

DONGKUK STEEL

Environmental Report 2020



About Report

This report was issued to stakeholders such as customers, employees, shareholders, investors for the purpose of providing information on environmental management of Dongkuk Steel.

Dongkuk Steel is a steel company that makes its contribution to the realization of a "resource circulation society" and a "low-carbon society" as an environmental task, and this report also focuses mainly on the information about its tasks.

Our sincerity has been 66 years

Dongkuk Steel, a leading domestic EAF (Electric Arc Furnace) company, considers even the environment.

We are practicing social responsibility for 66 years to create a society where people, environment, and companies can co-exist.

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Dongkuk Steel will continue the dream and passion of a sustainable global steel company.

Dongkuk Steel Chairman
Chang, Sae-joo



“Green Survival” Era, Dongkuk Steel will be the new standard for eco-friendly steel business models.

Today, the world faces numerous environmental challenges, including climate change, finite resources, food and water shortages, and mankind has entered the 'Green Survival' Era that goes beyond eco-friendly for sustainability.

On the grounds that the international society continues to make efforts to build a low-carbon resource cycle, such as the UN-SDGs(Sustainable Development Goals) and Paris Climate Change Accord, and Dongkuk Steel is actively supporting and participating in such international society movement.

Iron is a recycled material with the properties of an infinite loop that can be recycled over and over again without any quality damage. Past 66 years, Dongkuk Steel has contributed towards construction of resource circulation society by EAF using steel scrap as raw material. In addition, EAF, Dongkuk Steel's manufacturing method emits only 25% of carbon dioxide compared to Blast Furnace, so the growth of the EAF industry is an indispensable process for building a resource circulation society and a low-carbon society.

Dongkuk Steel, as a leader in the domestic EAF company, has been working with a sense of responsibility to play an important role in solving sustainability problems through the development of the industry.



Dongkuk Steel will once again show the strength of first privately-owned steel company

Dongkuk Steel Vice Chairman
Chang, Sae-wook



In 2010, Dongkuk Steel devoted to preemptively form an eco-friendly steel company by introducing high-efficient eco-friendly EAF (Eco-Arc) for the first time in Korea. In addition, we comply with the green management policy across all workplaces, with the establishment of an environmental management system based on ISO14001, an integrated management system for energy and greenhouse gases, and the introduction of eco-friendly facilities.

From now on, Dongkuk Steel will use high technology to efficiently recycle accumulated domestic steel scraps, which consists of domestic steel demand for about tens of years, and work relentlessly by continuously supporting to become part of achieving national goal of reducing carbon dioxide emission by 37% in 2030.

Thank you.







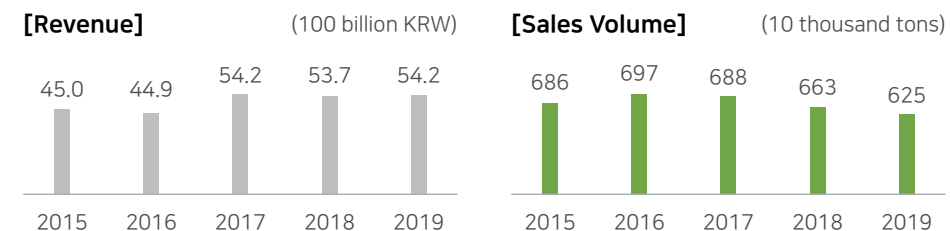
About Us

In 1954, when Korea had to be rebuilt from scratch due to the Korean War, Dongkuk Steel, Korea's first privately-owned steel company, was established.

66 years later, Dongkuk Steel stands as the leader of the world market.

About Dongkuk Steel

			
Foundation July 7th, 1954	Employees 2,485 people (As of Mar. 2020)	Equity Capital 589 billion KRW	Products and Services Steel Products Production & Sales



Environmental History

1954 · Foundation of Dongkuk Steel	1966 · The Nation's 1st EAF Steel Making Plant Completion	1971 · The Nation's 1st Production of Heavy Plate	1972 · Incheon Works Operation
1975 · The Nation's 1st Production of Pre-Painted Steel	1980 · Busan's 1st Completion of Waste Water Disposal Plant in Busan	1997 · Operation of Heavy Plate & Section Shape Steel Plant in Pohang Works · Busan Works ISO14001 Acquisition	2003 · Pohang Works ISO14001 Acquisition
2008 · Pohang Works Fuel Change (Bunker-C → LNG)	2009 · Busan Works Voluntary Agreement for Greenhouse Gas Emission Reduction	2010 · Incheon Works Eco-EAF Installation · Dangjin Works ISO14001 Acquisition	2014 · Busan Works Solar Power System Installation · Busan City Green Environment prize awarded
2016 · Dangjin Works ISO50001 Acquisition	2018 · Incheon/Pohang/Busan Works ESS Facility Installation	2019 · Dangjin Works The 1st acquisition of Integrated Environment Permission among the steel companies	

Product



✔ **Steel Making**
Incheon Works 2.2MnT/yr
Pohang Works 1.4MnT/yr



✔ **Reinforcing Bars**
Incheon Works 2.2MnT/yr
Pohang Works 0.55MnT/yr



✔ **Sections**
Pohang Works 1.0MnT/yr
Sinpyeung Works 0.3MnT/yr



✔ **Heavy plates**
Dangjin Works 1.5MnT/yr



✔ **Galvanized Steel & Pre-painted Steel**
Busan Works
Galvanized Steel 1.7MnT/yr
Pre-Painted Steel 0.75MnT/yr

Domestic Network



✔ **Incheon Works**
Specialized for Eco-Reinforcing Bar Production
The Nation's 1st Installation of Eco-EAF



✔ **Pohang Works**
Section Shape Steel & Reinforcing Bar Production by Knowhow & Technical Skills
The Nation's 1st Installation of Twin-Vessel type EAF



✔ **Dangjin Works**
Specialized for Masterpiece Heavy Plate Production
Production of High Quality Heavy Plate(Normalizing, TMCP, etc.) based on IT



✔ **Busan Works**
World Best Pre-Painted Steel Production
The 1st Launching of Pre-Painted Steel Brand in Steel Industry, "Luxsteel" and "Appsteel"



✔ **Sinpyeong Works**
Various small-to-medium size Section Shape Steel Production
Customized Customer's Various Demands
Focused on Development of small-to-medium size Section Shape Steel

Global Network

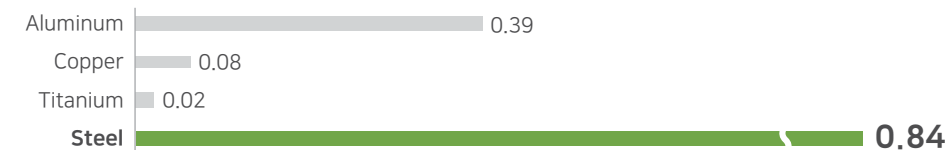


Realization of a recycling society

Steel is the most Eco-Friendly Metal Material

Generally, eco-friendliness of material is represented by recycling intensity which shows its recyclability. Steel is 0.84 which is extremely higher than other metal materials, and even compared to plastics which is recycled just 3~5% of its total production volume, steel is being recycled more than 90% after removal of impurities.

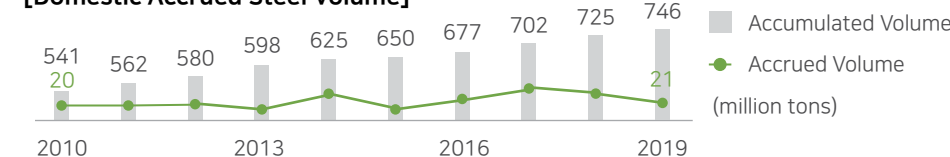
[Recycling Intensity Comparison]



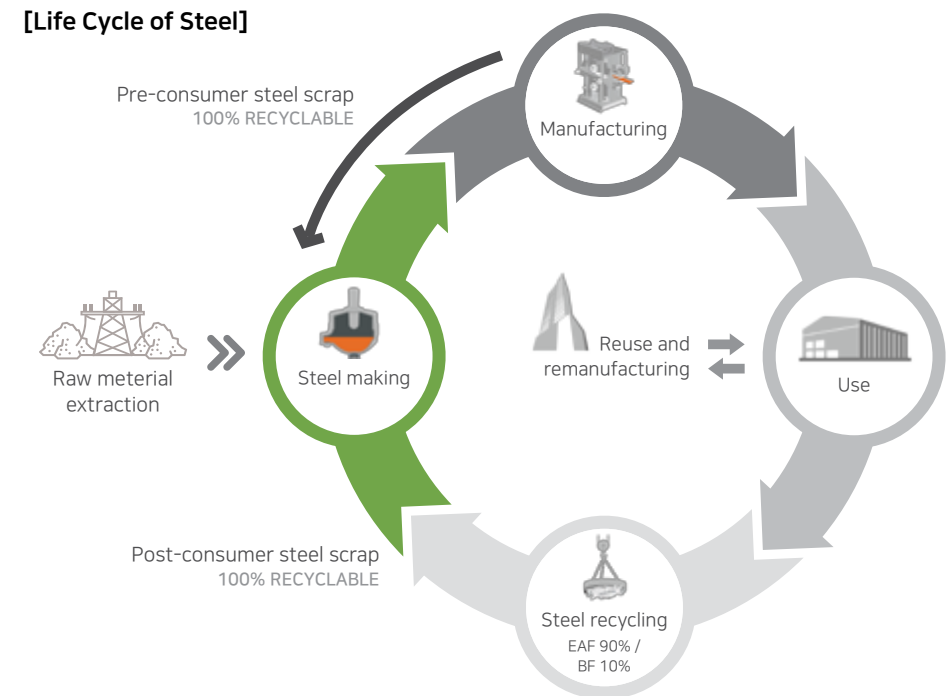
Steel is the new resource of future

Accumulated amount of domestic accrued steel is estimated around 700 million tons and this is domestic steel demand volume of almost 30~60 years. Recycling of accrued steel plays a very important role since it improves environment continuously since it can suppress the consumption of new natural resources.

[Domestic Accrued Steel Volume]



[Life Cycle of Steel]



EAF is the most effective way to recycle steel

Among the ways of production of steel products, EAF method which uses steel scraps as main raw material and it reuses steel scrap around 9 times more than Blast Furnace method, is most effective method to recycle resources.

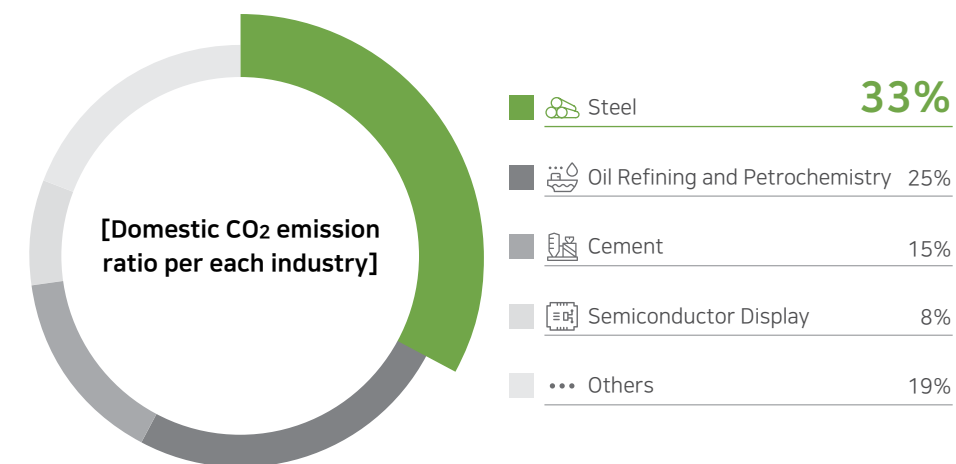
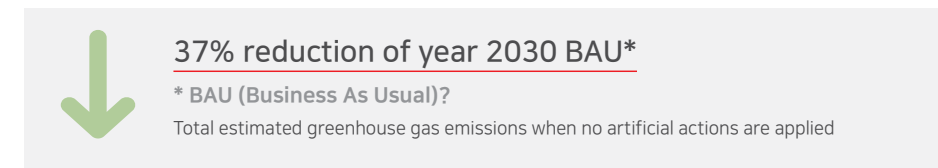
Realization of a Low-Carbon Society



Steel Industry should lead the realization of a low-carbon society

The CO₂(greenhouse gas, cause of global warming) emissions in Korea took 7th place among the OECD member countries, and in order to do be responsible and liable, Korea has promised international society to reduce 37% of year 2030 national greenhouse gas emissions forecast value. To go along with the eco-centric times, steel making companies who are responsible for 33% of domestic CO₂(greenhouse gas) emissions should lead the realization of the low-carbon society.

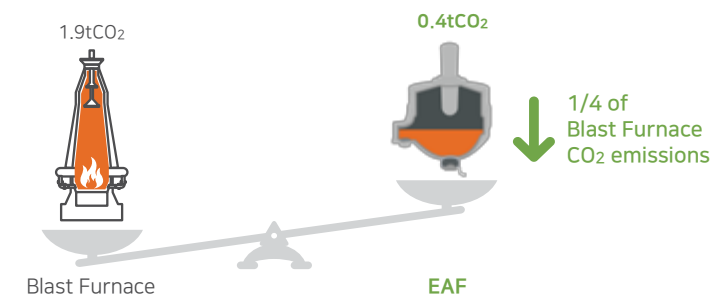
[Korea Greenhouse Gas Reduction Aim]



EAF is effective production method for realization of a low-carbon society

Blast Furnace companies which use iron ore and cokes as main material are possessing 90% of CO₂(greenhouse gas) emissions in Steel industry. And also, even in Life Cycle Viewpoint*, it's reported that CO₂(greenhouse gas) emissions per 1 ton of steel by EAF product is 4 times lower than the Blast Furnace products.

[Comparison of CO₂(greenhouse gas) Emissions per 1ton of Steel Product]



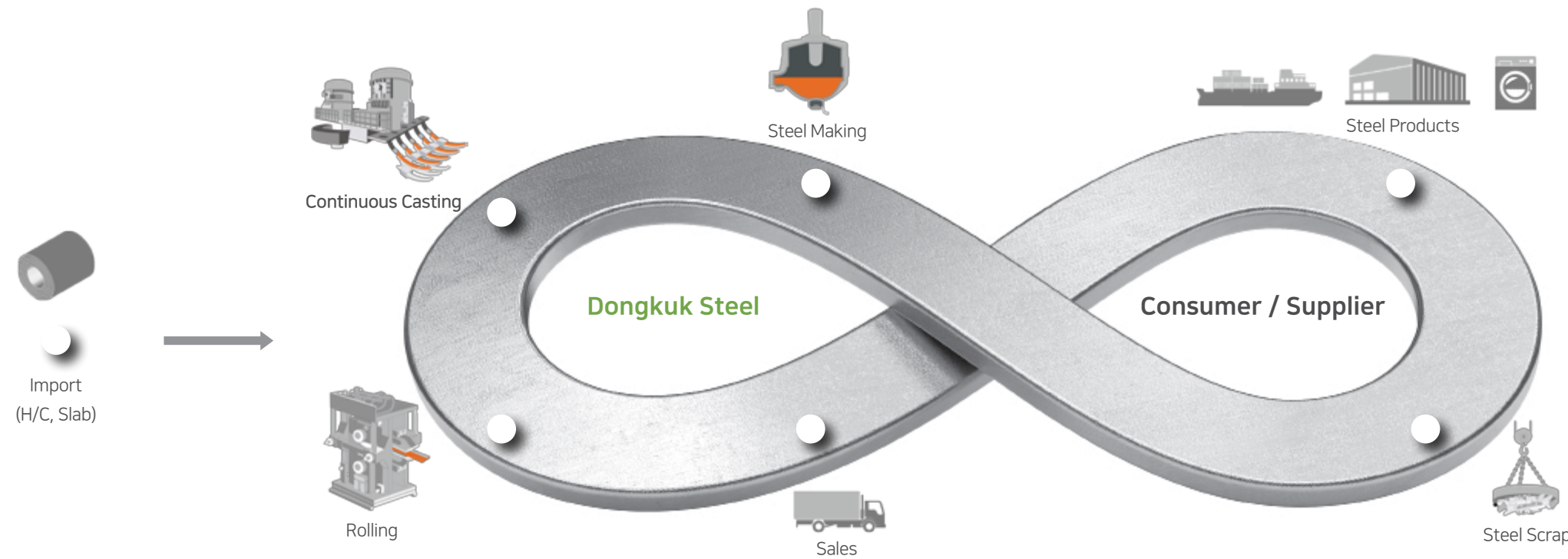
* Life Cycle Viewpoint?

The method to evaluate environmental effect by the quantification of pollutant emitted from material and fuel used in the process for product production from material collection to manufacturing, transport, utilization and destruction.

Item	Blast furnace Steelmakers	EAF Steelmakers
CO ₂ Emissions (10 thousand tCO ₂)	9,361	906
Crude Steel Production Volume (10 thousand tons)	4,927	2,264
CO ₂ emissions per 1ton (tCO ₂)	1.9	0.4

[As of 2019]

Introduction of environmental management performance in 2019

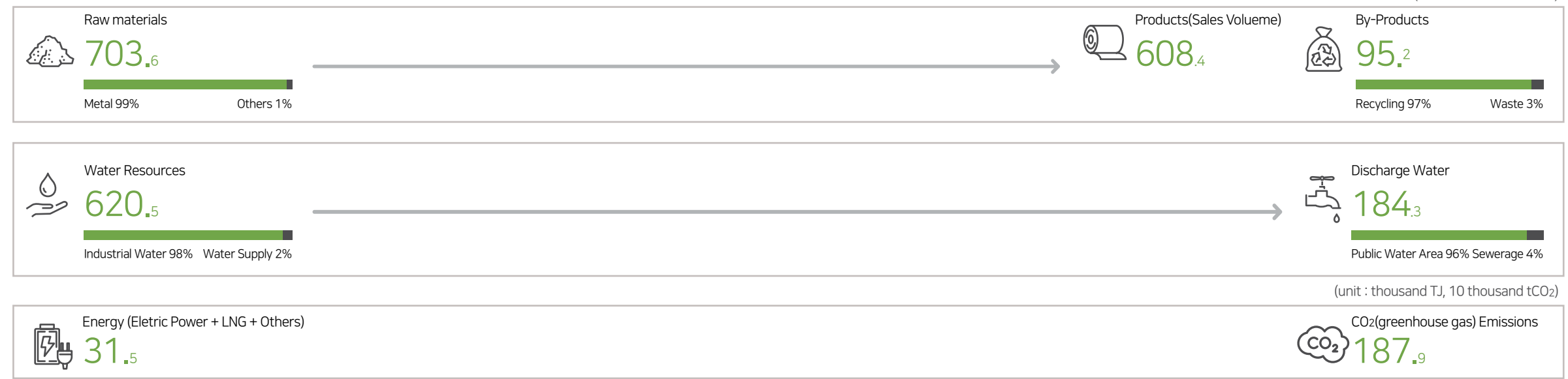


Dongkuk Steel is "Steel Recycler"

Dongkuk Steel is strictly observing principles to minimize pollutant emissions and energy consumption in every workplace considering the environmental impact in overall production process based on EAF manufacturing method which uses steel scrap as circulating recycled material.

[IN-PUT]

[OUT-PUT]



(unit : 10 thousand tons)

(unit : thousand TJ, 10 thousand tCO₂)

Dongkuk Steel is making its way

Main activities for environmental management in 2019

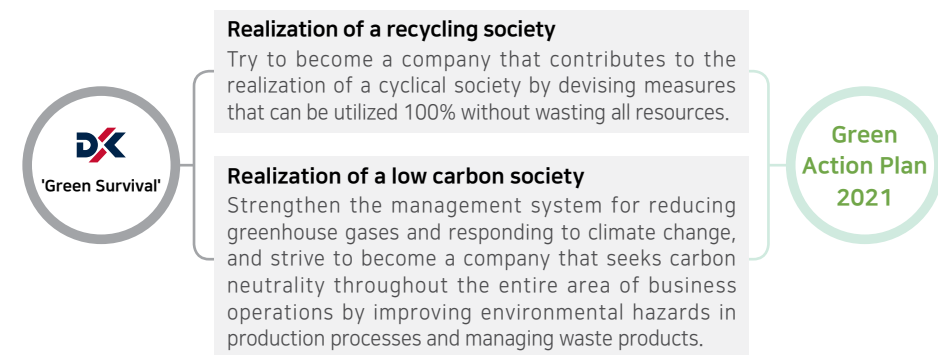
Dongkuk Steel practices customer satisfaction and human-centered management based on its management ideology of 'contributing to the development of culture through iron'. In order to become a truly eco-friendly company for the realization of a cyclical, low-carbon society, we are committed to managing environmental management policies and environmental management organizations to meet the guidelines.



Dongkuk Steel's Environmental Management Goal

* Green Action Plan 2021

In order to be the most competitive company in 'Green Survival' Era, Dongkuk Steel will set a goal in environmental management by 2021 and all employees are going to make its way.



Green Management

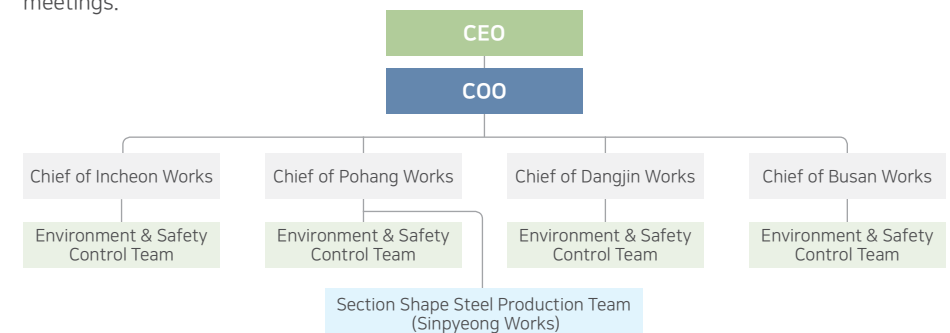


Eco-Friendly Green management policy

- ✓ Recognize the environment as an essential element of management, and prioritize at all levels.
- ✓ Establish and implement high-quality standards that comply with all domestic and international environmental laws and agreements and satisfy customer requirements.
- ✓ Pursue efficient use of resources throughout management activities and minimize environmental pollution through continuous improvement.
- ✓ Identify the potential occurrence of environmental emergencies and come up with systematic countermeasures.
- ✓ Establish and implement goals to achieve environmental policies, announce this policy to stakeholders, and endeavor to advance environmental management.

Organization chart of environmental management and major meetings

As the main agent, the environmental safety teams at each workplace respond quickly to environmental issues of overall activities and manage them systematically through regular meetings.



Classification	Content
Company's Environmental Safety Meeting	Quarterly meetings on issues related to the company's environmental safety [quarterly factory tour offline meeting]
Greenhouse gas emission rights management meeting	Quarterly meetings on issues related to the company's emissions monitoring, sharing technologies for reduction
Environmental Safety Commission	Integrated management of the company's environment/safety/health, responds to the government on environmental policy regulations, etc.

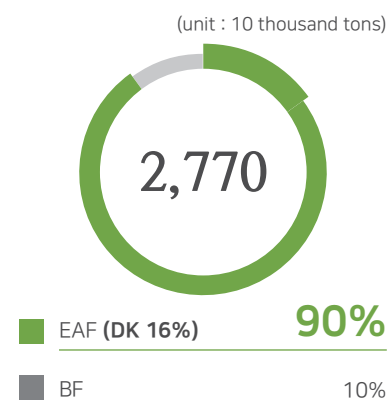
* Frequently hold exchange meetings with domestic major steelmaking companies, such as JFE, for sharing the advanced environmental safety management techniques

Dongkuk Steel is making a recycling society

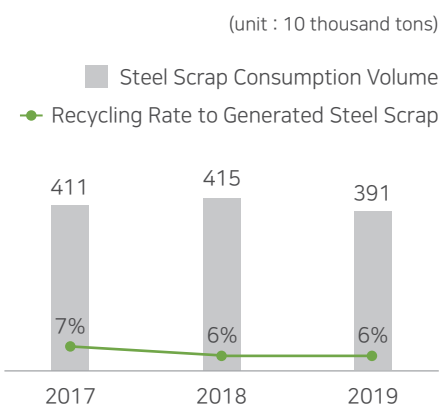
Raw Material Management

90% of domestic steel scrap consumption volume in year 2019 is being used by EAF steel making companies, and around 16% (3.91 million ton) of it is being used as raw material in Dongkuk Steel. Also, all the scrap generated by rolling in the form of by-products are recycled as raw materials for steelmaking.

[2019 Domestic Steel Scrap Consumption Volume]



[Steel Scrap Consumption Volume in Dongkuk Steel]



Water Resources Management

Dongkuk Steel Pohang and Incheon Works have wastewater non-discharging facilities, meaning 100% of water is being recycled. In case of Busan and Dangjin Works, pollutant is being eliminated with physical/chemical/biological methods to manage wastewater at the wastewater treatment facility in order to minimize the impact of water quality of nearby sea.

[Water Recycling Rate of each Works]

Works	Supply	Recycling	Recycling Rate
Incheon	208	208	100%
Pohang	125	125	100%
Dangjin	22	10	46%
Busan	260	75	29%

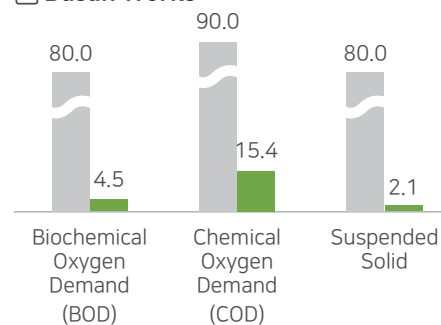
(10 thousand tons)

* Dangjin Works : Discharge after final treatment at outside sewage treatment plant

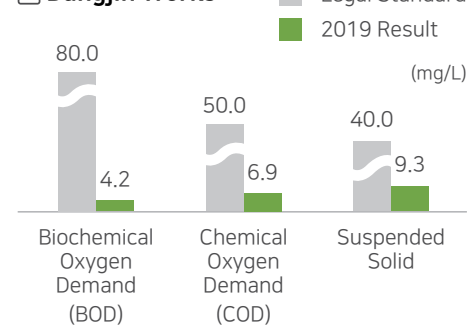
* Busan Works : Discharge after meeting environmental standard

[Water Pollutants Discharge Concentration]

Busan Works



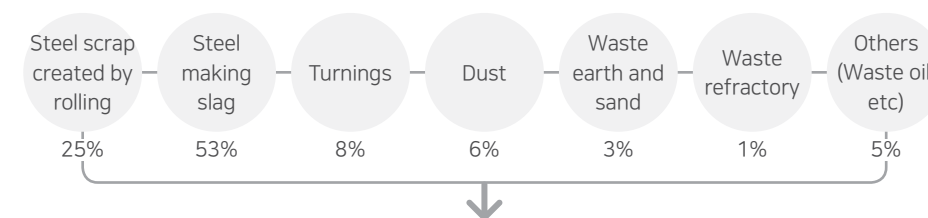
Dangjin Works



By-Products Management

By-Products such as steel scrap created by rolling, steel making slag, turnings created in production are reused as much as possible, and even the unused or buried wastes are now recycled to new resources such as road paving aggregate by the outside specialized company, and so are highly contributing to resource recycling policy.

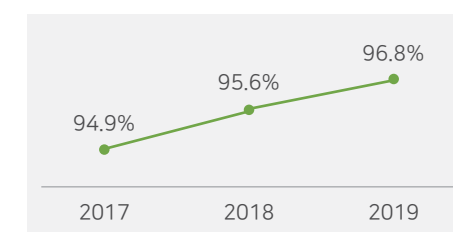
[By-Product Occurrence Share, As of 2019]



[Result of By-Product Practical Use]

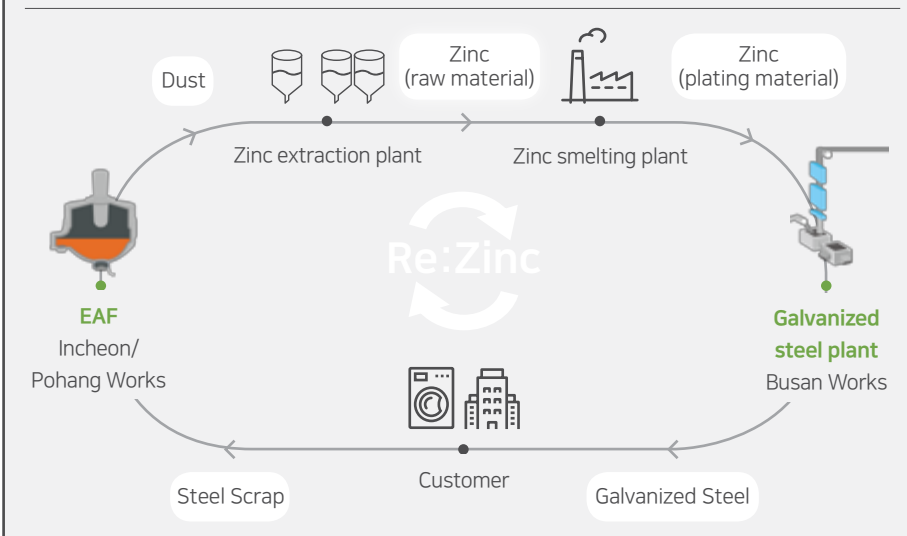
Purpose of Recycle	Rate
Paving aggregate	54%
Company internal reuse	25%
Iron making raw material	8%
Paint raw material	6%
Landfill/Incineration	3%
Others	4%

[Result of By-Product Recycling Rate]



Recycling of Zinc (Zn)

EAF is most general process to recycle Zinc. The main elements of dust which is occurred during the EAF process are iron and Zinc, and Zinc which possesses around 30% of the dust is returned to galvanized steel production plant after extraction and smelting processes. Galvanized steel is used in automobile, home appliances, etc. and it is recreated by EAF process when it becomes to steel scrap at the end of its lifetime.



• Dongkuk Steel's Role in Zinc Recycling

Dongkuk Steel is making a low-carbon society

Energy Management

Dongkuk Steel is making generous investment in eco-friendly facilities and continuous effort for reduction of greenhouse gas. Also, we are making constant effort for realization of a low-carbon society through the energy efficiency improvement and development of eco-friendly products.



Greenhouse gas reduction activity of Eco-Arc EAF

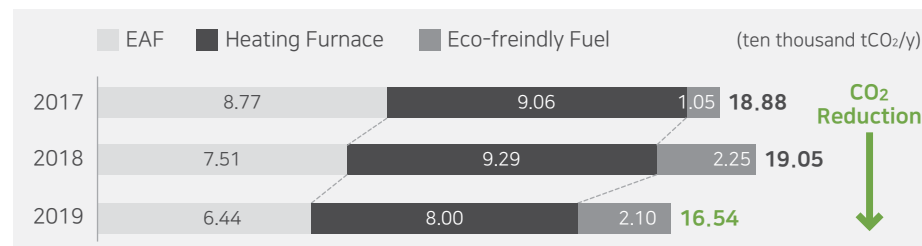
Amount of energy used of Eco-Arc EAF, installed in the country for the 1st time, is around 30% lower than general EAF through scrap preheating method using waste gas, and is eco-friendly facility with low environmental pollutant emission, and so achieved reduction effect of 64 thousand tCO₂ during year 2019.



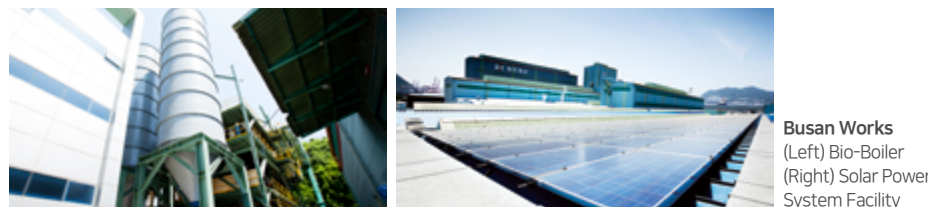
Energy usage reduction activity through flexible operation of heating furnace

Activities to reduce the amount of heating furnace LNG fuel used such as HDR (Hot Direct Rolling) installation at No.2 rolling mill of Incheon Works, regenerative heating furnace installation in Dangjin Works and Hot Charge improvement effort of each plant had achieved annual reduction effect of 80 thousand tCO₂.

[CO₂ (greenhouse gas) Reduction Effect by sector]



Activities for Greenhouse Gas Reduction by Eco-Friendly Fuel Application



[CO₂ Reduction Effect after Eco-Friendly Facilities Installation] As of 2019 (ten thousand tCO₂/y)

Facility / Works	Improvement Part	CO ₂ Reduction Effect
Eco Arc EAF	Electric Power	6.4
HDR Concurrent Heating Furnace	Fuel(LNG)	3.3
Regenerative Burner		0.5
Waste Heat Recovery Equipment / Vacuum Roll	Fuel(Waste Heat)	0.1
Bio Boiler	Fuel(Waste Wood)	1.4
Solar Power System Facility	Electric Power	0.1
Total		11.8

Greenhouse Gas(GHG) Reduction

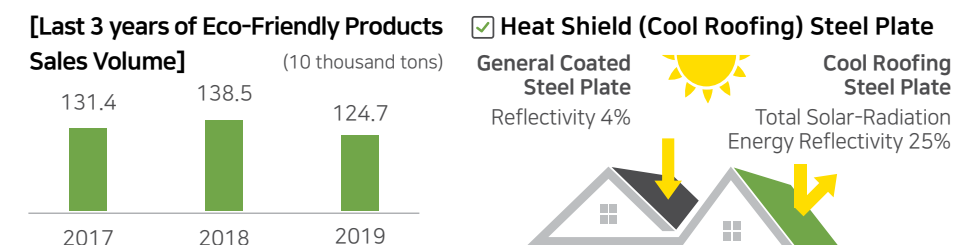
Dongkuk Steel has been meeting government quotas by the preemptive effort regarding global warming, and this is the achievement for the 5 consecutive years since the introduction of greenhouse gas quotas policy by government in 2015.

Year	Carbon Emission (thousand tCO ₂)	[GHG per tons of crude steel production] 단위: t-CO ₂ /t-S			
		Division	2017	2018	2019
2017	1,993	Scope 1	0.131	0.123	0.129
		Scope 2	0.271	0.272	0.275
		Total	0.402	0.394	0.404
2018	1,952				
2019	1,879				

* The above figures were computed from Works with EAF, Pohang and Incheon Works, and might not be correctly matched with the statement of all our workplaces submitted to government.

Eco-Friendly Products Development & Supply

Dongkuk Steel is developing and producing high performance & functioning eco-friendly reinforcing bar, and is contributing for low carbon society by the reduction of air conditioning & heating power through the heat shield steel plate development and supply.



Eco-Friendly UV Steel Plate

[Productivity & Energy Efficiency Comparison]

Item	Eco-Friendly UV Steel Plate	General Steel Plate
Volatile Organic Compounds(VOCs)	0%	40~50%
Energy Saving Efficiency	5.6x	1
Production Plant Space	0.1	1
Pollution Control Facilities	not necessary (pollution-free)	necessary

Luxteel Bio Coat (Antibacterial Steel Plate)

Multi-Function Antibacterial Steel Plate for Green Environment Protection	Semi-permanent Sterilization Effect	Prevent Propagation of E.coli O-157, Pseudomonas aeruginosa, Staphylococcus	Antifungal Action

Participation in Governmental Support Projects

Leading the realization of eco-friendly company & low carbon society by strengthening energy efficiency and management.

Installation of EMS facility

Completion of EMS facility installation in Incheon Works (2019)

Installation and operation of ESS facility

Completion of ESS Facility Installation in Incheon/Pohang/Busan Works (2019)

Green Action Plan 2021



In order to realize a recycling, low-carbon society that Dongkuk Steel aims to achieve, all executives and employees have set goals for improving recycling rates of by-products and water resources and further reducing carbon emissions by 2021.

Action plans for a Recycling society

- 6 : CLEAN WATER AND SANITATION
- 8 : DECENT WORK AND ECONOMIC GROWTH
- 12 : RESPONSIBLE CONSUMPTION AND PRODUCTION
- 14 : LIFE BELOW WATER
- 15 : LIFE ON LAND

✓ Raw Material Management

- Increase the total recovery rate of products with integrated management systems



✓ By-Products Management

- Reducing pollutant emissions by investing in SCR (Compliance with the standard values by facility)
- Continuous development of demand for recycling and reuse of by-products



✓ Water Resources Management

- Investment in TMS(Telemonitoring system) for real-time monitoring of emissions



Action plans for a Low-Carbon Society

- 7 : AFFORDABLE AND CLEAN ENERGY
- 11 : SUSTAINABLE CITIES AND COMMUNITIES
- 12 : RESPONSIBLE CONSUMPTION AND PRODUCTION
- 13 : CLIMATE ACTION
- 15 : LIFE ON LAND

✓ Electricity Management (↓ 4,450 tCO₂)

- Improve energy efficiency by improving operations (EAF auxiliary burner pattern adjustment, etc.) (↓ 2,000 tCO₂)
- Reduce power usage by investing and renovating facilities such as vacuum roll and VSD compressor (↓ 2,450 tCO₂)



✓ Fuel Management (↓ 3,230 tCO₂)

- Reduce fuel consumption by improving operations, by not using Steam Dryer and optimizing heat patterns of heating furnace (↓ 2,376 tCO₂)
- Reduce fuel usage by investing in heating furnace automatic temperature control system, insulation construction of exterior walls, etc. (↓ 854 tCO₂)



* Sustainable Development Goals(SDGs)

17 biggest common goals that the United Nations and the international community want to solve are 1) universal humanity issues, 2) global environmental issues, and 3) economic and social issues. (2016~2030)

✓ Others

- Installation of solar panels for the use of renewable energy



Dongkuk Steel's Main Environment-Certifications



Dongkuk Steel is obtaining and applying international standard certifications in order to manage based on international management system. Furthermore, Dongkuk Steel is building a sustainable eco-friendly steel company model with generous facility investments and environmental management.

Certification	Approval Period	Certification Agency	Works
ISO 14001	2019.09.14~2022.09.13	BSI	Dangjin
	2018.04.03~2021.04.02		Pohang
	2018.03.15~2021.03.14	KSA	Busan
ISO 50001	2019.09.12~2021.08.21	BSI	Dangjin

Dongkuk Steel's Main Environment-Agreements



Dongkuk Steel is doing the utmost efforts for the reduction of air pollution & fine dust through voluntary agreements with ministry of environment and local government.

Agreement	Agreement Period/Date	Agreement Organization	Works
Voluntary agreement for the reduction of pollutant emission	2017.07.10~2021.12.31	Dangjin City	Dangjin
	2018.04.09~2020.12.31	Pohang City	Pohang
	2018.04.12	Ministry of Environment	Incheon
Integrated Environment Permit*	2019.04.26	Ministry of Environment	Dangjin

* The Ministry of Environment's integrated management system of 7 laws & 10 licenses regarding environmental pollution facility, Dongkuk Steel obtained for the 1st time in steel industry.

Greenhouse Gas Emission Volume Verification Statement



Dongkuk Steel is guaranteed by a 3rd party regarding CO₂ emission volume in order to secure the fairness, transparency, and reliability.

[Summary of Statement]

- Dongkuk Steel's 2019 greenhouse gas emission volume statement was written based on the guidelines regarding aim management operation of greenhouse gas & energy.
- Dongkuk Steel's importance evaluation result regarding greenhouse gas emission and amount of energy used was more than 500 thousand tons of CO₂-eq which satisfies less than 2.5% of total emission volume as importance of quantitative standard.
- Therefore, Dongkuk Steel presents "Proper" opinion regarding Dongkuk Steel's volume of greenhouse gas emission and amount of energy used in 2019.

Verification Agency : KfQ (Korean Foundation for Quality)
Representative : Seok Un Youn



Annex. Environmental Management Achievements Details

✓ Air Pollutant Emission Volume

Classification	2017 2018 2019		
	(ton)		
Dust	66	81	101
Sulfur Oxides	77	26	36
Nitrogen Oxides	694	654	820

✓ Air Pollutant Emission Concentration

Classification	2017 2018 2019		
	(kg/ton)		
Dust	0.033	0.038	0.059
Sulfur Oxides	0.033	0.011	0.017
Nitrogen Oxides	0.277	0.246	0.410

✓ Greenhouse Gas Emission Volume

Classification	2017 2018 2019		
	(thousand tCO ₂)		
Total	1,969	1,931	1,857
Scope 1	723	673	662
Scope 2	1,247	1,259	1,196

✓ The amount of Water used

Classification	2017 2018 2019		
	(million tons)		
Water usage	6.16	6.15	6.20
Recycling	4.07	4.18	4.36
Recycling Rate	66%	68%	70%

✓ The amount of Energy used

Classification	2017 2018 2019		
	(TJ)		
Total	33,609	33,337	31,460
Electricity	7,907	7,163	6,297
Fuel	25,665	25,911	24,909
Steam	38	262	254

✓ Water Pollutant Emission Concentration

Classification	Legal Standard	Busan Legal Sandard Dangjin		
		(mg/L)		
BOD	max. 80	4.5	max. 80	4.2
COD	max. 90	15.4	max. 50	6.9
Suspended Solid	max. 80	2.1	max. 40	9.3
PH	5.8~8.6	7.1	5.8~8.6	7.5

✓ Greenhouse Gas & Energy Degree of Intensity

Classification	2017 2018 2019		
	(tCO ₂ eq/t-S, TJ/ton)		
Greenhouse Gas	0.193	0.192	0.193
Energy	0.003	0.003	0.003

✓ By-Products Volume & Recycling

Classification	2017 2018 2019		
	(million tons)		
Creation	0.88	0.87	0.95
Recycling	0.83	0.83	0.92
Recycling Rate	94.9%	95.6%	96.8%

* All the figures excepting water pollutant emission concentration are average values of Dongkuk Steel's all plants

Environmental Report 2020

**We save the Earth
by recycling steel**



Report Contents	This report contains Dongkuk Steel's activities & achievements of environmental management.
Report Standard & Range	Registration information of environmental information public system was applied, and was written as per scope of information disclosure.
Report Period	This report has information by December 31 st , 2019 of environmental management activities & achievements, and some quantitative data are offering figures for the last 3 years.

※ Please contact below for inquiry regarding this report.

02 2222 0128 | Ferrum Tower 6F, 19, Euljiro 5-gil, Jung-gu, Seoul, Korea