TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

DIGITAL TECHNOLOGY FOR A SUSTAINABLE FUTURE

Samsung SDS TCFD Report 2022

SAMSUNG SDS

About This Report

Samsung SDS discloses its information regarding climate change response in accordance with the recommendations of the Task force on Climate-related Financial Disclosures (TCFD) and seeks to minimize the financial impact attributed by the climate crisis.

Table of Contents

Disclaimer

This document contains predictive information and forecast on risk analysis and financial impact of the Company's business operations, which is a result of analysis on the premise of changes in the Company's internal and external business environment that may occur in the future, and thus contains uncertainties. In addition, this material has been prepared based on historical data and/or externally reliable public information, and the Company does not guarantee the accuracy or completeness of this material or its contents. 'Predictive information' such as, forecast, anticipation, plans, expectations, etc., may differ from the actual future performance of the Company due to the uncertainty of its nature, and there are risks involved in relying on past data and 'predictive information' that may not include certain variables.

The TCFD Overview

As the materiality of disclosing climate change-related information increases, as of 2021, more than 2,600 companies, governments, and supervisory agencies in 89 countries around the world have declared their endorsement for the TCFD. In major countries, including the UK, New Zealand and Switzerland, TCFD-aligned disclosures become mandatory.

Governance
Organizational governance on climate change-related risks and opportunities

Strategy
Actual and potential impacts of climate change-related risks and opportunities on the Company's business, strategy, and financial plans

Risk Management
Processes used by the Company to identify, assess, and manage climate-related risks

Metrics and Targets
Indicators and targets/goals used to assess and manage climate-related risks and opportunities

Key Achievements

Declaration of Support for the TCFD

Samsung SDS declared its support for the TCFD in April 2021, and was the first Korean software and service company to do so.

Governance

· The ESG Committee

- Established the ESG Committee under the BOD
- Consists of 5 members: the CEO and 4 independent directors

· Environmental Management TF

- Consists of 1 executive in charge of the environment along with staff from 6 environment-related departments.

Strategy

· Climate Change Response Strategy

- Goal: Carbon Neutral by 2035
- GHG Reduction Strategy(4G)
  - · Green Cloud
  - · Green Energy
  - · Green Logistics
  - · Green Campus

Risk Management

· The ESG Committee on Risk Management

- Oversees and manages environment related risks and issues

· Risk Council

- Monitors and manages environment related regulations and risks

Metrics and Targets

· Carbon Neutral 2035

- Reduce 60% of Scope 1 and 2 emissions by 2030
- Achieve carbon neutral by 2035
- RE100: source 100% of electricity consumption from renewables

· SBTi-based Scope 3 reduction plan (under development)

Governance

Samsung SDS top management is wholly responsible for responding to climate change and the governance supervising and managing related issues by the BOD along with the CEO(the Board chair). The BOD oversees the climate change-related strategies, operations, and management. The company's management makes decisions on, deliberates on, and supervises important environment related issues with the ESG Council and Environmental Management TF.

ESG Committee

The ESG Committee was established in October 2021, under the BOD. The committee deliberates on and approves the agenda on sustainable management including climate change. The committee reviews issues, strategies, and programs related to sustainable management, and supervises and advise major sustainability issues affecting the company's business.

Composition

Composition		Roles
Independent	4(including the chair)	· Establishing ESG strategies and policies · Managing and supervising actions taken in relation to ESG · Establishing strategies and directions in response to climate change · Disclosing ESG information and managing external communication
Executive	1	

Environment-related Agenda

Item	Details	Date
ESG strategy and progress report	Environment management organization operation plan	January 27th, 2022
ESG rating results and filings	2022 Samsung SDS ESG plan	January 27th, 2022

Workshops strengthen the competency and decision-making capability of the ESG Committee. External experts are invited to share their viewpoint and take part in discussions on environmental issues.

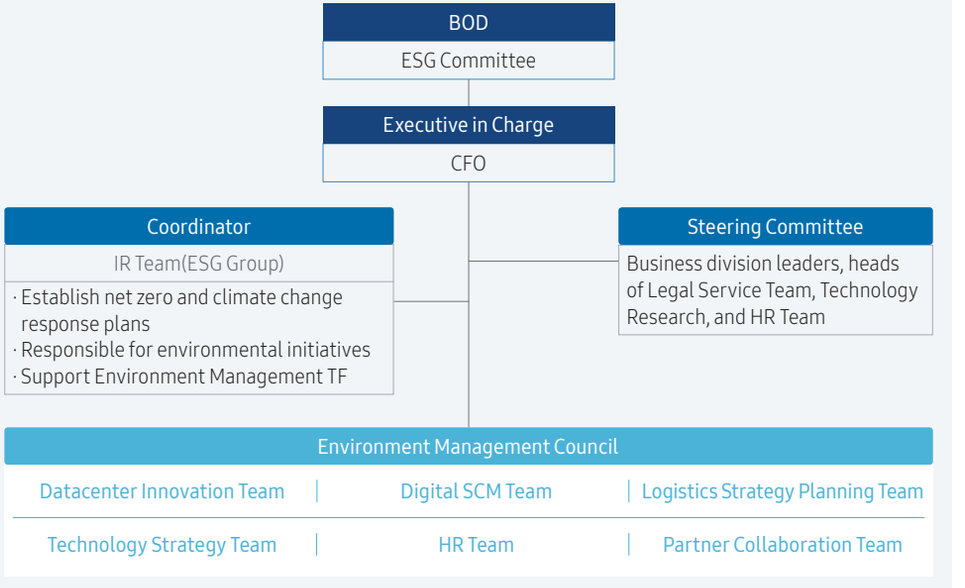
Workshop

Category	Details	Reporting Date
Climate Change	Regulations and trends on climate change and global leading companies cases	April, 13th, 2022
Carbon Neutrality	Carbon neutral and renewable energy plans	May 16th, 2022

Environment Management TF

Samsung SDS takes environmental conservation and responding to climate change issues very seriously. The company's management performance index reflects its effective response to climate change and environment related issues to ensure successful environmental management. Environmental Management TF was established in December 2021 to respond to climate change. To reinforce the governance, CFO was appointed as the executive in charge and related departments participate. The TF identifies environmental management tasks in a variety of categories, and will continue to identify environmentally friendly projects and to carry out detailed activities.

Environmental Management TF Governance



Strategy

Samsung SDS established climate change scenarios and analyzed related risks based on global guidelines such as TCFD and CDP. Largely 2 major scenarios(① physical, ② business environment such as regulations, market, and technology level) were analyzed and managed the risks of “RCP 8.5 and IEA Current Policy Baseline Scenario” in comparison to “RCP 2.6 and IEA Sustainable Development Scenario.”

Risks and Opportunities

	Short-term(~2025)	Medium-term(~2030)	Long-term(~2050)
Risks	· Increase in carbon credit cost · Costs for regulatory response(costs for verification, manpower)	· Increase in costs for purchasing renewable energy (including electricity rates) · Increase in cooling costs due to global warming	· Corporate reputation risks · Facility management risks due to climate change
Opportunities	· Reduced data center operating costs through the expansion of high-efficiency facilities	· Reinforced the competitiveness of eco-friendly data centers	· Improved brand image as an eco-friendly company

Transitional Risks

1) Policy and Legal

Because Samsung SDS is a global company operating in 40 countries around the world, it is affected by the systems and regulations of different countries. The international community is actively addressing climate change caused by global warming and enacting national environmental regulations and policies in accordance. Samsung SDS may be subject to the EU Carbon Border Adjustment Mechanism(CBAM) and mandatory climate disclosure regulations by the US Securities and Exchange Commission. Cost of responding to new regulations and policies in countries where it operates is expected to be increased. Further, due to Carbon Neutrality Framework Act in Korea effect in March 2022, risks of responding carbon emission regulations and reducing carbon emissions are expected to increase.

2) Technology

Data throughput is expected to be continuously and vigorously increase as the demand for IT services based on digital technologies such as AI and IoT. Accordingly, high-performance computing(HPC) technology, processing large-capacity data at high speed, is applied to improve data center performance and increase efficiency. Therefore, investment is expected to increase to improve energy efficiency and performance of data centers.

3) Market

Samsung SDS' major B2B customers declare carbon neutral, expand their emission management scope, and reinforce eco-friendly purchasing policies. Due to the trends moving towards carbon neutral and response to climate change, carbon emission reduction activities can significantly impact on its businesses.

4) Reputation

As corporate environmental and social responsibilities on environment are increasing, corporate ESG activities have become even more important. As a global leading IT service provider operating business in 40 countries, Samsung SDS can be affected by negative feedback from stakeholders, therefore, lower its brand value and damage reputations. To lower its reputation risks and enhance corporate brand value, Samsung SDS will i) declare carbon neutral target and use of renewable energy plan, and ii) disclose detailed plans through SBTi in order to fulfill environmental responsibilities and willingly respond to climate change.

Physical Risks

1) Facility Management Risks due to Climate Change

Climate change may cause natural disasters such as typhoons, torrential rains, and abnormal high temperatures, which may damage offices and buildings or cause malfunctions in facilities. Replacement cycle for outdoor air filters at data centers may be shortened due to an increase in the occurrence of yellow dust caused by global warming and fine dust by the use of fossil fuels. The amount of solar power generation may decrease due to lack of sunlight as well.

2) Global Supply Chain Risks due to Climate Change

Global supply chain risks such as rising oil prices are increasing more than ever due to abnormal weather conditions. Samsung SDS’ logistics services may be exposed to such risks, and this may cause delays and disruption in logistics services or increase service costs having negative impacts on its financial performance.

Opportunities

1) Reduced Operating Costs by Expanding Low-carbon Facilities

Samsung SDS already obtained PUE* for global top-tier data centers, and is continuously improving the ratio by expanding renewable energy, using direct and indirect outdoor air cooling system, introducing high-efficiency power facilities, controlling the number of temperature & humidity chambers using computational fluid dynamics(CFD), and identifying optimal cooling conditions with artificial intelligence. For efficient energy management, Samsung SDS established Power Status Monitoring(PSM) to monitor the usage of IT equipment and data center facilities in real time measuring and managing energy usage for each component. With PSM, Samsung SDS monitor the results of various activities to improve energy efficiency in real time. Samsung SDS is expected to be able to reduce electricity consumption, GHG emissions, and electricity costs by 31% for Dongtan Data Center, which is scheduled to open in 2022. Samsung SDS will also reduce energy costs for existing data centers by expanding high-efficiency facilities.

2) Strengthening the Industrial Competitiveness of Eco-friendly Data Centers

Samsung SDS considers energy-efficient data centers as an opportunity for growing its business. Customers prefer products and services that are engaged in eco-friendly activities with minimal negative impact on environment, and increasingly choose brands that are engaged in such activities and services. In the era of the 4th industrial revolution, data usage is rapidly increasing, and the data center outsourcing business is expected to continue to grow. Samsung SDS' data center has a low PUE* which can lower energy costs and increase cost competitiveness. As a number of customers require low-carbon data centers increases, it is expected that Samsung SDS can secure technological competitiveness.

3) Enhancing Corporate Image as an Eco-friendly Company

Climate change can be a risk to businesses, but it can also be an opportunity. Samsung SDS strives to achieve net zero and renewable energy conversion. Various stakeholders such as investors and ESG rating agencies monitor a company's eco-friendly activities and fulfillment of the related goals, influencing its corporate image and brand reputation. Eco-friendly activities including the operation of energy-efficient data centers and conversion to renewable energy are expected to have a positive impact on a company's brand value and reputation.

* PUE(Power Usage Effectiveness) : The total amount of electricity used by the data center that is divided by the amount of electricity consumed by IT equipment. It is generally used as a measure of data center efficiency; the closer to 1, the more power is saved.

Financial Impacts

1) Cost of Purchasing Carbon Credits

Samsung SDS is subject to the national GHG Emissions Trading Scheme(ETS), and has been allocated carbon credits for all domestic business sites from 2021. If the amount of emissions exceeds the quota, additional allowances must be purchased or emissions must be reduced. As the paid allocation ratio for the Phase 3 of the ETS is set as 10%, there will be a serious shortage of carbon credits. That is, the credit cost may increase and additional costs may incur.

2) Purchase Costs for Renewable Energy

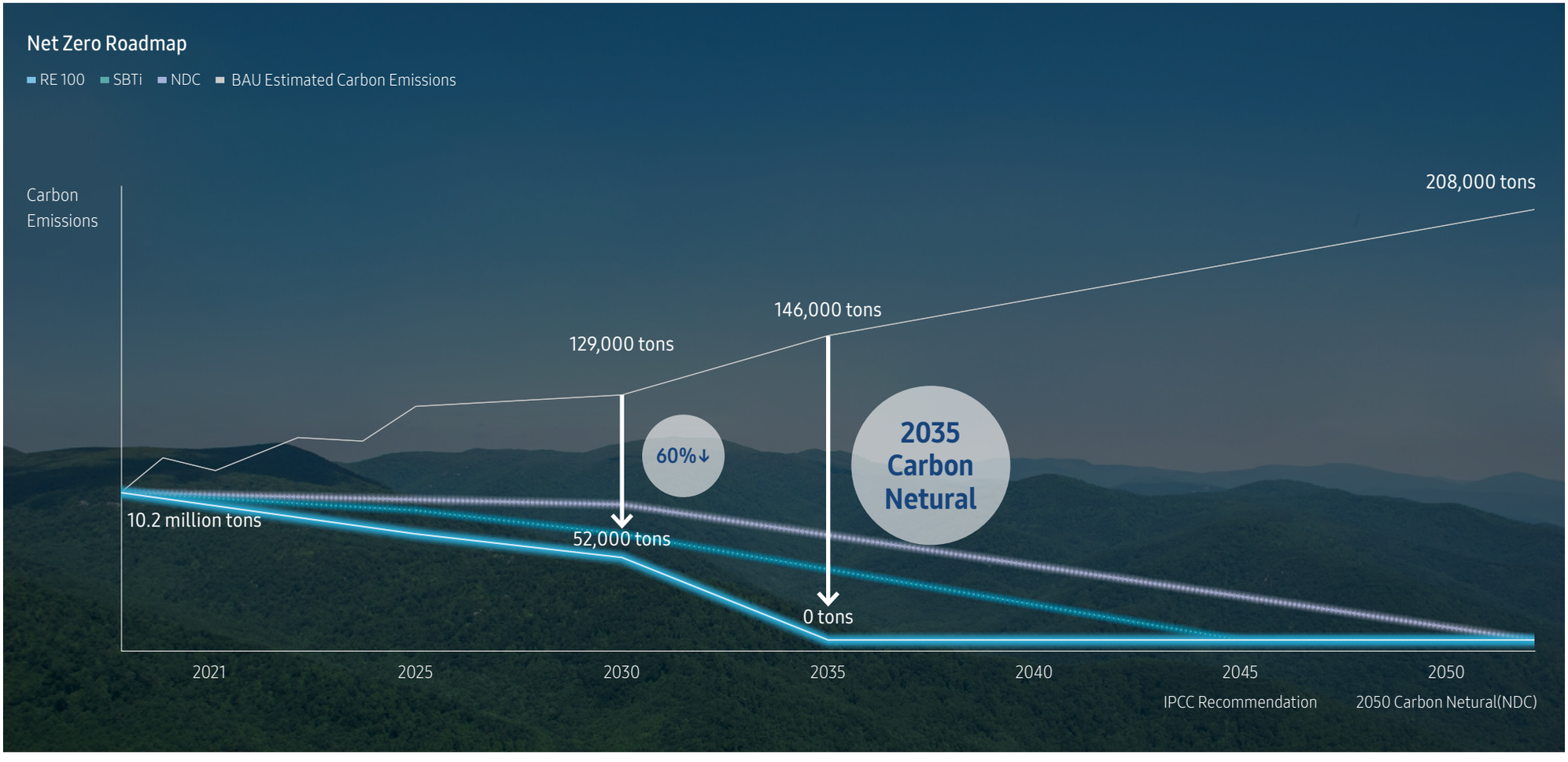
In order to meet its goal of achieving carbon neutrality by 2050, the Korean government has enacted a number of policies and regulations to lower carbon output and increase the use of renewable energies. The government is expected to phase out energy generated by fossil fuel and maximize the use of renewable energy in order to achieve 2050 national net zero target. The government policy to switch to renewable energy has a significant impact on the industry; the demand for renewable energy is expected to skyrocket causing price hikes and procurement risks.

3) Increase in Cooling Costs due to Global Warming

When operating data center infrastructure, the most energy is consumed to cool the server room. Climate change causes global warming and increases the cooling costs of data centers.

2035 Carbon Neutral

The rapid growth of IT industry due to the pandemic has led to increase in the amount of data usage and transportation volume. Samsung SDS businesses are directly affected by these factors and the amount of greenhouse gas(GHG) emissions is expected to increase accordingly. Samsung SDS has set a leading carbon reduction goal of achieving carbon neutral by 2035, the highest level in the domestic IT industry, to secure business opportunities and to preemptively respond to the climate change crisis as a responsible member of society. Further, the company plans to participate RE100 and to transfer the energy use to 100% renewable energy. Samsung SDS supports the Paris Agreement, and will join the 'Business Ambition for 1.5℃,' and plans to reduce Scope 1 and Scope 2 carbon emissions from business sites by 4.2% annually compared to the emissions in 2021 in accordance with the science-based GHG emission reduction guidelines.



Response to Climate Change

Scope 1(Direct Emissions)

Green Campus

Reduce carbon emissions through paperless campaigns, efficient use of resource, solutions(e.g., VDI, Brity Works) to support improvement in employee commuting

Transition corporate-owned vehicles to EVs

Afforestation

Scope 2(Indirect Emissions)

Green Cloud

Operate eco-friendly high performance data center(HPC) and continuous investment for data center efficiency and PUE improvement

Increase the number of inverters

Install containments

Change cooling method

Green Energy

Transit to renewable energy with solar PV and thermal power generation

Scope 3(Indirect Emissions)

Green Logistics

Reduce carbon emission with Cello, intelligent logistics platform

Employee commuting and business trips

Green procurement

Minimize single-use products

Route Optimization

Improvement in loading efficiency

Calculate carbon emissions for each transportation method

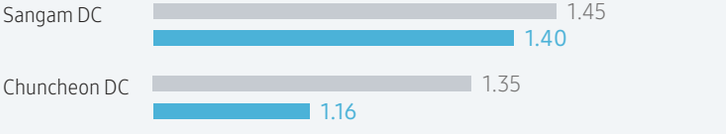
GHG Emission Reduction Strategy

Green Cloud	Green Logistics	Green Energy	Green Campus
· Build high energy efficient data center · Continuously improve data center energy efficiency	· Optimize routes and loads with logistics platform, Cello · Improve features related to carbon emissions	· Generate solar energy · Convert to electric vehicles · Absorb and/or remove emissions	· Paperless campaign · Recycling resources · Utilize collaboration solutions

Green Cloud

Samsung SDS plans to reduce carbon emissions by approximately 30% compared to Business As Usual (BAU) by 2030 by building an eco-friendly data center and introducing corresponding operation technology. Through the construction of a high-efficiency data center(Dongtan DC with target PUE 1.12) and continuous investment and technology application(increase the number of inverters, install containments, change cooling method) to improve data center efficiency. The company will decrease the average PUE to reduce GHG emissions compared to its sales level.

Improve PUE with Outdoor Air Cooling



* Comparison of PUE between periods when outdoor air taken and not taken in

Green Data Center Certification (Platinum Grade)

Eco-friendly Investment at Dongtan Data Center

(Unit: billion KRW)

Category	Items	Amount
Construction	Containment	0.9
Electricity	High efficiency UPS	4.0
	High efficiency transformer	2.4
	Device for power factor correction	0.2
	LED lights	0.7
	Establishment of solar energy facilities	0.9
Machinery	High-temperature and cold-water refrigerator(large temperature difference)	5.1
	Water-side economizer	5.1
	Inverter pump	1.0
	Fan wall(variable air volume fan)	16.8
	Temperature & humidity chamber(variable air volume fan)	2.0
	Total heat exchanger	0.01
Total		39.2

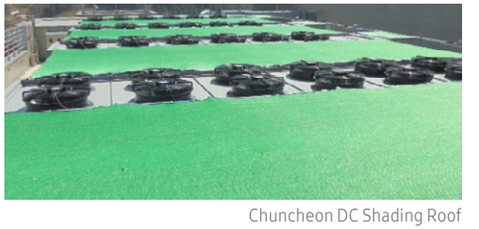
Green Energy

Samsung SDS plans to reduce 78,000 tCO_2eq(60% of its emissions estimated) by 2030 and achieve 100% transition to renewable energy by 2035.

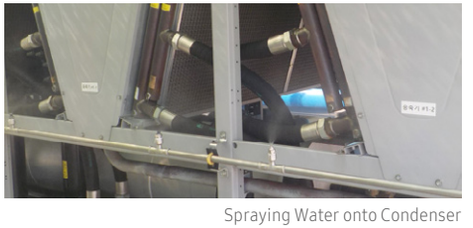
Year	Estimated GHG emissions	Amount of renewable energy*	GHG emissions after
2022	10.2	0.6	9.6
2023	11.0	1.9	9.1
2024	10.1	1.6	8.5
2025	10.8	2.8	8.0
2026	11.7	4.3	7.4
2027	10.9	4.0	6.9
2028	11.8	5.5	6.3
2029	12.6	6.9	5.7
2030	12.9	7.8	5.1

* REC, PPA, and/or other means to transit to renewable energy

Chuncheon DC Photovoltaic Power Generation



Chuncheon DC Shading Roof



Spraying Water onto Condenser

Containment Cold Aisle

Green Logistics

In order to achieve its carbon emission reduction target, Samsung SDS is developing the ESG platform to monitor various ESG data such as electricity consumption and to manage data center PUE in real-time. The company's logistics service platform, Cello, contributes to reduce carbon emissions by optimizing load and routes. Further, a feature to calculate carbon emissions for each transportation method will be added shortly.

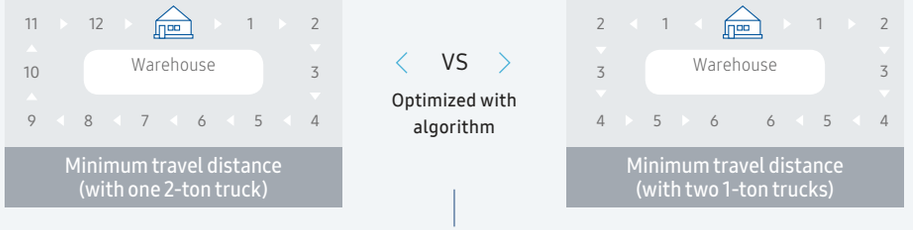
우수녹색물류실천기업
Certified Green-Logistics Company
국토교통부

Green-Logistics Company Certification

Cargo Characteristics		Examples of Optimal Logistics Method			
		Cargo size	Delivery period	Affordability of freight charge	Transportation method
Type of goods Weight/volume Transportation section and routes Delivery date and freight charge	Simulation →	No. of pallets	Short term	High	Air
		No. of boxes	Short term	High	Express
		No. of boxes	Long term	Low	Ocean FCL
		20ft<	Long term	High	Ocean FCL

Routes Optimization

· Automated vehicle allocation plan considering delivery condition and routes



After application of system

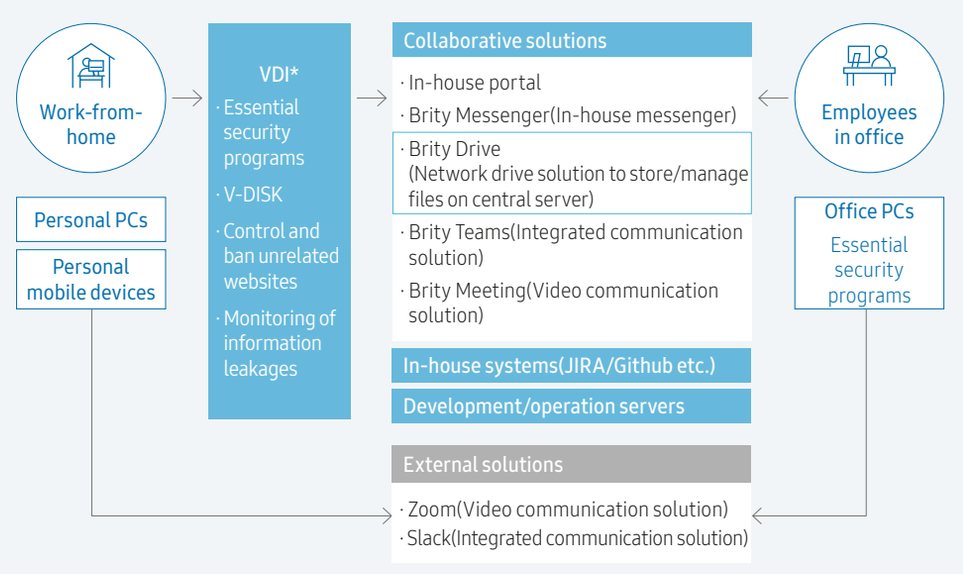
20% reduction in number of vehicles allocated, and
15% reduction in number of delivery destinations

Green Campus

Samsung SDS promote various activities to reduce carbon emissions in workplaces such as changing corporate-owned vehicles to electronic vehicles, runs paperless campaign, utilizes VDI and collaborative solutions, and recycles resources. Specifically, use of printer toner was reduced by 41.8% after paperless campaign.

Paperless Campaign, Jjong-ee

For employees to form the same environment when remote working, collaboration solutions including VDI(Virtual Desktop Infrastructure) and Brity Drive were provided. Further, the solution contribute to reduce carbon emissions and improved employee work convenience, especially after pandemic broke out: reduction in employee commuting.



* Virtual Desktop Infrastructure: a virtual environment to achieve the same work environment both inside and outside the office

Climate-related Risk Assessment

Samsung SDS conducted qualitative and quantitative scenario analysis on risks related to climate change. As the Korean government announced that Korea will reduce its GHG emissions by 40% until 2030 to ultimately reach net zero, carbon related regulations will inevitably be tightened, and stress on the Korean industries is expected to aggravate. To this end, the climate-related risk scenario is analyzed based on the NDC, national policies and target for climate change issues. The GHG emission reduction strategy and target are analyzed based on RCP 2.6 and BAU Scenario, whereas the emission amount was analyzed based on RCP 8.5.

Boundary

Samsung SDS has 2 climate change risk scenarios, ① physical and ② transition such as regulations, markets, and technology levels, and the environmental risks are analyzes based on global standards including TCFD and CDP. The risks of 2 scenarios are managed in comparison with the risks of 'RCP 2.6 and IEA's Sustainable Development Scenarios(SDS)' and 'RCP 8.5 and IEA Scenarios based on the current status.'

Timescales

The timescales are divided into short-term(up to 5 years), medium-term(up to 10 years), and long-term(up to 20 years), and risks and opportunities are analyzed by each timescale.

Risk Types

Samsung SDS defined risks and opportunities into 6 categories: regulation, technology, acute physical, chronic physical, market, and reputation. For business impact analysis, 6 topics are selected: financial impact, management strategy, product and service, business site, R&D, and value chain.

Physical Risk

Risk Type	Natural disasters related to climate change, such as typhoons and floods
Analysis Criteria	RCP 2.6(2ºC scenario) RCP 8.5(4ºC scenario)
Focused Subjects	Samsung SDS data centers

Transition Risk

Risk Type	Climate change risks related to government regulation, market, technology, industry and corporate reputation
Analysis Criteria	IEA Sustainable Development Scenario IEA Scenario based on current policies
Focused Subjects	[Policy] Carbon regulation [Market] IT and logistics market

Financial Impact

· Chronic physical: increase in cooling cost at data centers due to global warming

- KRW 500 million annually when 2°C rises
- KRW 800 million annually when 4°C rises

· Acute physical: increase in facility management cost due to climate change

- KRW 170 million annually when data center maintenance cost rises by 10% based on RCP 8.5 Scenario

· Regulation: GHG-related regulations of Korean government

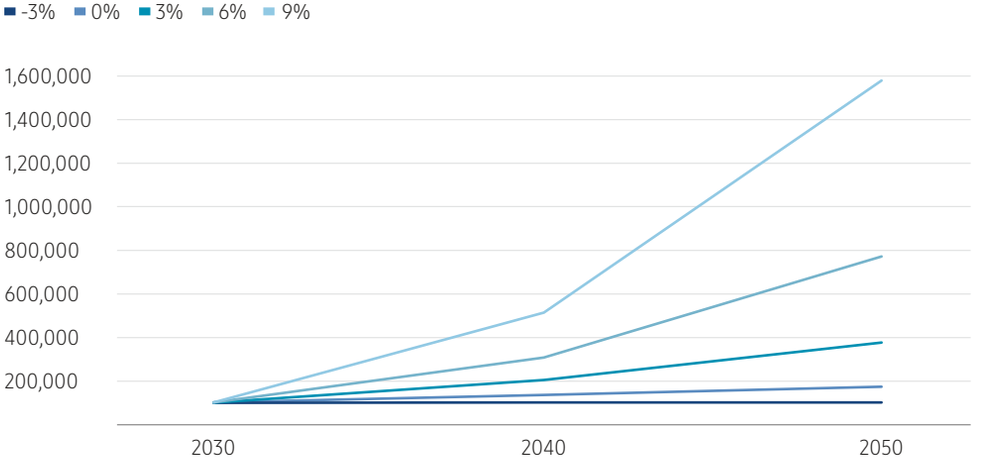
- Additional cost, KRW 82,500/ton, to achieve Well Below 2°C target by 2030

Sensitivity Analysis

Samsung SDS will respond to climate change by setting carbon neutral and RE100 target. The cost of purchasing renewable energy as well as changing the energy source is expected to be a critical financial risk. Considering the current renewable energy market in Korea, REC is the most realistic and propelling method. Therefore, REC sensitivity analysis was conducted with consideration of NDC, SBTi, RE100, carbon neutral target year, and cost fluctuation.

Along with REC sensitivity analysis, PPA and other means of renewable energy will be monitored, and the sensitivity analysis will be continuously conducted every year. To this end, Samsung SDS will continue to monitor and review the strategy and methods, and disclose the status.

RE100 Cost based on REC Price Fluctuation



As demand for renewable energy surges, financial burden can increase as REC price fluctuates. Depending on REC prices, carbon neutral expense is expected to range between KRW 500 billion to 2 trillion by 2050. To minimize the cost, the company will constantly monitor the market price of renewable energy and revise renewable energy portfolio.

Risk Management

Analyze	Establish Strategy	Manage	Monitor and Improve
- Define risks that are highly relevant to Samsung SDS - Risk analysis (risk occurrence cycle, probability of occurrence, financial-geographic-time impact range, etc.)	- Establish company-wide strategy for each issue - GHG reduction - Construction and Operation of Data Center - Products and Services - Technical R&D - Cost of responding to climate change	- Specific management activities - Data center energy efficiency - Carbon Offset - Expansion of renewable energy - Participation in climate change initiatives - Support for suppliers' GHG reduction projects	- Performance monitoring - Performance assessment - Reflect and improve assessment results - Establish an annual plan for the next year

Risk Types	Business Impact Analysis	Operation of Risk Management
Regulation Acute Physical Technology Chronic Physical Market Reputation	Financial Impact Business Strategy Products and Services Workplaces R&D Value Chain	3.1. Risk Management - Governance - Management Process - Monitor and improve

Risk Council

The Risk Council of Samsung SDS holds a briefing session twice a month on financial and non-financial risks, including climate change issues. Consisting of directors in charge of human resources, finance, legal affairs, and supply chain, the Risk Council is responsible for reporting major issues, issues to the Board of Directors.

Samsung SDS manages sustainability issues by designating the CFO as the Chief Risk Officer(CRO) of the Risk Council. With support from relevant departments, the Council analyzes risks associated with climate change related regulations, corporate reputation, and supply chains. In addition, the council identifies and manages specific activities to manage critical climate change risks and opportunities. The council also evaluates the performance of the company's activities to manage these key risks and opportunities, and based on the evaluation results, improvement plans for more effective management are reviewed. Achievements and progress are transparently disclosed through the sustainability report.

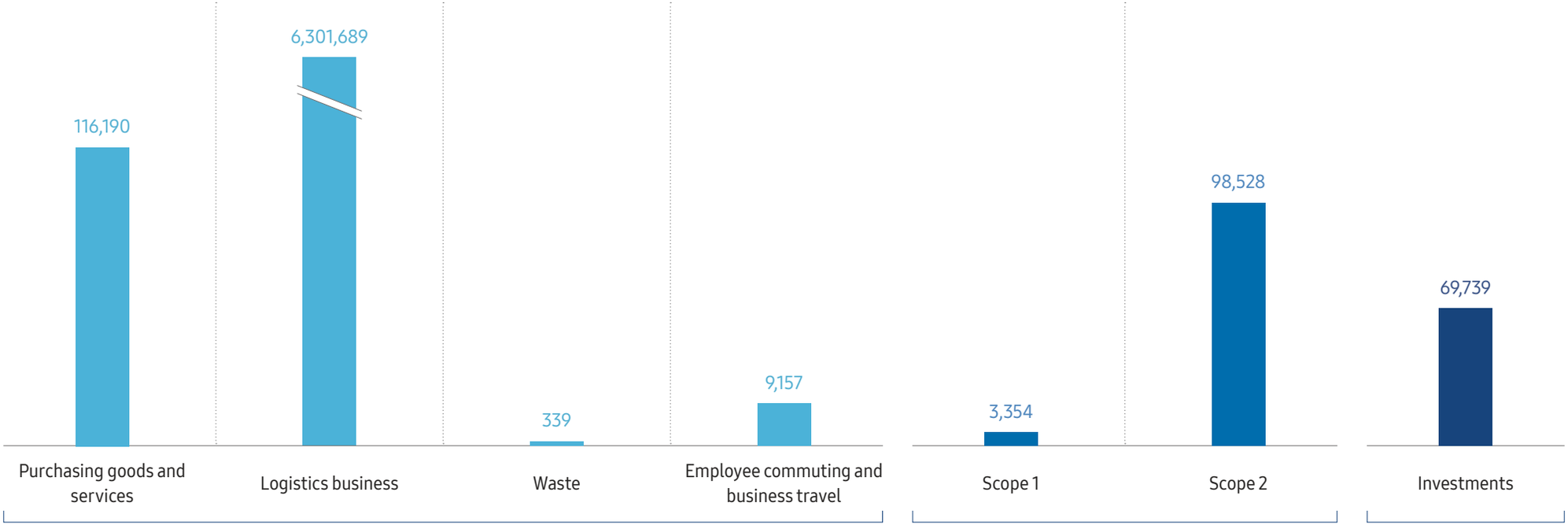
Metrics and Target

Value Chain Emission Management

Samsung SDS will continue to manage GHG emissions by monitoring and analyzing carbon emissions throughout the value chain.

GHG Emissions throughout Value Chain in 2021

(Unit: tCO_2eq)



Purchasing goods and services	Emissions by purchasing goods and services in 2021(exclude tangible/intangible assets and buildings under construction)
Upstream transportation	Emissions from logistics business operation
Waste	Emissions from waste generated from offices
Employee commuting and business travel	Emissions by employee commuting and business travel

Scope 1 (direct emission)	Company owned vehicles, heating and emergency power at office buildings
Scope 2 (indirect emission)	Electricity used at offices and data centers

Investments

Emissions of equity investment taking the company equity ratio into account

Key Metrics and Target

	Current	2030	2035
Data Center PUE (Power Usage Effectiveness)	1.5	1.3	1.3
Emission Reduction from DC Operation Efficiency	5,373	54,838	61,742
Renewable Energy Conversion Rate	0%	60%	100%
	Current Level	2030	2035
Scope 3 Emission Reduction Rate	0%	17%	25%

Greenhouse Gas(GHG) Emission Amount

Samsung SDS Scope 1 emissions are generated mostly from boilers, work vehicles, and emergency generators, while Scope 2 emissions are mainly from power consumption at data centers and the use of hot water supplied from Korea District Heating Corp., The company's total Scope 1 and 2 GHG emissions in 2021 is 101,873 tCO_2eq, 6,596 tCO_2eq increased compared to the emissions in 2020, due to the increase in data center server installations and the building a new business site.

Type	2019	2020	2021
Sum of Scope 1 and Scope 2	97,073	95,277	101,882
Scope 1	4,300	3,488	3,354
Scope 2	92,778	91,795	98,522
Scope 3	-	5,890,563	6,419,436

Environmental Initiatives

In order to accept the global recommendations for climate change-related information disclosure, Samsung SDS declared its support for TCFD in April 2021, becoming the first Korean software and service company to do so.

Samsung SDS participates in the Carbon Disclosure Project(CDP), and obtained Management B in 2021.

In accordance with the RE100 guideline, Samsung SDS prepares to transfer the energy source from fossil fuel to renewable energy.

Samsung SDS plans to establish a carbon emissions reduction target in accordance with the SBTi to systematically implement and verify reduction targets.

SAMSUNG SDS