitoring Service Center(RMSC) to monitor operation information in real-time and monitor for abnormalities through its regular support operation system. DHIC also helps prevent accidents in advance by providing this information to customers.

#### Lifetime Management of Supplied Facilities of Materials and Equipment

- DHIC has enhanced customer management and generated additional profit through ongoing technical support targeting not only DHIC-supplied facilities but also facilities supplied by overseas business companies after the end of warranty periods.
- DHIC leverages performance diagnosis technology to support rational, efficient operation of aged power generation facilities.

#### Material & Equipment Supply through Technical Support

Classification	2017	2018	2019
Field Technical Support(case)	14	22	11
Profit Creation (case/price)	2 (about 10.8 billion)	3 (about 25 billion)	8 (about 12 billion)

### EXPANSION OF COMMUNICATION WITH CUSTOMERS

#### Customer Communication via Visits and Technology Exchange

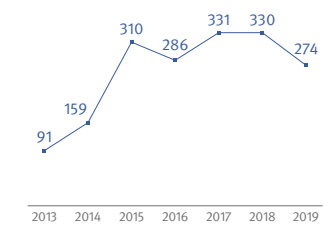
- DHIC visits client companies directly and provides information about new technology developments and facility improvements. Additionally, DHIC operates the 'Technology Exchange for Communication' to solicit opinions of client companies and share data about power generation operations.
- DHIC facilitates active participation and discussion by client companies in the technology exchanges, rather than convening seminar-type events.

#### Current Status of Technology Exchange

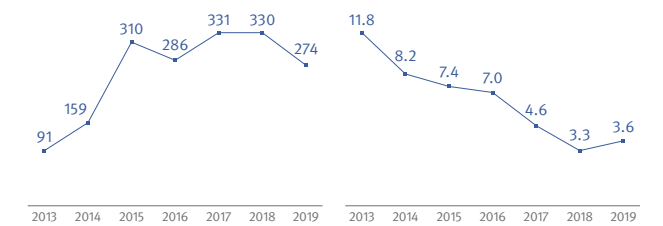
Classification	2017	2018	2019
Current Status of Technology Exchange	14	12	22

#### Reply to Technical Support Requests

##### Number of Cases Received Annually (Recent 7 years, cases)



##### Average Response Time(days)



- About 12 days taken in 2013 ▶ Shortened to 3.6 days in 2019
- Average reply days in 2019 increased slightly due to the increased number of cases for reviewing facility improvements

#### Field Trip Program for Stakeholders

- DHIC invites new employees and career employees of client companies to participate in field trips to visit DHIC technology development and manufacturing facilities.
- In 2019, DHIC organized 2 field trips for a combined total of 99 participants.

#### Establishment of VOC Response System

- DHIC provides prompt responses and reliable data when customers request technical support via the DHIC website.
- Since 2019, in order to provide better service, DHIC has improved the system for customers to select customer service agent directly via the website. Based on customer service satisfaction evaluations in 2019, this service obtained 9.5 points out of a total of 10 points(10 = perfect service).
- DHIC provides information regarding problems in advance to operate the call center for emergency request through the phone and the technical support at the field when the emergency situation occurs at client companies.

#### Customer Satisfaction Survey

- In order to provide better service to customers, DHIC engaged an external professional agency to conduct a survey to assess customer satisfaction with products and services provided by DHIC.
- DHIC also conducted an on-line survey and interviews to solicit customers' opinions.
- Since 2019, DHIC has expanded surveys of overseas customers' satisfaction.

#### Survey Results of Customer Satisfaction

Classification	2017	2018	2019
Results of Domestic Customer Satisfaction Surveys	-	82.1 points	83.3 points
Results of Overseas Customer Satisfaction Surveys	-	-	94.1 points

As enterprises are increasingly targeted by cyberattacks, cyber terror, and hacking, DHIC is paying greater attention to information protection. DHIC has been testing the application of AI/Machine Running Technology to enhance enterprise information security management. DHIC is preemptively responding to growing security-related risks by automating the work process for information security management.

### POLICY & STRATEGY

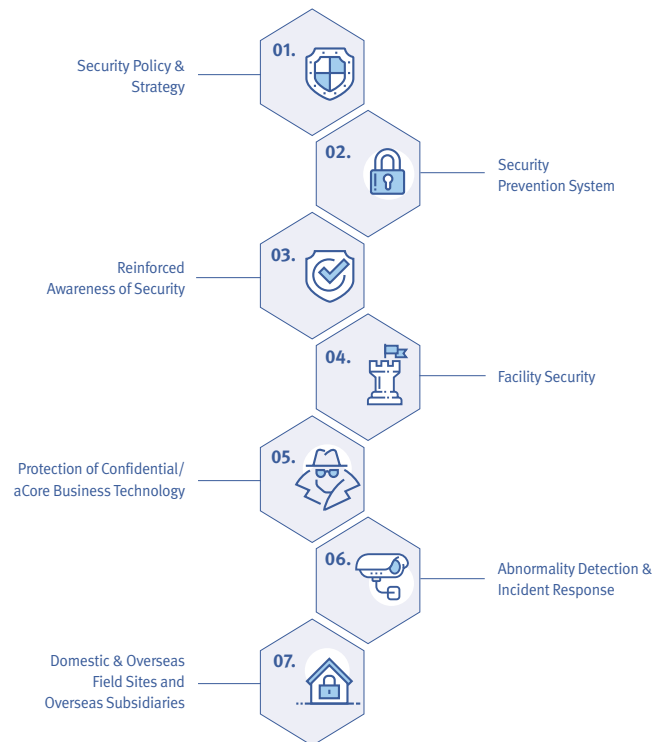
#### ORGANIZATION

To protect company assets from internal and external security threats, DHIC's Security Audit Team(supervised by the Chief Information Security Officer, CISO) implements a company-wide information security plan and an information system audit.

#### INFORMATION SECURITY MANAGEMENT SYSTEM

- DHIC has established an information security management system based on ISO 27001 international security protection standards.
- DHIC has provided information security management policy to overseas subsidiary companies – to guide subsidiary companies as they establish information security management policies which conform to local conditions and concerns.
- Based on the information security management systems adopted by DHIC and Doosan Group, DHIC conducts 24-hour monitoring to detect cyber attack attempts and applies information security solutions based on incident analysis.

DHIC's Information Security Management System



#### INFORMATION SECURITY MANAGEMENT STRATEGY

##### Preventive Handling of Information Security Incidents

- In order to prevent cyber attack-related damages, e.g., paralysis of work systems, leakage of confidential business information, financial losses, DHIC has introduced an upgraded, professional information security protection system which aims to both prevent and respond effectively to security incidents.
- DHIC is increasing information security management through measures such as enhancing the security of vulnerable work systems and applying SCAM\* verification program.

\*SCAM: Crime which involves hacking email information of an enterprise and using it to obtain illegal transaction payments.

##### Protection of Confidential/Core Business Technology

- In order to protect the company's confidential and core technology, DHIC has been reinforcing management procedures. In particular, DHIC is cooperating with the national government to protect DHIC technologies which are designated as 'national core technology' and/or 'national defense industry technology.'

##### Internal Information System Audits & Security Incident Investigations

- In order to protect company assets and secure data integrity, DHIC implements information system audits.
- DHIC has also supplemented the post-trace investigation system to block leakage of important company information. DHIC enforces a data monitoring and distribution procedure and identifies potential paths(other than the normal distribution path) could bypass the security system.

##### Reinforcement of Security Awareness

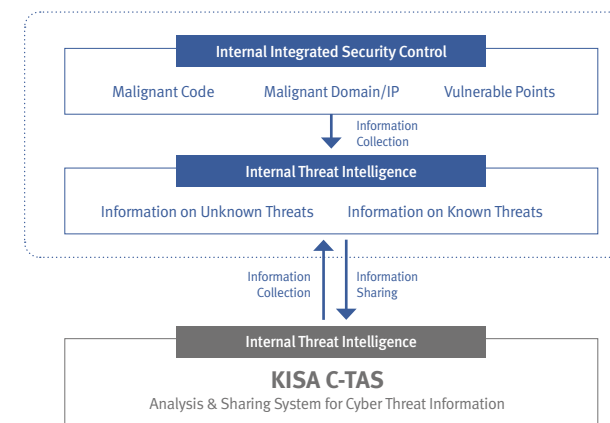
- DHIC delivers online & offline security education to reinforce awareness of information security – targeting all employees at domestic and overseas business sites.
- DHIC provides specialized, professional security education to designated staff in charge of security for each department(e.g., human resources, finance, IT, etc.).

### UPGRADED RESPONSE TO CYBERATTACKS

#### Establishment of Information Security Management System

- Threat Intelligence(TI) pursues an 'Offensive Security' strategy based on analysis of big data. DHIC leverages TI technology for information security management.
- DHIC has established and applies the Korea threat intelligence system of C-TAS(Cyber Threat Analysis and Sharing) in cooperation with Doosan Group and KISA(Korea Internet Service Association).
- Using these system, DHIC systematically collects cyber threat information. The collected data is analyzed comprehensively; and the resulting information is shared between relevant agencies and used to prevent external invasive threats to DHIC.

Cyber Threat Intelligence Architecture



- Since the introduction of the Threat Intelligence system in 2019, DHIC has completely automated the information security management system – from the detection of security threats to taking actions to block threats. Through these efforts, DHIC has enhanced the efficiency of information security management through reduction of human inputs.
- Currently, DHIC is working to continuously improve security threat detection. In particular, DHIC has established an information security management system based on AI/Machine Running Technology; and plans to connect this technology to the existing Threat Intelligence system.

Core Information Security Management Activities

Classification	Major Work Areas
Hacking Detection Monitoring	<ul style="list-style-type: none"> <li>24X365 monitoring on security event</li> <li>Report of the symptom of invasion(E-Mail)</li> </ul>
Invasion Incident Action Support	<ul style="list-style-type: none"> <li>Analysis of cause and damage from hacking incident</li> <li>Support the recovery from invasion &amp; adopt measures to prevent recurrence</li> <li>Cooperative actions with external agencies(KISA, KCSC)</li> <li>Daily inspection report of the operation status of information security management system</li> <li>Emergency reports, such as report of invasion incidents</li> </ul>
Report	<ul style="list-style-type: none"> <li>Emergency reports, such as report of invasion incidents</li> </ul>
Help Desk	<ul style="list-style-type: none"> <li>24X365 response to information security inquiries</li> <li>Response to inquiries of various security issues</li> </ul>

### INTERNALIZATION OF INFORMATION SECURITY CULTURE

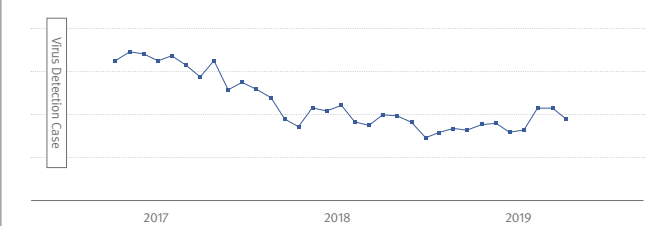
#### In-House Employees

- DHIC conducts annual online education for all employees, as well as specialized offline security education for persons-in-charge of security for all departments(e.g., human resources, finance, IT). In the event of information security policy changes, or when internal or external security issues arise, DHIC provides updates via the in-house portal or e-mail.

#### Partner Companies

- To help partner companies guard against rapidly-increasing SCAM incidents, DHIC provides SCAM education materials to the management departments of partner companies.

Progress of Virus Detection Case in DHIC



Outcomes of Establishment of Threat Intelligence System

- 15% reduction in the number of cases of PC Virus experienced by employees
- 48 times enhanced speed to block PC Virus

#### Prevention of Imposter Scam-Related Damage for Clients

- DHIC proactively prevents security incidents through security education on 'Impostor Scams' for partner companies. DHIC targets persons and departments in charge of purchasing; and encourages them to adopt tailored alert programs for impostor scam email('SCAM Filters').

Alert Program for Impostor Scam Email(SCAM)

The program detects the characteristics of scam emails, i.e., emails in which criminals partially change user email addresses and use that to send emails to email addresses previously emailed by the original users. When detected, SCAM warning windows pop up so that the user can cancel sending the scam emails.

- SCAM programs can also block emails received from fake senders.

1. Major Function – Detection of Impostor Scam Email

2. Major Function - Alert & Report



# Social Contribution

DHIC strives to uphold Doosan's identity of a socially-responsible enterprise which contributes to the local community. DHIC plans to increase efficiency and competency of the social contribution program through the reorganization of social volunteer groups and refinement of various social contribution activities. In particular, DHIC's social contribution policy aims to meet local community needs, such as career education and urban recreation, and contribute to the overall development of the local community.

## POLICY & STRATEGY

### IMPLEMENTATION SYSTEM

#### Implementation Strategy

To achieve the goal of enhancing local community development and enterprise value, DHIC adheres to three principles: Business Orientation; Community Focus; and Employee Engagement. Specifically, DHIC implements three key streams of activity: fostering talented personnel; supporting vulnerable social groups; and working closely with local communities on activities to meet their social needs.

#### Operation of Social Volunteer Groups

4,600 employees – or 77% of all employees – have participated in DHIC social volunteer groups; and through these groups, engaged with and contributed to meeting the needs of vulnerable neighbors in and around Changwon and Seoul.

DHIC's social volunteer groups utilize the professional skills and talent of employees to contribute to the local community. There are social volunteer groups for technical, promoting safety, career education, and youth environmental hazard monitoring.

#### Policy to Support Social Contribution

To foster social contribution by company employees, DHIC has introduced policies related to matching grants, weekly voluntary service, computer system, and recognition of excellent volunteers.

DHIC has an agreement in place with company Saemaeul Credit Cooperatives to award excellent volunteers. For example, Saemaeul Credit Cooperatives offer various gifts to volunteers based on the annual voluntary services that they provide.

#### Social Contribution Committee

DHIC operates a Social Contribution Committee which oversees the appropriateness of social contribution programs and activities, as well as the transparency of donations.

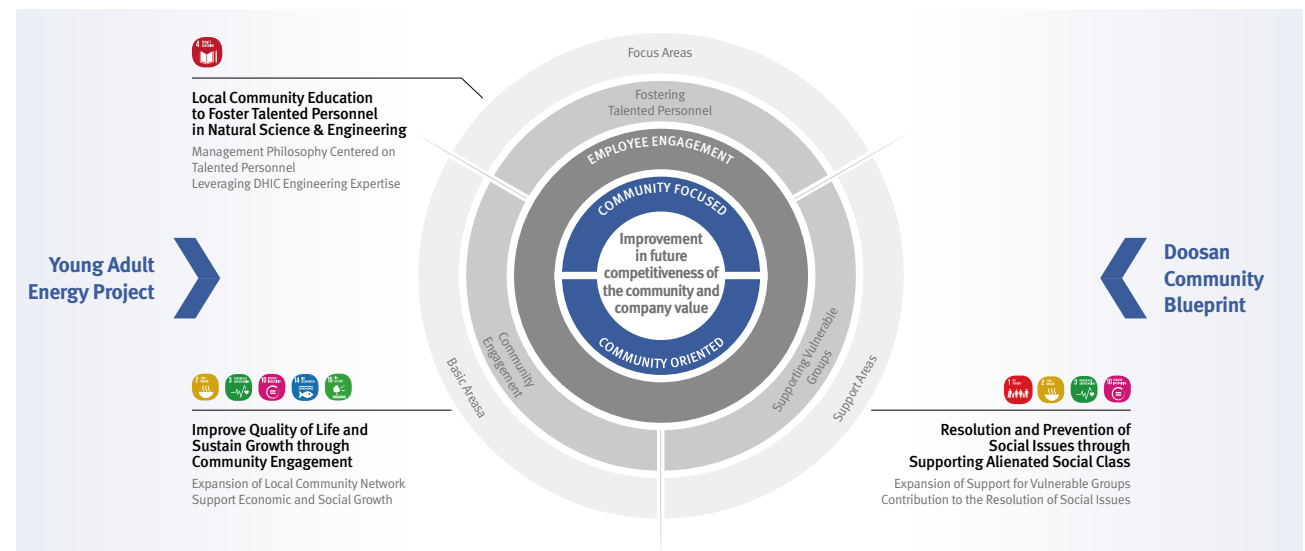
Staff from relevant departments serve as members of the Social Contribution Committee. Led by a Chairman, the Social Contribution Committee reviews and ensures that DHIC donations are appropriate for and benefit the targeted local community.

The Social Contribution Committee deliberates on not only the transparency and appropriateness of donations, but also ensures that the purpose and nature of donations conform to company social contribution strategy.

#### Organization Chart of Social Contribution Committee



#### Implementation Strategy for Social Contribution



## ACTIVITY & PERFORMANCE

### PROGRAM TO FOSTER TALENTED PERSONNEL

A particular focus area for DHIC is to foster future talent in accordance with Doosan Group's management philosophy for fostering talented personnel.

As the engineering industry employees many engineering graduates, DHIC focuses on fostering talented personnel in the fields of Natural Science & Engineering. Thus, this social contribution program is directly connected to DHIC's core business.

**Key Achievements in 2019 of Program to Foster Talented Personnel**

- Local Children's Center Program  
**Targeting 1,243 Children**
- Doosan Recruitment of Students for Technical Jobs  
**15 people**
- Matchmaking Unemployed Technical Training Students with Partner Companies  
**31 people**

#### Youth Energy Project

The Young Adult Energy Project is a social contribution program of DHIC that supports promising young adults to become balanced, talented and independent professionals with a diverse range capabilities.

The Youth Energy Project provides customized activities for each growth stage of talented personnel.

#### Major Programs of Youth Energy Project

<b>Elementary Students</b>	<ul style="list-style-type: none"> <li>Local Children's Center Program</li> <li>Covering Private Academy Expenses for Low Income Vulnerable Students</li> <li>Providing Reference Books through Love Sharing Campaign</li> <li>Supporting KkumKkumTa Orchestra</li> </ul>
<b>Middle School Students</b>	<ul style="list-style-type: none"> <li>MY Dream Youths Career/Engineer Experience Class</li> <li>Providing School Uniforms through Love Sharing Campaign</li> <li>Covering Private Academy Expenses for Low Income Vulnerable Students</li> <li>Providing Reference Books through Love Sharing Campaign</li> </ul>
<b>High School Students</b>	<ul style="list-style-type: none"> <li>Operation of Doosan Meister(Specialized) High School (Doosan Class)</li> </ul>
<b>College Students</b>	<ul style="list-style-type: none"> <li>Scholarships for college students from Children Foster Care Center</li> </ul>

#### Theme Program for Local Children Center

Targeting 76 affiliated local children centers in the Seoul and Changwon areas, DHIC has been organizing educational activities around 10 themes: history field trip, ecological experience, wooden craft, handicraft, cooking class, education of society, science, and history.

In 2019, DHIC contributed to the social and emotional development of 1,243 vulnerable children through a total of 96 activities implemented by social volunteer groups.



Local Children Center Theme Program("History Field Trip")

#### Operation of 'Doosan Class'(Industry-Academic Cooperation)

DHIC cultivates engineering manpower through the operation of 'Doosan Class' – and example of industry-academic cooperation.

DHIC has concluded industry-academy cooperation agreements with Changwon Machine Technical High School, Pusan Automobile Technical High School, Sudo Electricity Technical High School; and through these programs, provides technology education customized to DHIC human resource needs.

#### Provision of Reference Books to Children's Welfare Centers

DHIC provides reference books to 82 children's welfare centers for the purpose of enhancing the practical learning ability of vulnerable children.

In 2019, DHIC provided 11,742 reference books to 2,114 beneficiary children. Since 2011, DHIC has provided a total of 80 thousand reference books.

#### Youth DreamUP Project

For youth with talent and aptitude who are not able to pursue their dreams due to economic circumstances, DHIC implements the 'Youth DreamUP Project' under the supervision of Green Umbrella Children Foundation.

Under this project, DHIC support 5 students to cultivate their talent in the following sports: archery(1); shooting(2); Taekwondo(1); and softball(1).



## ACTIVITY & PERFORMANCE

### PROGRAM TO SUPPORT VULNERABLE GROUPS

- DHIC implements social contribution activities to improve quality of life for vulnerable people in our local community, including children, youth, elderly, and disabled.
- DHIC has broadened the range of beneficiaries in order to support a more diverse range of vulnerable people who are left behind by welfare policy.

#### Key Achievements in 2019 of Program to Support Vulnerable Groups

- Support provided to 10 social welfare centers targeting elderly, children and youths
- Improvement of psychological and mental health index of 165 participants(in 8 programs) from 49% to 63%.

### Social Welfare Center Connection Program

- DHIC implements a social contribution program together with selected social welfare centers. These social welfare centers serve as the contact point with vulnerable groups; assess the needs of such groups; and organize social contribution activities in which employees can participate.
- DHIC has been operating a joint program together with 10 social welfare centers(6 in Changwon and 4 in Seoul). The joint program aims to enhance the emotional well-being and sociability of vulnerable youth, elderly, disabled, and multi-cultural households.



Program to Connect Social Welfare Centers with Local Communities

### Clean House

- DHIC has composed the Technical Staff Volunteer Group through which employees can share their knowledge and skills.
- Through this volunteer group, DHIC has implemented activities to improve living conditions for vulnerable groups, farming villages, and children's welfare centers. E.g., electric facility inspection, wall papering, painting.



Clean House for Senior Welfare Center

### DASARANG DREAM

- DHIC, together with the Korea Red Cross and the Governor of South Gyeongsang Province, has implemented the DASARANG Dream program to support vulnerable since 2011.
- Through this program, DHIC has carried out voluntary services to purchase, pack and deliver daily necessities from social enterprises. Purchased goods have been delivered to 300 vulnerable households within the region.
- Through this program, DHIC regularly delivers snacks to company-affiliated children's welfare centers.

### LOCAL COMMUNITY ENGAGEMENT

- DHIC implements social contribution in close contact with local stakeholders in order to thrive together with the local community.
- DHIC has expanded its local community cooperation network to include stakeholders from local government, NGOs, social welfare agencies, and farming villages.

#### Key Achievements in 2019 for Local Community Engagement Program

- A total of 335 people participated in 49 DHIC volunteer talent-sharing activities in Changwon City.
- DHIC has contributed to increasing incomes for 100 farming households(a total increase of about total 37 million won) through farm exchange activities in 11 villages.

### Love Sharing Campaign: Kimchi Making

- DHIC implements an annual Love Sharing Campaign of Kimchi Making together with the local community.
- In 2019, the event will be held at the Changwon headquarter with about 400 people including the Civil Servant Family Social Volunteer Groups, the Volunteering Korea, the Multicultural Family DANURI Volunteer Group, and partner companies.
- DHIC delivered 5,000 heads of Kimchi made during the event to a total of 3,000 people in children's welfare centers, social welfare centers, and multi-culture households.



Love Sharing Campaign: Kimchi Making Event

### Helping Hands: One Enterprise, Seven Farming Villages

- DHIC has established relationships with 7 farming villages, including Changwon Guisan, Gosung Janggi, and Haman Misan, etc. DHIC annually provides helping hands to these villages during the farming and harvest seasons.
- In 2019, approximately 450 volunteers(DHIC employees and members of Changwon Voluntary Service Association) provided helping hands to partner farming villages during the fall harvest.



Helping Hands: One Enterprise, Seven Farming Villages

### Fire Prevention Education by Volunteer Group for Promoting Safety

- The Volunteer Group for Promoting Safety was launched in 2017 to expand DHIC safety culture to the local community. The group is composed of employees specialized in the areas of disaster response, fire prevention, health, and sanitation.
- DHIC has an agreement with Changwon City to provide safety culture education two times per year to children's welfare centers and social welfare centers in the city.
- These education sessions cover both theory and practical action tips, including emergency treatment during disaster situations of fire and earthquake and how to use/administer fire extinguishers, and fire hydrants, CPR, and AED(Automatic External Defibrillator).



CPR Education by Volunteer Group for Promoting Safety

### Wall Painting for Environmental Improvement

- To foster safe living environments for women, children and youth and to prevent crimes, DHIC – together with Changwon City and Changwon Police Department - operates a wall painting program in underdeveloped residential areas and areas vulnerable to crime.
- In 2019, DHIC created wall paths at Seorae Elementary School at Seocho-gu in Seoul, Bongsan Village at Woongnam-dong in Changwon, Angok-dong in Jinhae, and Jayeo Village at Dong-eup.



Painted Wall in Bongsan Village, Woongnam-dong in Changwon City



# Doosan Day of Community Service

'Doosan Day of Community Service' is a hallmark social contribution program of Doosan Group. On this day, employees in various locations throughout the world (Korea, U.S., Europe, Middle East) provide community service to their nearby local communities. In 2019, DHIC completed its mission to the community as a corporate citizen, with 1,694 employees from 23 workplaces in 8 countries participating in 55 activities.



**DHIC in Korea(Seoul, Changwon)**

35 activities, including: Clean Changwon(Seocho) with Doosan, Making Furniture of Happiness, Clean House, Renovating Farming Villages, and Wall Painting for Enhancing Community Safety



**Doosan Babcock, Doosan Enpure in U.K**

Renovating social welfare centers, children welfare centers, and community parks; and providing food and drinks through a foodbank



**Doosan Lentjes in Germany**

Renovating elementary schools and facilities for disabled; and providing volunteer services at a foodbank



**Doosan Vina in Vietnam**

Renovation of affiliated elementary schools



**Doosan Power System India**

Renovation of affiliated elementary schools; and improving sanitation for local community



**Doosan Power System Arabia in Saudi Arabia Middle East O.C**

Environmental sanitation in various regions



**Doosan HF Controls, GridTech, DTS in the U.S**

Environmental sanitation in various regions; removal of hazardous plants; providing volunteer services at a foodbank

# Appendix

# Communication with Stakeholders

## Classification System & Communication Channel

DHIC defines the following major stakeholder groups: shareholders; customers; employees; partner companies; local community; government; and competitor companies. DHIC actively communicates with these different stakeholder groups through various communication channels; and considers stakeholder feedback to enhance company management.

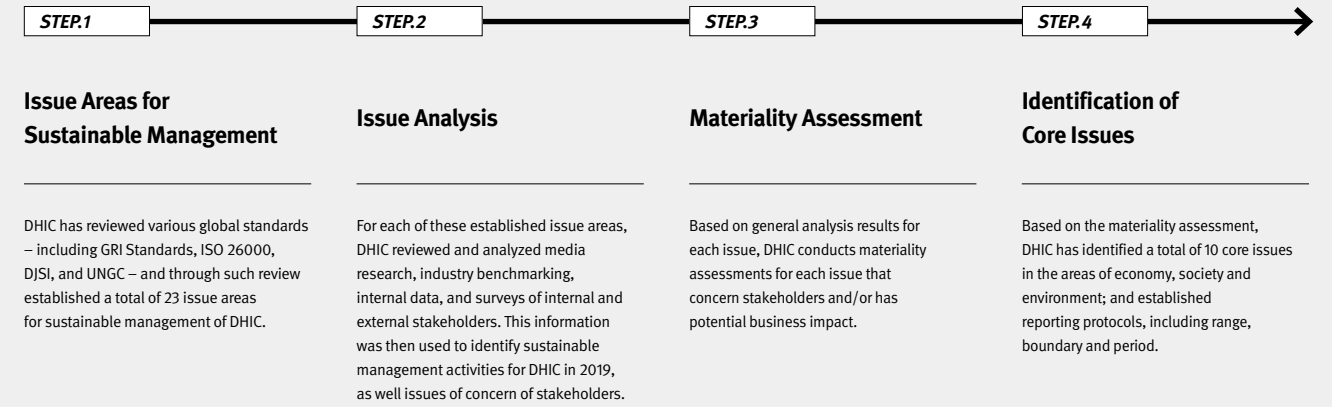
Survey Result of Customer Satisfaction

Group	Definition	Communication Channel	Times of Operation	Group	Definition	Communication Channel	Times of Operation
Share holders	Doosan Inc., Foreign investor, Institutional investor, Minority shareholder	IR	Regular	Partnership Companies	Primary Secondary	Representative Consultation Group	Once per month
		Conference	As necessary			Mutual Growth Conference	Once per year
		Overseas NDR(Non-Deal Roadshow)	As necessary			Meeting for the Mutual Growth of Primary Partner Companies	Every quarter
		Meeting for the Mutual Growth of Secondary Partner Companies	Once per year				
Customers	Domestic public power generation company, Domestic private power generation company, Overseas client	Road show	As necessary	Government	Government, Local government, Related agencies	DHIC Operation Committee	As necessary
		Technology presentation	As necessary			Cooperative Operation Committee	Semi-annual
		VOC(Voice of Customer)	Permanent			Mutual Growth Committee	Frequent
		Safety education for private power generation company	If taken place			SMEs Agriculture & Fishery Cooperation Foundation	Frequent
		Technology exchange & seminar	Frequent	Fair Trade Committee	As necessary		
		Technology Support Center(Online)	Permanent	FKILSC	As necessary		
		Emergency action team & call center for power generation interruptions	Permanent	KEITI	As necessary		
		Customer Satisfaction Survey	Once a year	Safety & Health Innovation Leader Forum	16 times per year		
Employees	Employees in Headquarter, Employees in overseas branch offices, Employees of overseas subsidiaries	Industry Safety & Health Committee	4 times per year	Competitive Companies	Manufacturer of Power Generation Facility, Desalination Company, Water Treatment Plant	PSM Consultation	Once every quarter
		Labor-Management Consultation	Once per quarter			Fine Dust Reduction Voluntary Agreement	4 times per year
		Education for employee(s) dispatched to overseas field sites	Once per week			Changwon Sustainable Development Consultation	Once per year
		Practical education for safety & health	Once per year			GyeongNam Climate Environment Network	Semi-annual
		Management Status Presentation	Every quarter			Policy Advisory Committee for Maritime Police	Once per month
		CTO Meeting	Frequent			Fire Prevention Development Consultation	Once per month
		Technology Support Center(Online)	More than 10 times per year			GyeongNam Province & Changwon City	Once per year, frequent
		Consultative groups of Social Volunteer Group	Once per month			Construction Safety Department Heads Consultation	Every quarter
						Construction Safety Hands-on Workers Consultation	Every quarter
						Health Managers Consultation	Every quarter
Local Community	Local residents, Schools, Research institutions, NGOs	Joint programs with social welfare center & local children welfare center	Monthly	Leader's Meeting for Chairmen of Construction Companies for Safety & Health	Once per year		
		Doosan Day of Community Service	Once per year	Executives and General Managers' Meeting for Safety & Health	Every quarter		
		Consultative groups of DHIC's Social Volunteer Group	Once per month	Anti-Terrorist Consultation of Overseas Construction Association	Twice per year		
		DHIC Communication Consultation Committee with Local Community(Woongnam-dong)	Twice per year	Technology Exchange Group	Once per year		
		Social contribution-related agencies(GyeongNam Province, Changwon City, beneficiary agency)	Frequent, as necessary				
		Workshop for persons-in-charge of social contribution from enterprises in GyeongNam Province	Once per year				
		Consultation Committee for Local Community Contribution	Frequent, as necessary				
		Ocean Plant Design Study Group	Twice per year				

# Participation by Stakeholders

## Identification of Stakeholders' Concerns Through Materiality Assessment

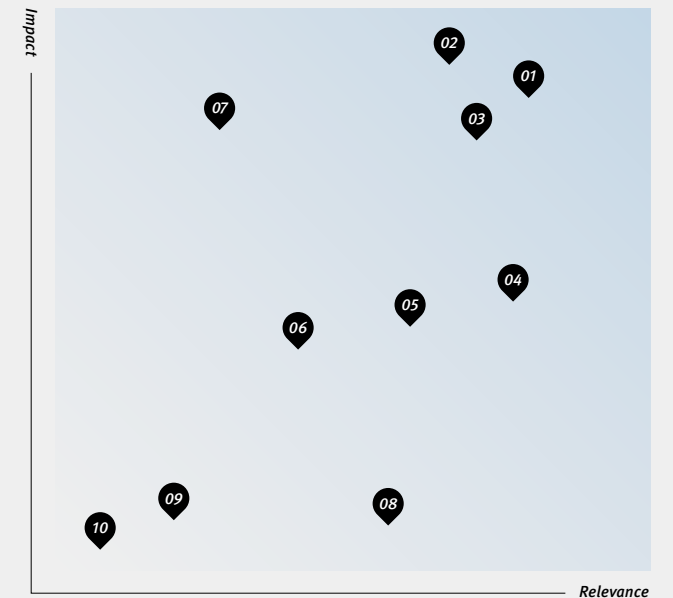
DHIC conducts an annual materiality assessment to identify issues of significant concern to stakeholders, as well as major issues which could have a large impact on business performance. DHIC discloses results through a general report; and considers stakeholder concerns in the decision-making and management process. The issues identified through the materiality assessment have been diligently disclosed via DHIC's general reports.



Selected Core Issues in 2019

Major Core Issues	Contents in General Report
<ul style="list-style-type: none"> <li>Creation of economic performance &amp; Enhancement of financial stability</li> <li>Procurement of new growth engine</li> <li>Expansion of R&amp;D investment</li> </ul>	<p><b>Business Strategy</b></p> <ul style="list-style-type: none"> <li>Strengthened new growth portfolio</li> <li>Strengthened business competitiveness</li> </ul>
<ul style="list-style-type: none"> <li>Reduction of greenhouse gas and energy consumption</li> <li>Development of eco-friendly product and service</li> </ul>	<p><b>Focused Areas of CSR</b></p> <ul style="list-style-type: none"> <li>Reduction of environmental impact from business activities</li> </ul>
<ul style="list-style-type: none"> <li>Realization of best quality management &amp; Maximization of customer satisfaction</li> </ul>	<p><b>Focused Areas of CSR</b></p> <ul style="list-style-type: none"> <li>Advancement of quality management</li> </ul>
<ul style="list-style-type: none"> <li>Realization of safe work environment</li> <li>Recruitment of core talented personnel &amp; Reinforcement of employees competency</li> <li>Realization of organization culture for healthy work environment</li> </ul>	<p><b>Focused Areas of CSR</b></p> <ul style="list-style-type: none"> <li>Realization of healthy organization culture</li> <li>Reinforcement of field safety management</li> </ul>
<ul style="list-style-type: none"> <li>Enhancement of social contributions to leverage core business competencies</li> </ul>	<p><b>Focused Areas of CSR</b></p> <ul style="list-style-type: none"> <li>Contribution to local community through talent sharing</li> </ul>

Core Issue Mapping



01. Creation of Economic Performances & Enhancement of Financial Stability
02. Realization of Safe Working Environment
03. Recruitment of Core Talented Personnel & Reinforcement of Employees' Competency
04. Procurement of New Growth Engine (Business diversification, new market advancement, etc)
05. Reduction of Greenhouse Gas Emission and Energy Consumption
06. Realization of Best Quality Management & Enhancement of Customer Satisfaction
07. Realization of Organization Culture for Healthy Work Environment
08. Enhancement of social Contribution Activities to Leverage Core Business Competencies
09. Expansion of R&D Investment
10. Development of Eco-Friendly Products and Services



# Performance Summary

## ECONOMY

### Consolidated Statement of Financial Position

56th Report as of December 31, 2018  
57th Report as of December 31, 2019

DOOSAN HEAVY INDUSTRIES & CONSTRUCTIONS AND SUBSIDIARIES

(Unit: won)

Subjects	End of 57th Report	End of 56th Report
<b>Assets</b>		
I. Current Assets	9,351,607,736,629	9,782,244,096,431
1. Cash & Cashable Assets	1,441,280,687,215	2,075,328,693,318
2. Short-Term Finance	268,320,160,761	392,294,778,458
3. Short-Term Investment Security	79,279,692,390	35,673,839,601
4. Accounts Receivable	2,092,822,360,607	2,112,062,463,001
5. Unclaimed Construction	1,761,026,139,486	1,917,549,497,427
6. Outstanding Balance	470,874,496,975	305,858,455,081
7. Prepayment	466,574,020,089	446,105,194,520
8. Prepaid Expenses	121,764,332,600	152,773,582,677
9. Short-Term Loan	85,498,883,370	115,051,807,262
10. Derivatives Evaluation Assets	35,066,050,494	21,477,357,030
11. Binding Contract Assets	25,785,207,028	9,022,592,449
12. Inventory Assets	2,201,708,429,106	1,891,576,145,991
13. Other Current Assets	301,607,276,508	307,469,689,616
II. Non-Current Assets	15,457,641,444,550	15,032,667,467,135
1. Long-Term Finance	2,548,786,446	5,201,067,000
2. Long-Term Investment Security	201,487,575,568	197,745,438,521
3. Investments by Related Enterprises and Joint Enterprises	155,757,265,633	100,927,082,338
4. Unclaimed Construction	102,739,503,644	-
5. Long-Term Loan	706,816,256,036	717,958,268,334
6. Tangible Assets	5,921,531,734,148	6,414,487,023,034
7. Intangible Assets	7,031,885,767,946	6,683,116,364,942
8. Real Estate Investments	498,211,016,067	26,484,941,678
9. Derivatives Evaluation Assets	17,011,219,245	21,777,431,040
10. Binding Contract Assets	18,149,165,186	14,695,425,682
11. Security Deposit	348,345,632,651	326,955,808,824
12. Deferred Tax Assets	401,285,168,759	459,502,962,385
13. Other Non-Current Assets	51,872,353,221	63,815,653,357
<b>Total Assets</b>	<b>24,809,249,181,179</b>	<b>24,814,911,563,566</b>
<b>Liabilities</b>		
I. Current Liabilities	13,773,221,961,020	11,504,611,441,750
1. Purchase Liability	2,532,417,863,903	3,082,932,725,599
2. Short-Term Loan	3,767,270,248,235	2,840,071,599,658
3. Securitized Liability	381,573,986,887	491,371,402,314
4. Accounts Payable	537,794,374,950	539,550,236,467

(Unit: won)

Subjects	End of 57th Report	End of 56th Report
5. Advances Received	87,362,541,801	80,537,056,518
6. Excessively-Charged Construction	1,461,856,470,698	1,236,549,335,742
7. Deposits	40,505,367,389	36,879,557,787
8. Accrued Expenses	664,011,536,281	592,800,027,139
9. Net Corporate Tax Liability	30,974,465,576	29,347,652,878
10. Current Maturities of Long-Term Liability	3,265,484,739,353	2,049,828,436,541
11. Derivatives Evaluation Liability	73,076,096,327	39,356,944,771
12. Confirmed Contract Liability	11,024,583,351	5,026,505,231
13. Estimated Liability	390,543,375,151	390,543,375,151
14. Current Lease Liability	80,788,294,005	-
15. Other Current Liabilities	448,538,017,113	292,028,113,707
II. Non-Current Liabilities	4,834,034,235,336	7,091,870,561,376
1. Private Loan	846,834,779,773	2,053,032,588,038
2. Long-Term Loan Payable	1,697,982,898,672	3,043,437,044,686
3. Long-Term Securitized Liability	292,290,321,272	248,788,085,785
4. Long-Term Accounts Payable	14,995,488,666	30,921,614,985
5. Net Defined Benefit Liability	674,264,222,128	611,283,884,965
6. Deposit Security	270,661,690,028	217,455,797,942
7. Derivatives Evaluation Liability	57,061,984,079	48,643,743,663
8. Confirmed Contract Liability	13,228,719,317	22,221,330,722
9. Deferred Corporate Tax Liability	331,502,786,410	373,209,052,064
10. Estimated Liability	322,995,953,618	233,563,821,406
11. Non-Current Lease Liability	175,749,643,381	-
12. Other Non-Current Liabilities	136,465,747,991	209,313,597,120
<b>Total Liability</b>	<b>18,607,256,196,356</b>	<b>18,596,482,003,126</b>
<b>Capital</b>		
Controlling Company Proprietor's Equity	2,562,136,568,811	2,804,847,577,636
1. Capital	1,075,255,425,000	650,255,065,000
2. Capital Surplus	1,762,628,456,797	1,678,913,750,186
3. Other Capital	48,935,313,897	(55,947,752,410)
4. Accumulated Other Comprehensive Income	649,530,462,196	680,535,131,925
5. Deficit	(974,213,089,079)	(148,908,617,065)
II. Non-Controlling Interest	3,639,856,416,012	3,413,581,982,804
<b>Total Capital</b>	<b>6,201,992,984,823</b>	<b>6,218,429,560,440</b>
<b>Total Liability &amp; Capital</b>	<b>24,809,249,181,179</b>	<b>24,814,911,563,566</b>

# Performance Summary

## ECONOMY

R&D INVESTMENT (Unit: one hundred million won, %)

Classification	2017	2018	2019
R&E Investment cost	2,241	2,338	2,391
R&D cost ratio to sales amount*	5.2	5.7	6.5

\*Computed by the standard of the headquarter of DHIC

\*Investment cost has been corrected in 2018(Corrected due to simple wrong typing)

SALARY FOR NEW EMPLOYEE TO LEGAL MINIMUM WAGE (Unit: %)

Classification	2017	2018	2019
New male employee	205	176	160
New female employee	205	176	160

\*Base minimum wage(2019 minimum hour wage: 8,350 won/2018 minimum hour wage: 7,530 won /2017 minimum hour wage: 6,470 won)

\*Standard for domestic businesses

BASE SALARY FOR FEMALE TO MALE & COMPENSATION RATIO (Unit: %)

Classification	2017	2018	2019
Base salary for female to male & compensation ratio	100	100	100

\*Standard of entire businesses including global businesses

SUPPLY NETWORK STATUS & PURCHASED AMOUNT (Unit: No. of companies, one hundred million won, %)

Classification	2017	2018	2019	
Number of Partnership Companies	Domestic	10,639	10,996	11,305
	Overseas	2,195	2,259	2,298
	Total	12,834	13,255	13,603
Purchased Amount by Partnership Companies	Domestic	18,911	16,839	20,084
	Overseas	6,671	5,753	3,375
	Total	25,582	22,592	23,459
Purchase Ratio by Domestic Suppliers	74	75	86	

\*Computed by the standard of the headquarter of DHIC

STATUS OF EXPENSES BY INDUSTRIAL ASSOCIATIONS (Unit: one million won)

Classification	2017	2018	2019
Donator	Large & SMEs Cooperation Foundation & others	GyeongNam Social Economic Support Center(Foundation) & others	GyeongNam Social Economic Support Center(Foundation) & others
Amount	8,699	652	512

\*No donation record for political organization and lobbyist

# Performance Summary

## SOCIETY

STATUS OF EMPLOYEES (Unit: people)

Classification	2017	2018	2019		
Total number of employees <sup>1</sup>	7,610	7,294	6,721		
Number of employees by gender according to the employment contract	Permanent worker	Male	6,626	6,376	5,711
		Female	268	213	197
	Contract worker	Male	624	622	697
		Female	92	83	116
By country	Domestic	7,080	6,781	6,249	
	Overseas	530	513	472	
Diversity of Employment	Disabled	137	141	130	
	National Merit	164	167	153	

<sup>1</sup> In reference to the end of year, the contract worker includes BG contract worker and field worker. Supervisor, advisor, outside directors and CEO and dispatching position are excluded. (In reference to employee under the business report)

NEW HIRING & TRANSFERRING (Unit: people, %)

Classification	2017	2018	2019	
Number of Newly Hired Manpower <sup>1</sup>	Total	435	364	350
	By Gender(Male)	390	330	278
	By Gender(Female)	45	34	72
	By Age(Younger than 30 years old)	289	68	78
	By Age(30 to 50 years old)	71	214	215
	By Age(over 50 years old)	75	82	57
Number of Transferred Manpower <sup>2</sup>	Total	558	1,047	737
	By Gender(Male)	502	949	683
	By Gender(Female)	56	98	54
	By Age(Younger than 30 years old)	262	150	46
	By Age(30 to 50 years old)	62	578	384
By Age(over 50 years old)	234	319	307	
Transfer Rate(Permanent workers)	8.1	15.9	12.5	

<sup>1</sup> The number of newly hired manpower in 2018 was partly corrected(Correction due to simple wrong typing)

<sup>2</sup> Due to changed computation standard for the number of transferred manpower(Including retired, voluntary transfer, and transfer to subsidiary company), the data for three years has been corrected and disclosed.

<sup>1,2</sup> In reference to the end of year, the contract worker includes BG contract worker and field worker. Supervisor, advisor, outside directors and CEO and dispatching position are excluded. (In reference to employee under the business report)

\*The number of employees has increased due to the transfer of affiliates(About 250 people) in 2018.

RATIO OF WORKER APPLIED BY COLLECTIVE AGREEMENT (Unit: people, %)

Classification	2017	2018	2019
Number of Workers for Membership	4,004	3,550	2,902
Number of Memberships in Labor Union, Labor-Management Committee	2,166	2,055	1,893
Ratio of Membership in Labor Union, Labor-Management Committee	54	58	65



**EDUCATION FOR EMPLOYEES**

(Unit: hours)

Classification		2017	2018	2019
Average Education Hours per Person	Male	58.0	11.7	11.4
	Female	128.0	22.7	4.3
	Office Work	-	15.5	11.7
	Technical Work	-	5.4	7.6

\* Separate management of education hour per person by job group since 2018

**RATIO OF EMPLOYEES WHO RECEIVE THE PERFORMANCE EVALUATION**

(Unit: %)

Classification	2017	2018	2019
Office Work	100	100	100
Technical Work	100	100	100

**STATUS OF MATERNITY LEAVE**

(Unit: people, %)

Classification		2017	2018	2019
Number of employees who have the right to receive maternity leave <sup>1</sup>	Male	1,755	1,799	1,837
	Female	49	57	69
Number of employees who have used maternity leave <sup>2</sup>	Male	8	25	40
	Female	19	16	23
Number of employees who have returned to work after maternity leave <sup>3</sup>	Male	5	17	32
	Female	17	21	9
Number of employees for 12 months continuous work after they have returned to work from maternity leave <sup>4</sup>	Male	0	5	14
	Female	14	15	13
Ratio of employees for 12 months continuous work after they have returned to work from maternity leave <sup>5</sup>	Male	0	100	82
	Female	93	88	62

<sup>1</sup> Male & female workers with children younger than 8 years old

<sup>2</sup> Number of people who started maternity leave in reference year

<sup>3</sup> Number of people who returned after the maternity leave in reference year

<sup>4</sup> Among employees who returned to work during the period of previous report, the number of employees who were in duty of working at the end of reference year.

<sup>5</sup> Maintenance rate = (Employees who maintained 12-months work after they had returned to work in reference year / Employees who returned to work during the period of previous report) X 100

\*Due to the changed reference date to compute the maternity leave, the data for three years have been disclosed.

**CONFIRMED CORRUPTION CASES & ITS COUNTERMEASURE**

(Unit: cases)

Classification	2017	2018	2019
Number of confirmed corruptions*	4	2	5
Number of disciplinary actions(Layoff, Suspension, etc.)	2	3	5
Number of contracts that are either terminated or not renewed with business partner due to corruption	2	1	0

\* Exclude duplicated cases of workers and partnership companies with the data which include the corruption cases of partnership companies

**STATUS OF INTERNAL REPORT OF ETHICAL MANAGEMENT**

(Unit: cases)

Classification	2017	2018	2019
Domestic	40	21	24
Overseas	0	11	9
Total	40	32	33

**LEGAL ACTION FOR UNFAIR TRANSACTION**

(Unit: cases)

Classification	2017	2018	2019
Number of legal actions	2	0	0

\*The fine due to two cases of unfair transaction in 2017 was 10 million 600 thousand won. There was no other non-financial sanction and lawsuit

**LEGAL ACTIONS FOR CORRUPTION**

(Unit: cases)

Classification	2017	2018	2019
Number of legal actions	0	0	0

\*Neither fine nor penalty for three years

**CORRECTIVE ACTIONS FOR DISCRIMINATION**

(Unit: cases)

Classification	2017	2018	2019
Number of reports of discrimination	12	7	5
Number of confirmed facts and actions	12	7	5

\*The company retains the system to report discrimination and strictly observes the protection of informants.

**PARTICIPATION IN LOCAL COMMUNITY, EFFECT EVALUATION**

(Unit: %)

Classification	2017	2018	2019
Business site which operates the program to develop local community	30	30	30
Business site which operates the program to develop local community considering the requirements of stakeholders	30	30	30
Business site which operates the advisory committee and process for wide local community including vulnerable social class	30	30	30
Business site which operates the official process to handle difficulties of local community	100	100	100

**PARTICIPATION IN VOLUNTARY SERVICE ACTIVITIES**

(Unit: cases, people, %, hours)

Classification	2017	2018	2019
Number of Activities	501	363	302
Participation by Employees	Number of Participants	3,633	2,790
	Participation Rate	53	42
Period of Voluntary Service	Total Hours of Voluntary Service	29,250	20,691
	Hours of Voluntary Service per One Person	5.13	3.11

## EXPENSES FOR SOCIAL CONTRIBUTION

(Unit: one hundred million won)

Classification	2017	2018	2019	
Amount of Expenses	Cash	88.9	8.4	6.6
	Goods	0.8	0.4	0.4
	Operation cost	1.2	0.5	0.5
	Total	90.9	9.3	7.5
Details of Expenses	Charitable Donation	16.2	0.3	0.1
	Investment in local community	67.5	8.9	7.4
	Others	7.2	0.1	0
Territories of Activities	Fostering talented personnel	35.9	7.1	6.0
	Supporting alienated social class	21.4	0.5	0.2
	Close contact type with local areas	33.6	1.7	1.3

## MAJOR NEGATIVE SOCIAL EFFECT IN SUPPLY NETWORK AND ITS CORRECTIVE ACTIONS

(Unit: numbers, %)

Classification	2017	2018	2019
Number of partnership companies in progress of social effect evaluation	324	376	148
Number of partnership companies which have been confirmed of actual & potential negative social effect	0	0	0
Ratio of partnership companies which have taken consultation for the improvement from the result of evaluation	100	100	100
Number of disciplinary actions for partnership companies*	2	0	1

\*The disciplinary action for partnership company, according to the specified DHIC's Differentiation Procedure for Partnership Companies, means the issue to implement the deliberation of disciplinary action by the Mutual Growth Promotion Committee.

\*The computation standard of "Disciplinary Action for Partnership Company" was changed in 2019 so that the data of disciplinary cases of partnership companies for three years have been corrected and disclosed.

## NUMBER OF COMPLAINTS OF WHICH THE VIOLATION OF CUSTOMER'S PRIVACY AND THE LOSS OF CUSTOMER'S INFORMATION HAS BEEN PROVED

(Unit: cases)

Classification	2017	2018	2019
Number of leakages, theft, and loss of customers' data and related complaints	0	0	0

## SAFETY &amp; HEALTH OF EMPLOYEES

(Unit: LTIR, ODR, LWSR, cases)

Classification	2017	2018	2019			
Employees	LTIR <sup>1</sup>	Domestic	0.18	0.15	0.16	
		Overseas	0	0	0	
		Total	0.12	0.10	0.10	
	ODR <sup>2</sup>	Domestic	0.06	0.25	0.20	
		Overseas	0	0	0	
		Total	0.04	0.17	0.13	
	LWSR <sup>3</sup>	Domestic	32.66	43.24	25.10	
		Number of disasters	Domestic	13	10	10
		Overseas	0	0	0	
Partnership Companies	LTIR	Domestic	0.09	0.19	0.26	
		Overseas	0.01	0.00	0.00	
		Total	0.03	0.04	0.06	
	LWSR	Domestic	3.22	7.36	24.77	
		Number of disasters	Domestic	5	11	24
		Overseas	1	1	0	
	Total	6	12	24		

<sup>1</sup> LTIR(Lost Time Incident Rate), U.S. OSHA(Work loss rate by the standard of Occupational Safety & Health Administration) = (Total number of suspended works/Total work hours) x 200,000

<sup>2</sup> ODR(Occupational Disease Rate) = (Number of Occupational disease and Patients related with occupation/Total work hours) x 200,000

<sup>3</sup> LWSR(Lost Workday Severity Rate) = (Total loss of workdays/Total work hours) x 200,000

\*LTIR, ODR, and number of disasters follow the computation standard of all domestic and overseas business sites. LWSR follows the computation standard of all domestic business sites

## PRODUCT SAFETY

(Unit: cases, numbers, won)

Classification	2017	2018	2019
Number of occurred issues of safety related recall	0	0	0
Total number of products returned due to the occurred issues of safety related recall	0	0	0
Amount of financial sanctions in relation to product safety(Penalty, Fine, etc.)	0	0	0



# Performance Summary

## ENVIRONMENT

\*Environmental data have been collected by the standard of the headquarter of DHIC

### REDUCTION OF ENERGY CONSUMPTION (Unit: Tj)

Classification	2017	2018	2019
Introduction of high-efficient facility	37	29	38
Total	37	29	38

### USE OF ENERGY

Classification		2017	2018	2019
Fossil fuel	Unit: MWh	505,841	457,897	469,466
Electricity	Unit: MWh	297,688	304,583	299,913
Total	Unit: MWh	803,529	762,480	769,379
Use of Energy	Unit: Tj	5,026	4,577	4,708
Cost of Energy	Unit: One million won	61,117	57,239	60,310
Reduction of Cost	Unit: One million won	27,200	27,900	2,415

\*Due to the change in Environmental Data Computation Standard(Standard of DHIC's Headquarter, Data from construction field excluded), the data for three years have been corrected and disclosed

### TOTAL EXPENSES FOR ENVIRONMENT (Unit: one million won)

Classification	2017	2018	2019
Amount of environmental investment	1,900	2,815	2,200
Expense of cosigned waste treatment*	1,092	1,047	1,759
Profit from waste disposal	649	911	805
Atmospheric environment	639	440	335
Water quality environment	217	203	297
Other expenses	30	25	21

\*Increased cost of landfill in 2019 due to insufficient landfill treatment facility

### USE OF RAW MATERIALS (Unit: tons)

Classification		2017	2018	2019
Nonrenewable raw materials	Scrap iron	114,308	110,574	120,300
	Recovered iron	70,527	59,418	64,462
	Chip	11,471	10,226	11,478
	Alloy steel	6,369	5,952	6,256
	Quicklime	7,412	6,997	7,742
	Fluorspar	949	404	874
	Lump coal	4,601	4,370	4,697
Renewable raw materials	Rebar	-	-	-
	Concrete	-	-	-
Total		215,637	197,941	215,809

\*Due to the change in Environmental Data Computation Standard(Standard of DHIC's Headquarter, Data from construction field excluded), the data for three years have been corrected and disclosed

### RECYCLING OF RAW MATERIALS (Unit: tons. %)

Classification	2017	2018	2019
Recovered iron	70,527	59,418	64,462
Chip	11,471	10,226	11,478
Ratio of Using Recycled Raw Materials	38	35	35

\*Due to the change in Environmental Data Computation Standard(Standard of DHIC's Headquarter, Data from construction field excluded), the data for three years have been corrected and disclosed

### QUANTITY TO TAKE FOR EACH SUPPLY SOURCE (Unit: tons)

Classification	2017	2018	2019
Surface layer water	-	-	-
Underground water	98,509	-	1,627
Rain water	40,000	-	-
Wastewater entered from other business sites	-	-	-
Water system or other water supply system	1,580,307	1,229,625	1,201,208
Total	1,718,816	1,229,625	1,202,835

\*Due to changed computation standard for domestic environmental data(Standard of DHIC's Headquarter, Data from construction field excluded), the date for three years have been corrected and disclosed

### RECYCLING AND REUSE OF WATER (Unit: tons)

Classification	2017	2018	2019
Quantity of Recycled Water	25,900	-	-

### EMISSION OF GREENHOUSE GAS (Unit: 1,000 t CO<sub>2</sub>eq)

Classification	2017	2018	2019
Direct Emission of Greenhouse Gas(scope 1)	117.8	105.5	108.7
Indirect Emission of Greenhouse Gas(scope 2)	139.4	138.1	142.9
Total	257.2	243.6	251.6

\*Some data of the emission amount of greenhouse gas were corrected in 2017 and 2018(Corrected due to simple wrong typing)

DISCHARGED SUBSTANCES TO ATMOSPHERE

(Unit: tons)

Classification	2017	2018	2019
NOx Emission Amount	0	0	0
SOx Emission Amount	0	0	0
VOC(Volatile Organic Compound) Discharge Amount	9.4	23.8	32.4
HAP(Hazardous Atmosphere Pollutants) Discharge Amount	0	0	0
PM(Particulate Matter) Discharge Amount	30.1	22	12.0

WASTE DISCHARGE

(Unit: tons, %)

		2017	2018	2019
Hazardous Wastes(Designated)	Recycling(Recycle rate)	719(17.8)	762(13.5)	608(15.7)
	Fertilization	-	-	-
	Incineration	373	-	430
	Landfill	2,944	4,849	2,813
	Others	9	-	-
	Total	4,044	5,611	3,851
General Wastes	Recycling	52,923	47,969	50,732
	Fertilization	-	-	-
	Incineration	1	-	838
	Landfill	11,401	3,081	742
	Field Storage	-	-	-
	Others	19,839	-	-
Total	84,164	51,050	52,312	

\*Due to changed computation standard for domestic environmental data(Standard of DHIC's Headquarter, Data from construction field excluded), the data for three years have been corrected and disclosed

WASTEWATER & RAIN WATER DISCHARGE

(Unit: tons, mg/l)

Classification	2017	2018	2019	
Name of Final Discharge Place for Wastewater	Deokdong Water Regeneration Center	Deokdong Water Regeneration Center	Deokdong Water Regeneration Center	
Treatment Method for wastewater	Physical & Chemical Treatment	Physical & Chemical Treatment	Physical & Chemical Treatment	
Discharged Amount of Wastewater(A)	191,985	131,513	144,348	
Name of Final Discharge Place for Rain Water	Masan Bay, etc	Masan Bay, etc	Masan Bay, etc	
Treatment Method for wastewater	Silt Protector, etc	Silt Protector, etc	Silt Protector, etc	
Discharged Amount of Rain Water(B)	1,695,328	2,906,139	3,059,804	
Total Discharged Amount of Wastewater & Rain Water(A) +(B)	1,887,313	3,037,652	3,204,152	
Water Quality of Discharged Wastewater	COD	12.4	9.6	9.9
	SS	5.7	3.1	3.8
	N-H	1.2	1.1	1.0
	Fe	0.2	0.1	0.1
	T-N	3.9	2.7	1.6
Water Quality of Discharged Rain Water	T-P	0.2	0.0	0.2
	COD	3.4	3.1	3.1
	SS	1.3	1.7	1.9
	T-N	2.2	0.3	0.9
	T-P	0.1	0.1	0.0

\*Due to changed computation standard for domestic environmental data(Standard of DHIC's Headquarter, Data from construction field excluded), the date for three years have been corrected and disclosed

HAZARDOUS CHEMICALS DISCHARGE

(Unit: numbers, tons)

Classification	2017	2018	2019
Number of Substances	2	2	3
Use Amount of Hazardous Chemicals	195.0	190.1	229.1

\*No hazardous chemicals discharged outside from 2017 to 2019

PURCHASING ECO-FRIENDLY PRODUCTS

(Unit; one million won)

Classification	2017	2018	2019
Purchased Amount	9,756	8,841	22,737



# Risk Management

There is a growing uncertainty in the global society, with the volatility of the global economy intensifying. To address this, DHIC has established an integrated risk management system that analyzes risk factors which may arise during business operation. DHIC classifies risks into Financial Risk, Business Risk, and Compliance & CSR Risk. Each risk is managed by a dedicated department.

## Integrated Risk Management System

DHIC has classified risks into Financial Risk, Business Risk, and Compliance and CSR Risk. DHIC has appointed a unit and executives dedicated to monitoring potential causes for each category of risk. These units regularly report any issues directly to the CEO. For risks that significantly affect the company, the Board of Directors makes final decisions. Four outside directors are appointed as risk professionals for each risk area. These risk directors deliver relevant education to support risk-related decision-making by the Board of Directors—in consideration of and accordance with relevant economic, business, environmental, and other laws.



## Financial Risk

DHIC is committed to minimizing financial risks associated with factors such as accounting, finance, finance, intellectual property, and disclosure. As a global enterprise, DHIC has established 'Foreign Exchange Management Instruction' to eliminate the risk of foreign exchange rate fluctuation. DHIC analyzes financial risks as predicted by business operations; and actively actively manages financial risk according to a response strategy. Such contents are transparently reported to stakeholders to enhance the credit rating of the company.

## Business Risk

DHIC recognizes risks related to new markets, projects and R&D as business risks. DHIC seeks business stability by establishing a proactive response system encompassing risk factors at all stages of the project, from raw material procurement to product and service provision to follow-up management. DHIC recognizes business risks for domestic and overseas market environments in advance and manages risks based on clear response criteria and procedures.

## Compliance & CSR Risks

DHIC categorizes various legal and non-financial risks related to the environment, safety, human rights, and local community as Compliance & CSR risks. Around the department in charge of each risk, DHIC has established a management system for immediate response while concurrently operating the CSR Committee for decision-making after sufficient discussion.

## Risk Analysis

DHIC conducts simulation of operation profit and loss for each stage of project implementation to analyze business opportunity and risk. Through a standardized checklist, DHIC analyzes business impacts and response measures. Analysis results are reported to the CEO every month.

Finance	Proceed with the sensitivity analysis for each scenario such as expenses, cash flow, and taxation.
Environment	Establish mid to long term roadmap and emergency response system for risks such as greenhouse gas emission and insufficient water, etc.
Others	Identify risk elements for each major stage and establish response measures utilizing Quality Gate System such as risk, human right and ethical management which may affect the project implementation

## Company-Wide Risk Management Culture

DHIC expands company-wide risk management culture and prevents recurrence of risk failures by delivering in-house education on management principles and processes related to each risk type. In addition, DHIC adjusts financial compensation to employees (under the CEO level) based on evaluation of risk improvement and performance.

# Human Rights Policy

DHIC respects the human rights of employees, as well as all DHIC stakeholders (as previously defined). DHIC recommends partner companies to manage human right management at the same level – targeting third parties of partner companies. DHIC demands adherence to human rights standards by partner companies and major business partners; and monitors their compliance.

DHIC, as a member of the UN Global Compact, complies with the 'Ten Principles of the United Nations Global Compact,' covering human rights, labor, environment, and anti-corruption. DHIC has proclaimed official support for and makes best efforts to observe other internationally-recognized human right principles, including 'The Universal Declaration of Human Rights,' 'The UN Guiding Principles on Business and Human Rights,' and the 'Ruggie Framework.'

DHIC has established and implements a human right management system (as outlined below) to prevent the violation of human rights which may occur during business operations. DHIC makes best efforts to prevent violations of human rights. DHIC strives to become an enterprise that grows mutually with society.

## Non-Discrimination of Employment and Guarantee of Freedom of Association and Negotiation

DHIC does not discriminate based on gender, religion, disability, age, social position, and/or region of origin. DHIC also acknowledges the freedom of association and negotiation of workers; and does not prevent or otherwise discourage the activities of labor unions.

## Prohibition of Forced Labor and Child Labor

DHIC prohibits any type of forced labor in its business activities. DHIC observes the minimum age of employment designated by the country in which business activities are taking place. When DHIC discovers cases of employment of underage persons (non-compliance with the minimum age of employment designated by the law of the host country), DHIC takes immediate remedial action to put an end to all illegal labor practices that cause damage to human dignity.

## Guarantee of Industrial Safety and Responsible Management of Supply Network

DHIC maintains a safe work environment and observes all laws and regulations related to environment, health and safety applicable to business sites. DHIC implements separate safety and health measures for pregnant women, disabled persons, and other vulnerable workers. DHIC has established a policy and guideline of CSR Risk Management for Suppliers; and conducts regular inspections to monitor compliance by all business partners. In addition, DHIC halts supply network transactions that violate human rights.

## Protection of Human Rights and Environmental Right of Local Residents

In conducting business operations, DHIC respects the right to life, the freedom of movement, the right to safety, and property ownership rights of local residents. In addition, DHIC maintains the principle of preventive action regarding environmental issues, and thus aims to prevent or relieve serious environmental damages and disasters. DHIC will establish and fulfill a plan to control such actions.

## Protection of Customers' Human Rights

DHIC complies with legal standards regarding design, manufacturing, and marking of products in order to protect the life and health of customers from any harm due to defective products. If any damage occurs due to a DHIC product, DHIC will notify customers of the risk and promptly accept returns of the corresponding product. In addition, DHIC respects the private life of customers; and thus takes necessary actions to ensure the security of personal information collected by the company.

**DHIC has opened a Cyber Report Center (<https://ethicshelpline.doosan.com/>) on its website. Human rights issues related to DHIC business activities can be reported confidentiality via this prompt and fair system. DHIC strives to lead and the industry with regard to observation of human rights principles as part of its vision of "Proud Doosan in the World."**

# Independent Auditors' Report

**To the Shareholders and Board of Directors of Doosan Heavy Industries & Construction Co., Ltd.**

## Opinion

We have audited the consolidated financial statements of Doosan Heavy Industries & Construction Co., Ltd. and its subsidiaries ("the Group"), which comprise the consolidated statements of financial position as of December 31, 2019 and 2018, the consolidated statements of loss and other comprehensive loss, changes in equity and cash flows for the years then ended, and notes, comprising significant accounting policies and other explanatory information.

In our opinion, the accompanying consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Group as of December 31, 2019 and 2018, and its consolidated financial performance and its consolidated cash flows for the years then ended in accordance with Korean International Financial Reporting Standards ("K-IFRS").

## Basis for Opinion

We conducted our audits in accordance with Korean Standards on Auditing ("KSAs"). Our responsibilities under those standards are further described in the Auditors' Responsibilities for the Audit of the Consolidated Financial Statements section of our report. We are independent of the Group in accordance with the ethical requirements that are relevant to our audit of the consolidated financial statements in Republic of Korea, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

## Material Uncertainty on the Ability to Continue as a Going Concern

We draw attention to Note 38 of the consolidated financial statements. As discussed in Note 38 to the consolidated financial statements, the Group has incurred a net loss of W104,367 million for the year ended December 31, 2019 and, as of that date, the Group's total current borrowings were W7,414,329 million and total current liabilities exceeded its total current assets by W4,421,614 million. These conditions, along with other matters as set forth in Note 38 to the consolidated financial statements indicate the existence of a material uncertainty which may cast significant doubt on the Group's ability to continue as a going concern. Our opinion is not modified in respect of this matter.

## Key Audit Matters

Key audit matters are those matters that, in our professional judgment, were of most significance in our audit of the consolidated financial statements as of and for the year ended December 31, 2019. These matters were addressed in the context of our audit of the consolidated

financial statements as a whole, and in forming our opinion thereon, and we do not provide a separate opinion on these matters.

## 1. Recognition of revenue including the input method

As described in the Note 2 to the separate financial statements, the Group recognizes its revenue when the control of products and services is transferred to the customers. Therefore, the Group estimates percentage of completion of performance obligation satisfied over time by using the input method and recognizes revenue over time depending on progress. For performance obligations satisfied at a point of time, the Group recognizes revenue when the product is delivered to and accepted by the customer.

As the amount of revenue recognized over time using the input method depends on the measured percentage-of-completion, management's judgment is involved in determining the method of measuring progress, estimating total contract cost and changes in construction. In addition, there is an inherent risk in revenue such as overstatement of unit sales price and manipulation of revenue through fictitious customers as revenue is one of the major performance indicators of the Group. Therefore, as there is a risk of overstatement of revenue due to an error in judgment or intent, we have identified the recognition of revenue as a key audit matter.

The following audit procedures were performed regarding the revenue recognized using the input method.

- Evaluation and tests of internal controls related to the determination and modification of estimated total contract cost, changes in contract terms
- For major projects completed during the current year, retrospective review by comparing the actual cost incurred during the current year and construction cost estimated at the end of the prior year
- Inquiries and inspection of documents for projects with significant changes in estimated total contract cost
- Comparison between estimated total contract cost used in revenue recognition and that of site department for major projects
- Comparison of estimated total contract cost with those of other similar projects
- Inquiries and analytical review of changes in the percentage-of-completion for each reporting period
- For major projects, inquiries and inspection of documents if there were significant differences between the progress rate in the respective monthly progress reports received from customers and the percentage-of-completion calculated based on cost
- For selected samples, inspection of documents to test the existence of cost of goods manufactured (including material costs, outsourced construction costs and other expenses) incurred during the current year

- For selected samples, inspecting related documents whether cost of goods manufactured (including material costs, outsourced construction costs and other expenses) are attributed to appropriate project
- Testing journal entries of cost transferred between projects to understand the reason of transfer and whether appropriate approval was obtained
- Site visits for selected on-going construction sites and sites have equipment under construction
- Recalculation of the percentage-of-completion independently for each project
- For selected samples, inspection of documents (change order, official letter and others) to test changes in contract price
- Examined the contractual delivery date with the expected delivery date as of year-end. For those which the contractual delivery date has passed, inquired of the basis, performed analytical review and agreed to underlying documents
- Retrospective review for liquidated damages estimated at the end of the prior period
- Assessing the appropriateness of the estimation of penalty for delay at the end of current period
- Evaluation and tests of internal controls adequacy related to product sales
- Inspection of purchase order, invoice, bill of lading for selected sales transactions in current period to agree with the substance of recorded sales transactions
- Assessing whether revenue is recognized in appropriate period by inspecting delivery acceptance notes signed by customers and bill of lading documents for selected sales transactions

## 2. Recoverability of due from customers for contract work

As described in the Note 2 to the separate financial statements, the Group calculates expected credit losses ("ECLs") based on the expected life of the ECLs and evaluates the recoverability of due from customers for contract work.

In calculating ECLs, management's judgment is involved due to uncertainty over the collection of due from customers for contract work from delayed payment of the owner, changes in conditions or claims incurred. Therefore, we identified the assessment of the recoverability of due from customers for contract work as a key audit matter, given there are risks of overstatement of due from customers for contract work due to error or bias in judgment.

The following audit procedures were performed regarding assessment of the recoverability of due from customers for contract work.

- Evaluation and testing of internal controls related to the assessment

- of recoverability of due from customers for contract work
- Inquiries and inspection of documents to assess payment terms, penalty for delay, delivery time, and other obligations of contracts for the due from customer for contract work increased significantly
- Inquiries of long-term due from customers for contract work and inspection of documents to evaluate the reasonableness of the cause
- Considering current status of billing and collection of due from customers for contract work for each major projects
- For the projects with bad debt allowance reserved over trade receivables assessed whether an allowance is reserved for unbilled accounts receivable and inspected documents
- Retrieving external confirmation letters from major customers and reviewing legal opinion provided by external counsels

## 3. Impairment of goodwill

As described in the Note 2 to the consolidated financial statements, the Group conducts an annual impairment test for goodwill and compares the carrying amount of each cash-generating unit containing goodwill with the recoverable amount calculated as the value-in-use which is the present value of estimated future cash flows, to determine whether it is impaired or not.

In estimating the discounted cash flows, significant judgment of management is involved including long-term sales growth rate and discount rates applied to cash flow projections. Therefore, we identified the impairment for goodwill as a key audit matter as certain key assumptions on which management has based cash flow projections such as growth rate and discount rates are included, are subject to management bias.

The following audit procedures were performed regarding impairment of goodwill.

- Evaluating and testing of internal controls related to impairment test for goodwill
- Inquiries and assessment of valuation model used by the Group
- Understanding future cash flows and testing whether the estimated future cash flows corresponds to business plan approved by the Group's management
- Testing the appropriateness of major assumptions (discount rate, growth rate and others) of the valuation model by comparing to benchmark of peer industry and past financial information of cash generating unit (by using our internal valuation specialists)
- Evaluation of the sensitivity analysis results of the discount rate and permanent growth rate presented by the Group to assess the impact of changes in major assumptions on the impairment assessment (by using our internal valuation specialists)



#### 4. Assessment of provision for warranty

As described in the Note 2 to the consolidated financial statements, Doosan Infracore Co., Ltd. and its subsidiaries("DI") segment of the Group provides customers with free warranty for a certain period of time after the sale of the product, and reserves a provision for warranty by estimating the expected warranty expenses.

The performance obligation of the warranty is determined by the nature and scope of the free warranty provided by DI and various assumptions, including the warranty period and estimated warranty expense to incur in the future. Therefore, we identified the assessment of provision for warranty as a key audit matter as certain key assumptions on which management has based on involves significant judgment of management.

The following audit procedures were performed regarding assessment of provision for warranty.

- Understanding accounting policy of recognition of provision for warranty and testing of internal controls
- Testing the accuracy of underlying data of major accounting estimates used by management
- Comparison and analysis of the basis of key assumptions used by management in measuring provision for warranty with past actual performance
- Performing independent recalculation of current balance of provision for warranty at the end of the current year

#### 5. Assessment of realization of the deferred tax assets

As described in the Note 2 to the consolidated financial statements, Doosan Engineering & Construction and its subsidiaries("DEC") segment of the Group reviews the carrying amount of deferred tax assets at the end of each reporting period. The carrying amount of deferred tax assets is reduced if it is no longer probable that sufficient taxable income will be generated to allow the recovery of all or part of the deferred tax assets.

Realization of deferred tax assets implies complexity as it requires management's judgment on the estimation of expected taxable income. Therefore, we identified the realization of deferred tax assets for DEC as a key audit matter given that the estimation of expected taxable income includes inherent uncertainty and involvement of significant judgment of key variables such as sales and operating profit.

The following audit procedures were performed regarding assessment of realization of the deferred tax assets.

- Evaluation of major inputs such as sales revenue and operating expenses used to determine expected taxable income through comparison of recent business plans considering updated past performance and industrial reports after the approval by the Board of Directors
- Assessment of estimated taxable income based on management's mid- and long-term business plan(by using our internal valuation specialists)
- Assessment of tax adjustments for individual temporary differences and the realization schedule(by using our internal tax specialists)

#### Other Matter

The procedures and practices utilized in the Republic of Korea to audit such consolidated financial statements may differ from those generally accepted and applied in other countries.

#### Responsibilities of Management and Those Charged with Governance for the Consolidated Financial Statements

Management is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with K-IFRS, and for such internal control as management determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, management is responsible for assessing the Group's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Group or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Group's financial reporting process.

#### Auditors' Responsibilities for the Audit of the Consolidated Financial Statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with KSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with KSAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Group's internal control.
- Evaluate the appropriateness of accounting policies used in the preparation of the consolidated financial statements and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Group's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Group to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the Group to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the Group audit. We remain solely responsible for our audit opinion.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We also provide those charged with governance with a statement that we have complied with relevant ethical requirements regarding independence, and communicate with them all relationships and other matters that may reasonably be thought to bear on our independence, and where applicable, related safeguards.

From the matters communicated with those charged with governance, we determine those matters that were of most significance in the audit of the consolidated financial statements of the current period and are therefore the key audit matters. We describe these matters in our auditors' report unless law or regulation precludes public disclosure about the matter or when, in extremely rare circumstances, we determine that a matter should not be communicated in our report because the adverse consequences of doing so would reasonably be expected to outweigh the public interest benefits of such communication.

The engagement partner on the audit resulting in this independent auditors' report is Se Bong Hur.

March, 20th, 2020



This report is effective as of March 20, 2020, the audit report date. Certain subsequent events or circumstances, which may occur between the audit report date and the time of reading this report, could have a material impact on the accompanying consolidated financial statements and notes thereto. Accordingly, the readers of the audit report should understand that the above audit report has not been updated to reflect the impact of such subsequent events or circumstances, if any.

# Third Party's Assurance Statement

To the Readers of 2019 Integrated Report of Doosan Heavy Industries & Construction:

## FOREWORD

Korea Management Registrar Inc.(hereinafter "KMR") has been requested by of Doosan Heavy Industries & Construction to verify the contents of its 2019 Integrated Report of Doosan Heavy Industries & Construction(Hereby referred to as "the Report"). Doosan Heavy Industries & Construction is responsible for the collection and presentation of information included in the Report. KMR's responsibility is to carry out assurance engagement on specific data and information in the assurance scope stipulated below.

## SCOPE AND STANDARD

Doosan Heavy Industries & Construction describes its efforts and achievements of the corporate social responsibility activities in the Report. KMR performed a type2, moderate level of assurance using AA1000AS(2008) and SRV1000 from KMR Global Sustainability Committee as assurance standards. KMR's assurance team(hereinafter "the team") evaluated the adherence to Principles of Inclusivity, Materiality and Responsiveness, and the reliability of the selected GRI Standards indices as below, where professional judgment of the team was exercised as materiality criteria.

The team checked whether the Report has been prepared in accordance with the 'Core Option' of GRI Standards which covers the followings.

<ul style="list-style-type: none"> <li>• GRI Standards Reporting Principles</li> <li>• Universal Standards</li> <li>• Topic Specific Standards</li> </ul>	<table> <tr> <td>Management approach of Topic Specific Standards</td> <td>Labor/Management Relations : 402-1</td> </tr> <tr> <td>Economic Performance : 201-1, 201-3</td> <td>Occupational Health and Safety : 403-2</td> </tr> <tr> <td>Indirect Economic Impacts : 203-1</td> <td>Training and Education : 404-1</td> </tr> <tr> <td>Anti-Corruption : 205-1, 205-3</td> <td>Diversity and Equal Opportunity : 405-1</td> </tr> <tr> <td>Anti-Competitive Behavior : 206-1</td> <td>Child Labor : 408-1</td> </tr> <tr> <td>Energy : 302-1, 302-2, 302-4</td> <td>Forced or Compulsory Labor : 409-1</td> </tr> <tr> <td>Water : 303-1</td> <td>Human Rights Assessment : 412-1, 412-2</td> </tr> <tr> <td>Emissions : 305-1, 305-2, 305-3</td> <td>Customer Health and Safety : 416-1, 416-2</td> </tr> <tr> <td>Environmental Compliance : 307-1</td> <td>Socioeconomic Compliance : 419-1</td> </tr> <tr> <td>Employment : 401-1, 401-3</td> <td></td> </tr> </table>	Management approach of Topic Specific Standards	Labor/Management Relations : 402-1	Economic Performance : 201-1, 201-3	Occupational Health and Safety : 403-2	Indirect Economic Impacts : 203-1	Training and Education : 404-1	Anti-Corruption : 205-1, 205-3	Diversity and Equal Opportunity : 405-1	Anti-Competitive Behavior : 206-1	Child Labor : 408-1	Energy : 302-1, 302-2, 302-4	Forced or Compulsory Labor : 409-1	Water : 303-1	Human Rights Assessment : 412-1, 412-2	Emissions : 305-1, 305-2, 305-3	Customer Health and Safety : 416-1, 416-2	Environmental Compliance : 307-1	Socioeconomic Compliance : 419-1	Employment : 401-1, 401-3	
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Employment : 401-1, 401-3																					

This Report excludes data and information of joint corporate, contractor etc. which is outside of the organization, i.e. Doosan Heavy Industries & Construction, among report boundaries.

## OUR APPROACH

In order to verify the contents of the Report within an agreed scope of assurance in accordance with the assurance standard, the team has carried out an assurance engagement as follows:

- Reviewed overall report
- Reviewed materiality test process and methodology
- Reviewed sustainability management strategies and targets
- Reviewed stakeholder engagement activities
- Interviewed people in charge of preparing the Report

## OUR CONCLUSION

Based on the results we have obtained from material reviews and interviews, we had several discussions with Doosan Heavy Industries & Construction on the revision of the Report. We reviewed the Report's final version in order to confirm that our recommendations for improvement and our revisions have been reflected. When reviewing the results of the assurance, the assurance team could not find any inappropriate contents in the Report to the compliance with the principles stipulated below. Nothing has come to our attention that causes us to believe that the data included in the verification scope are not presented appropriately.

### • Inclusivity

Inclusivity is the participation of stakeholders in developing and achieving an accountable and strategic response to sustainability

- Doosan Heavy Industries & Construction is developing and maintaining stakeholder communication channels in various forms and levels in order to make a commitment to be responsible for the stakeholders. The assurance team could not find any critical stakeholder Doosan Heavy Industries & Construction left out during this procedure.

### • Materiality

Materiality is determining the relevance and significance of an issue to an organization and its stakeholders. A material issue is an issue that will influence the decisions, actions, and performance of an organization or its stakeholders.

- Doosan Heavy Industries & Construction is determining the materiality of issues found out through stakeholder communication channels through its own materiality evaluation process, and the assurance team could not find any critical issues left out in this process.

### • Responsiveness

Responsiveness is an organization's response to stakeholder issues that affect its sustainability performance and is realized through decisions, actions, and performance, as well as communication with stakeholders.

- The assurance team could not find any evidence that Doosan Heavy Industries & Construction's counter measures to critical stakeholder issues were inappropriately recorded in the Report.

We could not find any evidence the Report was not prepared in accordance with the 'Core Option' of GRI standards.

## RECOMMENDATION FOR IMPROVEMENT

We hope the Report is actively used as a communication tool with stakeholders and we recommend the following for continuous improvements.

Doosan Heavy Industries & Construction reported individual sustainable management topics in two sections – Policy & Strategy and Activity and Performance – and covered the business status, performance, and directions with consistency. We recommend that to improve sustainability, the company strengthen the report on qualitative performance of environment and safety topics, which are globally significant in the industry.

## OUR INDEPENDENCE

With the exception of providing third party assurance services, KMR is not involved in any other Doosan Heavy Industries & Construction's business operations that are aimed at making profit in order to avoid any conflicts of interest and to maintain independence.

July, 15th, 2020

*E. J. Hwang*



# Environment Guideline

Based on the People-Centric management philosophy and leveraging technology, DHIC aims to protect the earth and the environment. In this regard, DHIC has established an environment guideline on the basis of Doosan Credo. This contains the company's regulations related to environmental management and protection; and internal instructions for how DHIC can protect the environment together with employees, partner companies, customers, and local communities. Based on this guideline, DHIC has implemented the below activities to reduce the environmental impact of business activities.

## Environmental Management of Production and Business Sites

For effective environmental management of production and business facilities, DHIC has established 11 procedures of goal management, education & training, documents & records, and internal evaluation, etc., as well as 10 instructions related to environmental impact assessment, atmospheric environment management, and waste management, etc.

## Selection and Continuous Evaluation of Suppliers/ Subcontractors/Service Providers

DHIC conducts regular (twice per year) evaluation of EHS management of partner companies. Evaluation results are utilized to provide incentives to and impose penalties on partner companies. In addition, DHIC delivers regular education to partner companies regarding EHS (and particularly environmental) standards and laws. Through such education – which is delivered through the consultation committee comprised of partner company chairs – DHIC reduces EHS (particularly environmental) risk throughout its entire supply network.

## Development of Products and Services

DHIC acknowledges both the crisis and opportunity presented by climate change and other diverse related environmental issues. Accordingly, DHIC actively pursues R&D to develop products and services which can minimize environmental impacts of DHIC business activities.

## Logistics

DHIC provides instructions to minimize environmental pollution which may occur during transportation. DHIC has established and implements best practice work standards for each stage – quotation, preliminary survey for transportation, selection of transportation company for contract to the local transportation (Land, Barge, Aviation, etc.), unloading, and insurance.

## Waste Management

DHIC has established and implements a waste management instruction covering the entire waste management process from generation to final disposal. Through this instruction, DHIC defines application range, terminologies, and responsibilities and authorities for the generation, collection, disposal, and inspection of waste, as well as consigned contract and monitoring. Guidelines are also provided regarding waste recycling.

## Engineering and Maintenance

DHIC has established an environmental manual in order to minimize the occurrence of environmental pollution when operating, maintaining, and repairing power plants installed by DHIC. The aim is to fundamentally prevent environmental pollution due to abnormal operation. This manual – which is adapted to the characteristics of each power plant – helps DHIC minimize environmental impacts related to operation of power plants.

## New Project

DHIC develops a Project Environment Plan which sets forth detailed methods of environmental management before launching a new project. The Project Environment Plan covers project policies related to water supply and waste discharge requirements, hazard substance management, and air pollution control.

## Preliminary Due Diligence at Acquisition to Merger

DHIC identifies environmental risk by conducting preliminary due diligence on companies before acquisition and merger. Major evaluation items include: pollution of soil and underground water, asbestos, hazardous chemicals, environmental pollution prevention facility, and greenhouse gas management. The evaluation results are considered as an important factor at the time of acquisition and merger.

# SASB(Sustainability Accounting Standards Board) Index

## Sustainability Disclosure Topics & Accounting Metrics

TOPIC	Code	Accounting Metric	Page	Remarks
Energy Management	RT-EE-130a.1	(1) Total energy consumed	88	
		(2) Percentage grid electricity	N/A	
		(3) Percentage renewable	-	
Hazardous Waste Management	RT-EE-150a.1	(1) Amount of hazardous waste generated	90	
		(2) Percentage recycled	90	
	RT-EE-150a.2	(1) Number of reportable spills	91	
		(2) Aggregate quantity of reportable spills	91	
		(3) Quantity recovered	91	
Product Safety	RT-EE-250a.1	(1) Number of recalls issued	87	
		(2) Total units recalled	87	
	RT-EE-250a.2	Total amount of monetary losses as a result of legal proceedings associated with product safety	87	
Product Lifecycle Management	RT-EE-410a.1	Percentage of products by revenue that contain IEC 62474 declarable substances	N/A	
	RT-EE-410a.2	Percentage of eligible products, by revenue, that meet ENERGY STAR® criteria	N/A	
	RT-EE-410a.3	Revenue from renewable energy-related and energy efficiency-related products	N/A	
Materials Sourcing	RT-EE-440a.1	Description of the management of risks associated with the use of critical materials	-	
Business Ethics	RT-EE-510a.1	(1) Corruption and bribery	50-51, 64	
		(2) Anti-competitive behavior	50-51, 64	
	RT-EE-510a.2	Total amount of monetary losses as a result of legal proceedings associated with bribery or corruption	85	
	RT-EE-510a.3	Total amount of monetary losses as a result of legal proceedings associated with anticompetitive behavior regulations	85	

## Activity Metrics

Code	Accounting Metric	Page	Remarks
RT-EE-000.A	Number of units produced by product category	-	
RT-EE-000.B	Number of employees	83	

# GRI Content Index

## UNIVERSAL STANDARDS(GRI 100)

TOPIC	No.	Standard	Page	Remarks
Organization Outline	102-1	Name of organization	1	
	102-2	Representing brand, products & services	10-29	
	102-3	Location of headquarter	4	
	102-4	Locations of business sites	4-5	
	102-5	Characteristics of owned structure & legal type	Disclosed in the business report	
	102-6	Report of target market	4-5	
	102-7	Size of organization	4-5	
	102-8	Information about employees and workers	60-61, 83	
	102-9	Explanation of organization's supply network	64-65	
	102-10	Size and structure of organization or supply network, critical change in ownership structure	-	No significant change
	102-11	Explanation of prior prevention principle & access method	92	
	102-12	External initiatives	44-45, 104	
	101-13	Status of membership acquisition of association and national and international policy organizations	104	
Strategy	102-14	Proclamation by a top decision maker of the organization's strategy regarding sustainability	2-3	
	102-15	Major elements of impact, risk, and opportunity	79	
Ethics & Integrity	102-16	Values, principles, and standards of the organization's behavioral norms, such as code of conduct and code of ethics	50-51	
	102-17	Internal & external advisory mechanism regarding the observation of ethics and laws and the integrity of the organization	50-51	
Governance Structure	102-18	Structure of organization's governance including the committee of highest governance	48-49	
	102-19	Procedure established by the highest governance level to entrust authority over economic, environmental, and social issues to high-ranking and other employees	48-49	
	102-20	Report if an executive level personnel in the organization has been appointed or report the personnel who takes responsibility for economic, environmental, and social issues	42-43	
	102-21	Process for stakeholders to discuss economic, environmental and social issues with the highest governance level	78	
	102-22	Composition of the highest governance level and its committee	48-49	
	102-23	Report if the chairman of the highest governance level also assume the position of an executive officer	48-49	
	102-24	Procedure to appoint and apply by the highest governance and its subcommittee	48-49	
	102-26	Role of the highest governance level and high-ranking officers in developing, approving and improving purpose, value or mission, strategy, policy and goal of the organization in relation to economic, environmental and social issues	42-43	
	102-27	Action to develop and strengthen common knowledge of economic, environmental and social issues by the highest governance level	42-43	
	120-29	Role of the highest governance level which identifies and manages economic, environmental, and social impacts, including costs and opportunities	48-49	
	102-30	Effectiveness of risk management procedure	48-49	
	120-31	Frequency of review of economic, environmental, and social impact, including crisis and opportunity, by the highest decision-making unit	48-49	
	120-33	Procedure to report important matters to the highest governance level	48-49	
	120-34	Nature of important matters to be reported to the highest governance level; and system for handling and resolving reports	48-49	
	120-35	Compensation policy for the highest decision-making unit and high-ranking executives	48-49	
	120-36	Procedure & standard to determine salaries	48-49	
Participation by Stakeholders	102-40	A list of stakeholder groups engaged by the organization	78	
	102-41	Elements of major impact, risk, and opportunity	83	
	102-42	Standards to identify and select stakeholders	78-79	
	102-43	Methods of facilitating participation by stakeholders	78-79	
	102-44	Response methods & results related to critical issues	78-79	
Introduction to Report	102-45	Subsidiary companies and joint investment companies to be included in consolidated financial statement(or equivalent document) of the organization	Disclosed in the business report	
	102-46	Process to define the contents of the report	About this report	
	102-47	List of material subjects identified in the content defining process.	79	
	102-48	Effect of redescription of information provided in previous report and its reason	About this report	
	102-49	Reporting period	About this report	
	102-50	Critical changes from previous reporting period regarding scope and subject boundaries	About this report	
	102-51	Date of latest report	About this report	
	102-52	Report cycle	About this report	
	102-53	Provision of an inquirer of report and relevant contents	About this report	
	102-54	Method of 'In Accordance With' selected by the organization	About this report	
	102-55	GRI Index report	102-103	
	102-56	External verification	98-99	

## Topic Specific Standards

### ECONOMIC STANDARDS(GRI 200)

TOPIC	No.	Standard Item	Page	Remarks
Economic Performances	201-1	Direct creation & distribution of economic value	80-81	
	201-3	Defined benefit pension liability & other retirement plans of an organization	Disclosed in the business report	
Indirect Economic Impact	203-1	Infrastructure investment & service support for public benefit	42-45	
Anti-corruption	205-3	Risk evaluation of corruption at business sites	50-51, 84	
Unfair Business Practices	206-1	Cases of confirmed corruption and related countermeasures	85	

### ENVIRONMENT STANDARDS(GRI 300)

TOPIC	No.	Standard Item	Page	Remarks
Energy	302-1	Consumption of energy inside of the organization	88	
	302-4	Reduction of energy consumption	88	
Water	303-1	Quantity taken from each supply source	89	
Emission to Air	305-1	Direct emission amount of greenhouse gas(Scope 1)	89	
	305-2	Indirect emission amount of greenhouse gas(Scope 2)	89	
Environment Compliance	307-1	Violation of environmental law & regulations	-	No violation of law and regulation for three years

### SOCIAL STANDARDS(GRI 400)

TOPIC	No.	Standard Item	Page	Remarks
Employment	401-1	New employment & transfer	83	
	401-3	Parental leave of absence	84	
Labor Safety & Health	403-2	Disasters on site, disease types, occurrence rate, ratio of days of absence, ratio of absence from work, number of work-related deaths	87	
Education & Training	404-1	Average hours of education for each employee	83	
Diversity & Equal Opportunity	405-1	Governance & Diversification of Employees	83	
Evaluation on Human Right	412-1	Business sites for review of or evaluation on human rights	62-63	
	412-2	Education for employees on human rights policies and procedures	62-63	
Local Communities	413-1	Percentage of operations with implemented local community engagement, impact assessments, and development programs	72-76, 85	
Safety & Health of Customers	416-2	Cases of violation product/service health & safety regulations	-	No violation of law and regulation for three years
Social, Economic Compliances	419-1	Violations of social and economic laws and restrictions	Disclosed in the business report	



# UN Global Compact

As a member of the UN Global Compact since 2014, DHIC complies with the ‘Ten Principles of the United Nations Global Compact,’ which covers human rights, labor, environment and anti-corruption. DHIC has adopted international standards on socially- responsible management and confirms its commitment to becoming a leading global enterprise – as well as a model enterprise for the Republic Korea –for sustainable socially-responsible business operations..

10 Principles		Page
<b>Human Rights</b>		
Principle 1	Businesses should support and respect the protection of internationally proclaimed human rights; and	62-63, 93
Principle 2	make sure that they are not complicit in human rights abuses.	62-63
<b>Labour</b>		
Principle 3	Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;	62-63
Principle 4	the elimination of all forms of forced and compulsory labour;	62-64
Principle 5	the effective abolition of child labour; and	62-64
Principle 6	the elimination of discrimination in respect of employment and occupation.	62-63
<b>Environment</b>		
Principle 7	Businesses should support a precautionary approach to environmental challenges;	44-45, 52-55
Principle 8	undertake initiatives to promote greater environmental responsibility; and	52-55, 100
Principle 9	encourage the development and diffusion of environmentally friendly technologies.	52-55, 100
<b>Anti-Corruption</b>		
Principle 10	Businesses should work against corruption in all its forms, including extortion and bribery.	50-51

## Membership Status

Standard	Items
Common	Korea Foundation for Cooperation of Large&Small Business, Rural Affairs, Korea Technology Finance Corporation, Korea Credit Guarantee Fund, Gyeongnam Center for Social Economy and Entrepreneurs, Gyeongnam Creative Economy Innovation Center, Korea New & Renewable Energy, National Academy of Engineering of Korea, Korean Federation of Science and Technology Society, Korea Management Association, Korea International Trade Association, Korea Industrial Technology Association, Korea Engineering & Consulting Association, Korea Society of Combustion, Korea Plant Industries Association, Machinery Financial Cooperative, Korea Enterprises Federation, World Energy Council in Korea, Korea-Arab Society, Korea Chamber of Commerce and Industry, Korea Fair Competition Federation, UNGC(UN Global Compact) in Korea, Marine Rescue & Salvage Association
Power Generation	Korea Institute of Electrical Engineers, Korean Society of Mechanical Engineers, Korea Electric Association, Korea Association of Machinery Industry, Korea Wind Energy Industry Association, Korea Wind Association, EPRI(Power Generation Research Center in U.S)-WRTC
Nuclear Power	Korea Radioactive Waste Society, Korea Nuclear Equipment Advancement Association, Korea Atomic Industrial Forum, Korean Nuclear Society, Korea Nuclear Association for International Cooperation, World Nuclear Association, Women in Nuclear Korea
Welding	Korea Welding Joining Society
EPC	Construction Association of Korea, Korea Housing Builders Association, Korea Federation of Construction Contractors, Korea Electrical Contractors Association, Korea Information & Communication Contractors Association, International Contractors Association of Korea, Korea Mechanical Construction Contractors Association, PEA(Plant Engineering Association)
Casting & Molding	Korean Institute of Metals and Materials, Korea Foundry Society, Korea Iron & Steel Association
Quality	Korea Standards Association, Korea Foundation of Quality

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