

# SUSTAINABILITY MEGATREND

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# Response to Climate Change

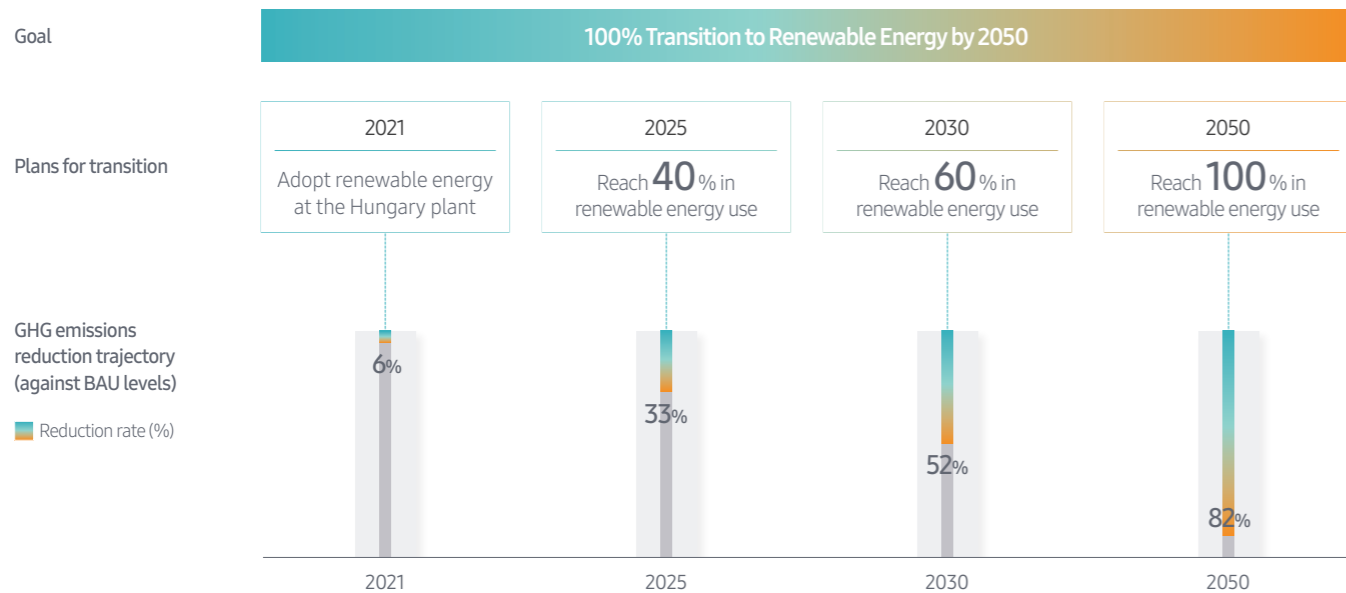
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## Management Strategy and Approach

### Setting Our Renewable Energy Goal

Countering climate change is emerging as a grave, imminent challenge of the international community and also as a new opportunity for businesses. To join in the concerted effort of the global community to address climate change and respond to the new normal of climate regulations, we at Samsung SDI have set a new goal of achieving '100% transition to renewable energy by 2050'.

To achieve our renewable energy transition goal, we will first increase the use of renewable energy step by step across domestic and overseas manufacturing worksites. We will adopt renewable energy at our Hungary plant, an automotive battery production location, in 2021, and move on to gradually expanding the use of renewable energy to meet 40% by 2025, and 60% by 2030 of our total power consumption through renewable energy respectively to completely shift to renewable energy at all our domestic and overseas worksites by 2050. By implementing our renewable energy transition plan, we believe we could reduce our GHG emissions by 33% by 2025, and by 52% by 2030 from BAU (Business As Usual) levels.



### Governance Related to Climate Change Response

Major issues such as climate-related risks and opportunities that may have impact on our business operations are managed at the Board of Directors and senior management level.

Our top management including the CEO discusses and manages climate-related major issues and response strategies (use of renewable energy and GHG emissions reduction targets & strategies, etc.). Major risks that could bring significant impact to our business operations are addressed through the deliberations and decisions made by the BOD.

Our Planning Team is responsible for identifying risks and opportunities in such sustainability management sectors as climate change, and for developing company-wide response strategies in alignment with our business strategy.

In addition, the EHS & Infra Team is engaged in diverse activities from calculating GHG emissions generated from business operations to conserving energy to help mitigate GHG emissions.

### Risk and Opportunity Factor Analysis

To effectively respond to tightening global climate change regulations and the needs of stakeholders including customers and investors, Samsung SDI is analyzing climate-induced risk and opportunity factors and their resulting impacts from the mid/long-term perspective.

### Risk Factor

Samsung SDI's climate-related risks are categorized into transition risks and physical risks.

Transition risks refer to risks that may arise as a result of the transition towards a low carbon economy in the international community, and can be classified into policy risks, market risks, technology risks and reputation risks.

To analyze transition risks, we assessed these risks based on three carbon price pathways – a high price scenario (full implementation to meet the Paris Agreement goal of 2°C), a medium price scenario (future possible carbon prices), and a low price scenario (full implementation of countries' nationally determined contributions) as well as on future GHG emissions prospects.

Policy risks are defined as impacts that affect businesses as a result of carbon prices increasing due to tightening climate change regulations.

While financial impacts from renewable energy transition and carbon regulations are not expected to be sizable in the short-term at Samsung SDI, their mid/long-term implications could expose us to additional carbon cost risks due to the growing EV battery and ESS markets and their resulting increases in production, GHG emissions and carbon prices.

Our level of risk exposure was assessed as low both in market risks and technology risks, each referring to the impact of climate change on market demand and cost of migrating existing products to their low-carbon versions respectively.

As to physical risks, our worksites in China, Korea and other Asian regions are likely to be exposed to the risks of heat waves, fires, floods (inundation) due to abnormal weather conditions stemming from climate change while our Hungarian worksite that serves as our key production base of EV batteries faces low risks.

### Opportunity Factor

Our green materials and energy solutions business falls under the category of low-carbon industries that play a pivotal role in achieving the 2°C scenario. As the global battery market demand is forecast to surge by 2030, this will naturally bring greater opportunities to increase our profits.

### Risk Management

Samsung SDI will strengthen internal management and connect more closely with stakeholders to move towards attaining its goal of achieving a full 100% renewable energy transition by 2050.

We will establish a mid/long-term roadmap for renewable energy transition, and achieve our goal as planned through continued risk factor identification, evaluation, and systemic performance management. We will transparently communicate each of the milestones we reach in attaining the set goal with our stakeholders through sustainability reports, CDP reports and other diverse means.

### Risk Factor Analysis Outcomes

Risk	Expected Impact	Risk Impact Mid/long-term (5 years and beyond)	Assessment Basis
Transition Risk <sup>1)</sup>	Increasing climate-related policies and regulatory risks	High	Samsung SDI GHG emissions prospects and future regional carbon prices based on climate change scenarios * Analytical tool: S&P Trucost
	Low impact of climate change on the financial status of major customers	Low	Financial impact assessments on customer industries and major customers * Analytical tool: S&P Trucost
	Low risk in consideration of low-carbon product and service offerings and R&D investments	Low	Ratio of sales in low-carbon related industries, ratio of investments and R&D on low-carbon technology * Analytical tool: S&P Trucost
Physical Risk	Risk of floods due to increases in average global temperature	Low	Risk impact assessments made in consideration of the regional proportion of business locations * Analytical Tool: Think Hazard index
	Rising expenses to maintain the operational conditions of manufacturing	Medium	Risk impact assessments made in consideration of the regional proportion of business locations * Analytical Tool: Think Hazard index

1) Source of carbon price scenarios: IEA and IRENA(2017); Trucost Analysis. As of June, 2017.

## Response to Climate Change

### Renewable Energy Transition

Samsung SDI is operating manufacturing worksites in Europe, the US, China, Southeast Asia and other parts of the world as well as in Korea. As such, we will consider institutional conditions and efficiency factors in these regions in developing our renewable energy transition plans and gradually extend their scope.

For our overseas manufacturing worksites, wide-ranging implementation plans are under review including the purchase of renewable energy certificates and the signing of Power Purchase Agreements. Beginning with our Hungary corporation embracing renewable energy in 2021, we will expand the use of renewable energy consecutively at our overseas manufacturing worksites in Asia, the US and others. In 2020, our Austria corporation met 67% of its total power needs through renewable energy. In Korea, review is underway on RE100 (Renewable Energy 100%) support programs by participating in a green pricing pilot project and a pilot program on RE100 Certificate (REC) trading.

### Reinforcing the Energy Management System at the Worksite Level

We take a multi-faceted approach to improving the substantial management of energy consumption at respective worksites. In 2020, an EES (Equipment Engineering System) was introduced to monitor and analyze the operational data of utility equipment mainly at our Cheonan worksite, and its application will extend to our Ulsan worksite in 2021. Furthermore, we are extending the application of the s-GEMS, our energy management system used by domestic worksites, to our overseas corporations. This system has been established at our Xi'an and Wuxi corporations, and will be expanded to all our overseas locations when COVID-19 subsides.

In line with the transition of international energy management system standards from ISO 50001 to ISO 50001:2018, we received reassessments and provided responsible staff at respective worksites with training on the new standard. In domestic manufacturing locations (Cheonan, Ulsan), we engaged external professional consultancies in auditing the on-site operation of our energy management system to identify and improve pending issues and establish a more efficient management system.

### Participating in the Emissions Trading System

We participate in the GHG emissions trading system to proactively respond to global climate change regulations. We are systematically managing our emissions targets with the help of the carbon management system established under the principles of Monitoring, Reporting, and Verification (MRV) and the s-GEMS, our IT energy management system. Such effective GHG emissions reduction activities eliminated the need for us to purchase GHG emissions credits for a total of six years during the first and second planning periods. Samsung SDI will continue with its efforts to mitigate GHG emissions in the years ahead.

### GHG Emissions Reduced at the Global Company-wide Level

Category	Unit	2018	2019 <sup>1)</sup>	2020
Fuel	tCO <sub>2</sub> e	9,878	16,306	17,662
Electricity & steam	tCO <sub>2</sub> e	42,998	104,073	76,183
Total	tCO <sub>2</sub> e	52,877	120,379	93,845

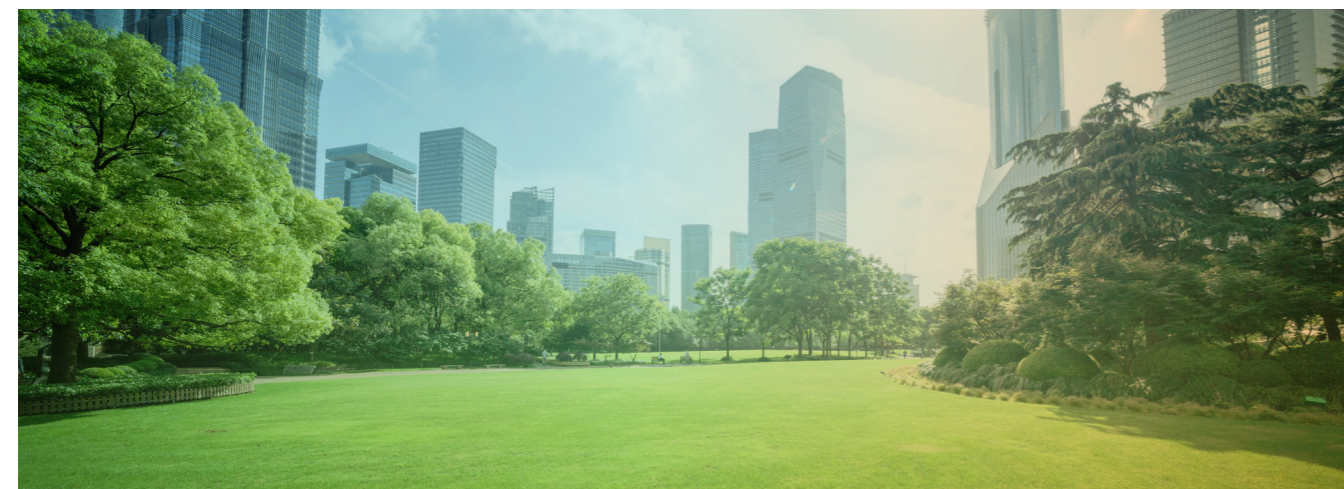
1) Reductions increased in line with change in the emission coefficient.

### Response to the CDP

In response to the increasing demand for climate information disclosures both at home and abroad, we are transparently disclosing our climate change strategy and our implementation of GHG emissions reduction activities through the CDP (Carbon Disclosure Project)<sup>1)</sup>.

As the impact of climate change aggravates on the financial aspect of businesses, we are also conducting objective analyses to proactively respond to this challenge. In 2020, we made it onto CDP's A-list.

1) A non-profit organization that evaluates the world's largest 500 companies by market capitalization for their response to its official request to disclose their environmental data, including GHG emissions and energy data



## Energy Use Management

### Major Energy Conservation Activities

We have designated specific worksites in Korea and abroad to provide them with intensive support and turn them into hub locations responsible for respective business divisions in rendering our manufacturing process more eco-friendly. Continuous technical support for overseas worksites is made available to the Cheonan worksite for Small-sized Li-ion Battery Business, the Ulsan worksite for Automotive and ESS Battery Business, and the Cheongju worksite for Electronic Materials Business. These worksites were assisted in altering their manufacturing process and infrastructure equipment operation methods, adopting energy-saving, high-efficiency equipment, and regularizing the reduction of losses from energy-consuming processes. In addition, quarterly theme-based energy-saving activities (Air Leak management, refrigerator and air compressor efficiency management, etc.) have been scaled up at the company-wide level to generate the greatest-possible reductions in energy use.

### Achievements Made in Reducing Energy Consumption among Domestic Worksites

Worksite	Activity	Achievement
Cheonan	Adopted variable controls on the regeneration temperatures of dehumidifiers	Reduce the consumption of electricity and steam energy
	Introduced a system to reuse pure RO concentrate	Reduce the consumption of industrial water
Ulsan	Altered the method to control temperatures within the dry oven/activated operational controls during the suspension of operations	Minimize electricity losses
Gumi	Improved the heat exchange method for air-conditioning equipment (direct expansion → cooling water)	Reduce electricity expenses
Cheongju	Improved efficiency in recovering waste heat within the water heating system	Reduce steam consumption



### Global Company-wide Energy Investments and Achievements in Reducing Energy Use

Category	Unit	2018	2019	2020	
Total investments	KRW million	1,840	1,495	2,869	
Fuel saving activities	No. of cases	78	88	98	
Electricity & steam saving activities	No. of cases	634	543	667	
	Total reductions made	TJ	1,081	1,679	1,640
	- Fuel reduced	TJ	197	321	396
	- Electricity & steam reduced	TJ	884	1,358	1,244
Savings generated	Total savings generated	KRW 100 million	89	186	195
	- Fuel savings generated	KRW 100 million	10	38	44
	- Electricity & steam savings generated	KRW 100 million	79	148	151

### Building Electric Vehicle/Bus Infrastructure

Along with the RE100 initiative, EV100 (Electric Vehicle 100%) is gaining increasingly wider acceptance to mitigate environmental pollution including but not limited to GHG emissions and particulate matters. Samsung SDI introduced two-step EV buses, that are purely battery-powered and thus do not generate any environmental loads during operation, for commuters at the Giheung worksite in 2019. We have since then built EV charging infrastructure in the parking spaces of our domestic worksites so that both our employees and customers can conveniently use their EVs.

Worksite	EV Chargers Installed
Giheung	1 for buses, 10 for passenger cars
Cheonan	1 for buses, 6 for passenger cars
Ulsan	7 for passenger cars
Gumi	4 for passenger cars

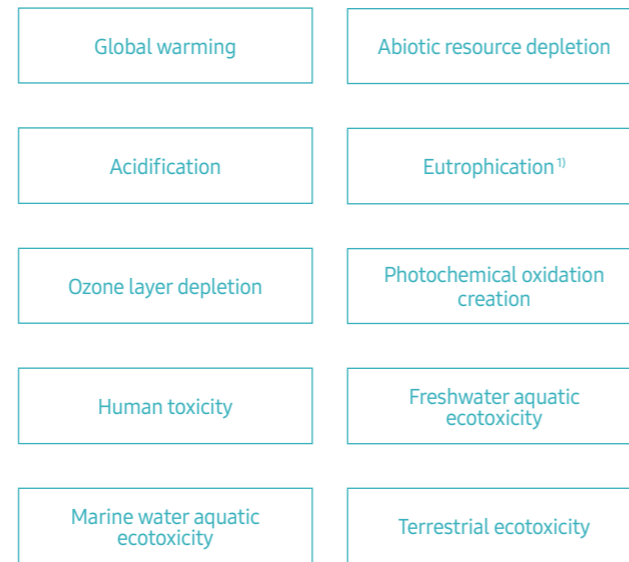
## Management of Product Environmental Impact

### Life Cycle Assessment (LCA)

Life Cycle Assessments (LCAs) were designed to identify GHG emissions and other environmental loads throughout the entire product life cycle from the extraction of raw materials to product use and disposal and to analyze the substantial environmental impact of such loads. Samsung SDI performs LCAs to develop measures to improve its environmental impact, and takes a step further to make these assessments in accordance with the principles set out in ISO14040/44 and PEFCRs (Product Environmental Footprint Category Rules) as a way to respond to the EU Battery Directive that is gaining significance recently.

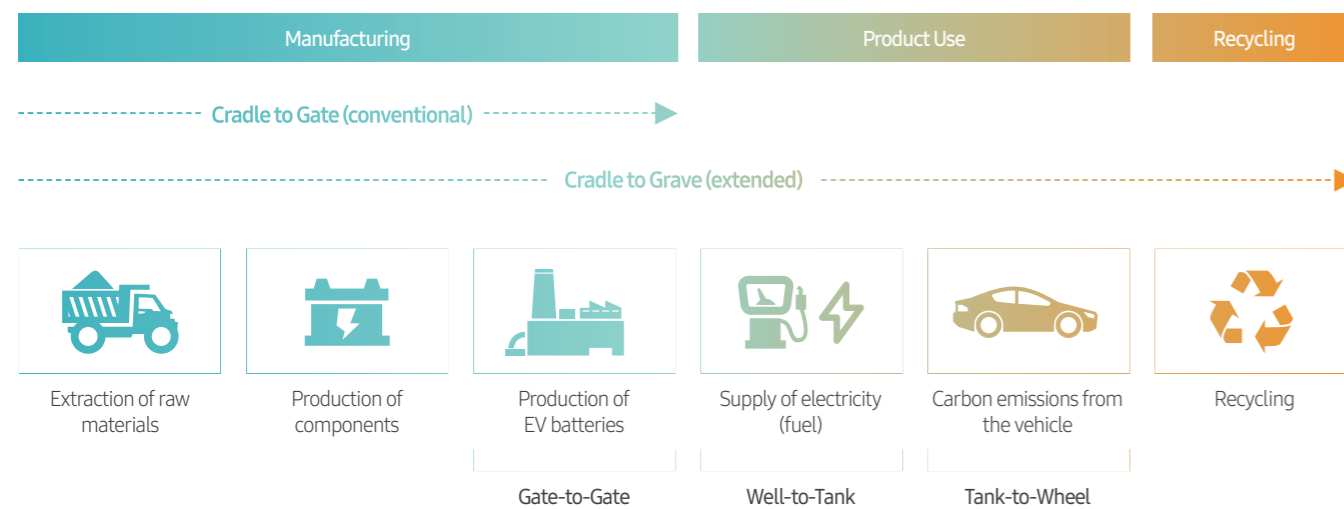
While the conventional Cradle-to-Gate LCA focused on the partial life cycle of products from manufacturing to the factory gate before they are delivered to the consumer, the improved process will take a Cradle-to-Grave approach to extend to the disposal phase in evaluating the environmental impact of products. This expanded methodology is expected to enable us to make further segmented assessment on environmental impact of products, and broaden the scope of assessments into reuse, recycling and other diverse impacts associated with resource circulation. Samsung SDI will leverage this improved process to evaluate the environmental impact of its products and thoroughly analyze assessment outcomes to further mitigate its environmental impact.

### Category of Environmental Impacts Analyzable through LCAs



1) Process by which rivers, seas and other aquatic ecosystems become progressively enriched with nutrients to eventually give rise to green tides or red tides

### Product Impact Assessment Phases of EV Battery



## Recycling & Reuse

### Background

Li-ion rechargeable batteries fulfill diverse functions in our daily lives, from mobile phones and laptops to EVs, and the market is surging in line with the growing demand. In proportion to this rapid market growth, the generation of end-of-life batteries is also expected to increase dramatically. Currently, there are no legally-binding regulations or guidelines both on the national and international level to govern the safe recovery and disposal of end-of-life Li-ion rechargeable batteries. This prompted us at Samsung SDI to partner with governments and specialized service providers to examine recycling and reuse measures to minimize the environmental impact of these end-of-life batteries from the product life cycle viewpoint.

### Recycling Achievements and Plans

In 2020, we established a resource circulation system to process the scraps generated from our Cheonan and Ulsan worksites to promote the recycling of end-of-life batteries. These scraps are sent to professional domestic recycling service providers and are recycled into cobalt sulfate, which is then delivered to materials suppliers and is fed back into our manufacturing process as primary/subsidiary raw materials. Going forward, we aim to expand a similar type of partnership to our overseas locations in Hungary, Malaysia and other parts of the world.

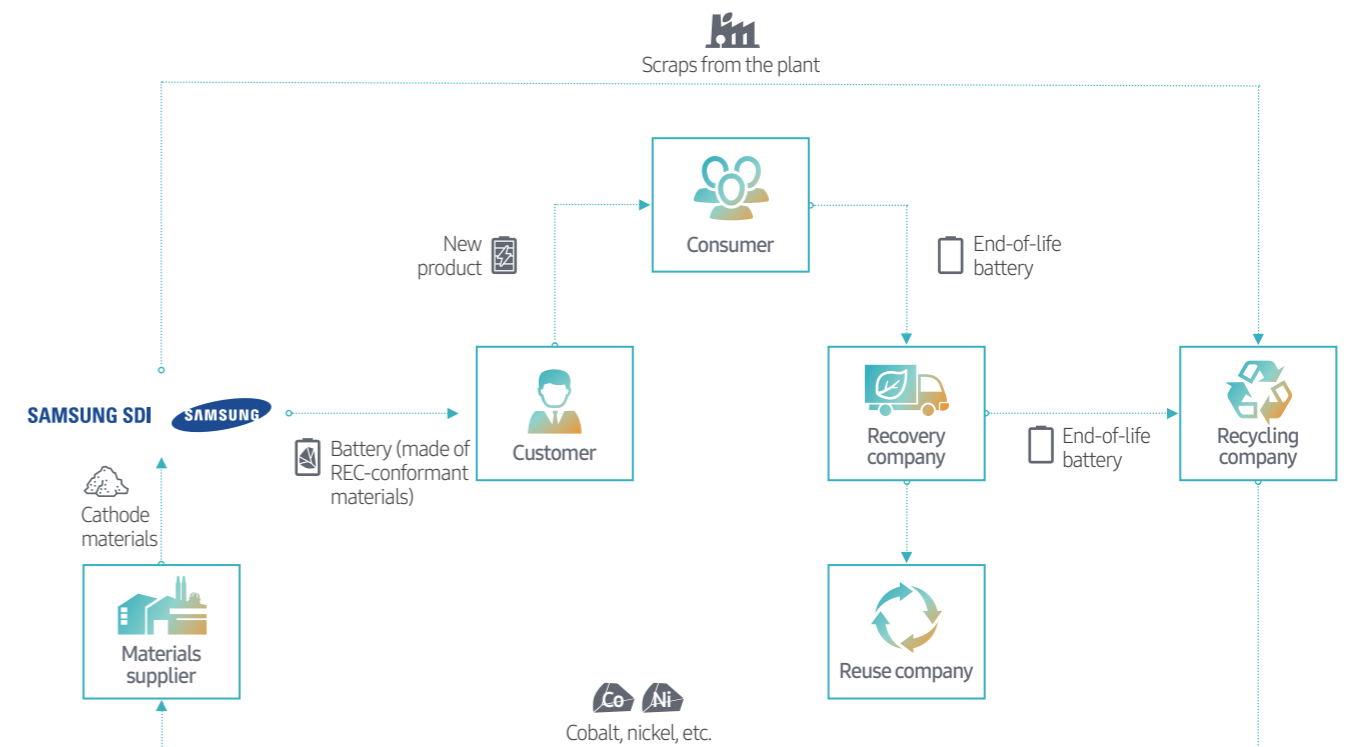
### Reuse Achievements and Plans

We are exploring the possibility of reusing end-of-service EV batteries for other applications. As part of such efforts, we are participating in an 'end-of-service EV-ESS battery recycling industrialization project' led by Jeollanam-do Province of Korea. Our plan is to review the technical conditions and feasibility requirements to be met to reuse batteries through R&D and demonstration on battery reuse.

### Resource Recovery Process

End-of-life batteries can be recovered in two distinctive ways: the first is to retrieve the scraps generated from the manufacturing process at the plant, and the second is to recover end-of-life batteries used by consumers in their disposal phase. Samsung SDI is closely cooperating with professional recycling companies equipped with scrap recovery skills to extract scraps generated from its plants, which then undergo grinding and chemical treatment to be recycled as raw materials for major metals. Looking ahead, we will consider potential partnerships with automotive OEMs to develop a closed-loop resource recovery system.

### Samsung SDI's Resource Recovery Process





# Management of Environmental Impact

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## Management Strategy and Approach

### 2025 Mid-term Environmental Targets<sup>1)</sup>

As the 2020 environmental goal (2015-2020) we set to systematically reduce our environmental impact reached its end date, we set a new mid-term goal to be attained by 2025. Its target indicators include water withdrawal intensity/reuse rates, waste discharge intensity/recycling rates, and air pollutant emissions/water pollutant discharge intensity, and we will increase our environmental efficiency through company-wide efforts and improve our business sustainability in so doing.

Environmental Target Indicator	Unit	2021 Reduction Target (baseline 2020)	2025 Cumulative Reduction Target (baseline 2020)
Intensity of water withdrawal	Ton/KRW 100 million	-7.3%	-32%
Intensity of waste discharge	Ton/KRW 100 million	-2.1%	-10%
Intensity of air pollutant <sup>2)</sup> emissions	Ton/KRW 100 billion	-3.6%	-17%
Intensity of water pollutant <sup>3)</sup> discharge	Ton/KRW 100 billion	-7.7%	-33%
Water reuse rate	Water reused/water withdrawn	-	22%
Waste recycling rate	Amount recycled/amount discharged	-	80%

1) Reporting scope: All production facilities in Korea and abroad, excluding sales bases and offices, and the Headquarters and the R&D Center (as to production facilities, only those with production records for 2020 were included), Intensity: Calculated based on consolidated sales

2) Sum of NOx, SOx, and PM emitted

3) Sum of BOD, COD and SS discharged

## Pollutant Management

### Management of Air Pollutant Emissions

To ensure the stringent management of air pollutants generated from our worksites, we install and operate appropriate control equipment at each of our emitting facilities. Pollutants that are emitted to the atmospheric environment following their treatment are monitored for their compliance with our internal standards that exceed the legally-allowable thresholds that have been further reinforced recently, and are managed for their emission trajectory. To minimize the generation of particulate matters that are emerging as a serious social issue, we have promptly replaced boilers with low-NOx burners at our worksites, and have reset the replacement cycle of fillings used for air pollutant control equipment to improve their treatment efficiency and reduce the emission of pollutants accordingly.

#### Air Pollutant Emissions in 2020 (unit: kg)

Category	2020	
Air pollutants	NOx	70,114
	SOx	3,480
	PM	63,329

### Management of Water Pollutant Discharge

To preserve our aquatic ecosystem, we have raised the bar in operating and managing effluent treatment facilities to minimize the discharge of water pollutants in so doing. In particular, we introduced internal standards that are more stringent than the legally-permissible thresholds (30~50% of such thresholds), and perform year-round monitoring by installing and operating the TMS (Tele-monitoring System)<sup>1)</sup> even at those worksites that do not bear any legal obligation to install such a system in order to review their compliance with these standards. Furthermore, annual 'water quality analysis capacity assessments' are made on those companies that measure water quality at our worksites to verify their competency and to establish the reliability of water pollutant measurement data.

1) Remote water quality monitoring system that enables the real-time monitoring of water pollutants being discharged at sewage and effluent treatment facilities and effluent-discharging worksites

#### Water Pollutant Discharge in 2020 (unit: kg)

Category	2020	
Water pollutants	BOD	11,977
	COD	98,907
	SS	46,785



## Waste Management

### Endeavors to Ensure Safety in Waste Treatment and Reduce Waste Generation

To minimize the environmental impact from our business operations, we improve defect rates within the manufacturing process as a way to reduce waste generation. Any and all waste generated is transferred to professional waste treatment companies for treatment, and these companies are assessed annually for their status of treatment facility management and regulatory compliance to doubly make sure that waste is processed in accordance with applicable regulations.

We also identify qualified recycling companies to increase our recycling rates, and reuse raw materials by engaging in tolling business on end-of-life batteries and scraps to reuse them as raw materials through recycling to ultimately mitigate the discharge of waste. In 2020, company-wide waste generation amounted to 143,373 tons, out of which 124,183 tons were recycled.

#### Waste Management in 2020 (unit: Ton)

Domestic waste recycling rate	96.1%	Overseas waste recycling rate	77.3%
Total generation	71,097	Total generation	72,276
- General waste	37,810	- General waste	41,514
- Designated waste	33,287	- Designated waste	30,762
Amount recycled	68,334	Amount recycled	55,849
Amount landfilled	317	Amount landfilled	4,542

## Water Resources Management

### Water and Effluent Management

At Samsung SDI, we endeavor to reduce our consumption of water and manage water quality at an appropriate level. In 2020, to minimize the amount of chemicals used to operate facilities exclusively assigned for manufacturing, we shifted from the existing ion exchange resin method to EDI (electrodeionization) to curb the use of such harmful chemicals as hydrochloric acid and caustic soda and mitigate the generation of effluents accordingly.

In 2021, we set a goal of completely eliminating the use of hazardous chemical substances (sulfuric acid and caustic soda) and will cut off the source of high-concentration acidic and alkaline effluents while rationalizing processes to improve the storage, transport and treatment facilities of organic/inorganic effluents at battery production locations.

#### Effluent Discharge in 2020 (unit: Ton)

Category	2020	Category	2020	
Domestic	Giheung	Malaysia	140,519	
	Suwon	Tianjin	75,072	
	Cheonan	Wuxi	608,633	
	Cheongju	Overseas	Xi'an	84,384
	Gumi	Hungary	205,620	
Ulsan	Vietnam	40,323		
Subtotal	2,299,058	Subtotal	1,154,551	



## Management Strategy and Approach

### Quality Management Strategy

Samsung SDI puts product safety and quality before all else, and is committed to delivering these top priority values on multiple fronts. Our quality innovation spans both the development and mass-production phases to bolster our company-wide quality operation system and supply the optimal products that cater to customer needs as a result. In 2020, our battery business established a more stringent quality gate to strengthen the assurance of mass production quality, and secured the safety quality of our products in so doing. Work is also underway to ensure the uniform quality of products through the standardization and automation of our global manufacturing operations. Our Electronic Materials Business has posted a more than 30% improvement in such major customer quality indicators as quality VOC and customers' return rate in 2020 through its sustained efforts for quality improvement and assurance. Notably, significant improvements were made on quality issues related to post-process impurities through the fine-tuned management of impurities present in raw materials. In 2021, we will focus on minimizing defects escaped by elevating the quality of raw materials and quality assurance so that we contribute to attaining the company-wide management philosophy of 'establishing top-notch quality'.

### Quality Management System

Samsung SDI operates its development (PLM), manufacturing (MES) and quality (IQMS, LIMS) systems in accordance with such quality management system standards as ISO 9001 and IATF 16949. Furthermore, we are in full compliance with our 8-Step Quality Process that ranges from development to VOC management while making constant reviews and improvements on the issues identified as in need of supplementation.

#### Quality Management Code of Conduct

##### Deliver value to customers to earn their trust

We enhance customers' value by lending an attentive ear even to their potential needs and fully reflecting them in our products. We address the Voice of Customers (VOC) in a speedy, accurate and cordial manner to forge close and trust-based partnerships with customers.

##### Place the environment and safety first

We believe that product quality is a matter of our collective conscience and thus can never be compromised. As such, we faithfully comply with international environmental management standards, and value quality awareness and responsibility in accordance with our Zero Defect philosophy in order to put customer safety first.

##### Continuously improve the quality management system and process

Samsung SDI's quality management policy is in compliance with ISO 9001 and IATF 16949. We clearly define, strictly follow and continuously improve phase-specific procedures and judgment criteria of our development (PLM), manufacturing (MES), and quality (IQMS, LIMS) systems as well as the 8-Step Quality Process.

### 8-Step Quality Process



## Commitment to Improved Product Safety

### Proactive Safety and Quality Assurance

Samsung SDI performs complete verifications on safety factors even from the product development phase including the selection of raw materials. To put safety first across the entire quality management process, a Q-FMEA (Quality Failure Mode and Effect Analysis) is made in the development phase to identify and improve potential issues related to safety and quality in order to preemptively ensure quality. To consider changing product use conditions and increasingly diversifying applications in establishing product safety and quality, we expand the coverage of product verifications to doubly make sure that any and all products are shipped to our customers remain risk-free. Besides, an accelerated testing methodology was employed in the product development phase to proactively detect potential issues that may arise during mass-production while stricter verifications were made to secure the quality of mass-production.

### Strengthened Quality Assurance

As the pursuit of ever-finer line widths accelerates in the semiconductor manufacturing process, this demands that we raise the bar on the quality of semiconductor materials and also establish our assurance capabilities. Our plan in 2021 is to secure a larger-area wafer evaluation process to improve the compatibility of our evaluations. As to polarizing films, we are optimizing optical inspection devices among others in line with the shift towards ultra-large-size and ultra-high-resolution products among our customers in order to detect even minute defects.

### Stabilization of Raw Material Quality

Our Electronic Materials Business is tightening the management of metals, impurities and residual solvents that are present in raw materials to improve on quality issues related to raw materials and preemptively ensure quality in so doing. In 2021, we will reduce quality costs that incur due to impurities contained in raw materials while stabilizing their quality through the preliminary processing of samples, the development of product evaluation tools, and the creation of a database of raw material impurities.

### Establishment of a Statistics-based Quality Management System

We leverage an advanced statistical analysis and quality monitoring system to detect and control potential quality risks before their occurrence to better guarantee our product performance and safety. Besides, a quality system is up and running to monitor and manage safety factors, and statistical process management allows us to perform real-time monitoring and control of anomaly signs on key management factors across the entire process from component handling to customer delivery. This ensures that we take a preemptive approach to quality management and fundamentally prevent defects from escaping and affecting our customers. By exploring statistical logics and deploying an associated system to advance our quality assurance system, we tirelessly identify and improve issues with our quality assurance process. Our Electronic Materials Business is reinforcing its statistical data analyses, and rigorously examines any process anomalies by analyzing even fine patterns of material-related process conditions. In 2021, we will upgrade our monitoring of quality trends on polarizing films.

## Strengthened Management of Product Environmental Performance

Materials provided by our Electronic Materials Business mainly go to manufacture semiconductors and displays, and they are managed for their containment and content of hazardous substances in accordance with the product environment conditions of our customers. In line with the increasingly tightening product and environment requirements across the globe, we are also revising relevant management standards, and, in the event that harmful substances are contained in product raw materials, we go the extra mile to ensure that such substances are mitigated or eliminated as early as from the development phase. We also apply internal standards that are even more stringent than those stipulated in domestic/international environmental regulations in controlling the content of harmful materials to assist our customers in establishing the safety of their workers and the eco-friendliness of their products.



## Strengthened Product Safety and Quality from the Customer Viewpoint

### Products that Reflect Customer Feedback

To establish a market-leading competitive edge in product quality, we keep a watchful eye on customer defect rates, Voice of Customers (VOC) and other customer-related metrics as the Key Performance Indicators (KPIs) of our business operations. In 2021, we set a main goal of expediting our response to VOC in addition to registering VOC on our system and making metric-specific analyses and improvements with an aim to accelerate our handling of VOC as well as pursuing quality improvements, thereby delivering greater customer satisfaction. In so doing, lead time targets were set in each of the immediate response - customer report - improvement measure phases to be managed by respective business divisions. Furthermore, an emergency response organization system was developed for each of our major customers to minimize any delay in response in the initial emergency phase and to strengthen our focus on addressing such situations. Our battery business established an RMA (Returned Materials Authorization)-based customer response process to manage such effective customer indicators as customer inline defects and field failure rates and to swiftly detect and improve issues. We also hold field quality meetings to reinforce our capabilities in collecting feedback generated from the field while developing fundamental solutions to quality issues by improving on chronic defects and analyzing the effectiveness of the measures taken. Our Electronic Materials Business has adopted the quality issue management system dubbed 'Focus 119' to identify quality issues in real time that arise when customers use products. In addition, the division has identified defect simulation methods, which is attributable to its efforts to collect process-related information from customers to preemptively establish quality, thereby securing our quality assurance capabilities. From 2021 onwards, we will dispatch our employees to China to better service our Chinese customers in line with the increasing demand from these customers.

### Customer Environment Test (CET)

We continue to raise the bar on our Customer Environment Test (CET) operation to secure performance stability while minimizing risks in the product use phase that may occur due to the diversification of battery-powered applications. CET aims to improve safety risks by reviewing product use conditions upfront. While the widely-adopted practice is to apply a company's own quality standards, CET examines the appropriateness of cell applications under the conditions set by customers. By delivering cell products in their optimal conditions, we prevent large-scale quality incidents caused by misdesign or miss-matching on the part of customers as well as ignition accidents experienced by consumers due to their improper product use.

In 2021, we are standardizing customer review documents to reinforce our CET response and management regulations in line with the increasing penetration of sharing applications (bike, kick board, and scooter) while extending the scope of reviews on sharing modes and charging station management. To boost the capacity management of new packers, we made it a rule to conduct on-site reviews and ensure 100% of compliance. Going forward, we will identify additional review metrics to beef up the CET process review and stability concerning our ESS business, and reflect CET metrics in the product development process. Improvements are also being made by analyzing issues across respective phases of the CET process and operating regular meetings to share such issues. This surely leads to reduced lead times in each phase and enhanced completeness, meeting the customer needs for timely deployment.

### Customer Satisfaction Management and Improvement

To advance our quality assurance system and truly cater to customer needs as a result, we not only strengthen our initial response to the Voice of Customers, but also conduct customer satisfaction surveys by respective business divisions. This also allows us to examine any complaints raised by customers across a wide range of categories, including R&D competency, service and delivery as well as product quality. The VOC collected during the survey period is transferred to relevant departments through various meetings, and is fully considered in understanding the current status of our product quality and services and in setting the direction for our improvement activities. In 2020, COVID-19 made it extremely challenging to immediately respond to customers. Still yet, we arranged customer response staff at respective global worksites and engaged in preemptive communication with customers to keep customer response issues to a minimum. Our Small-sized Li-ion Battery Business proceeded with a Customer Satisfaction Index (CSI) survey on 15 major customers in 2020 to analyze their complaints on each of the survey categories (quality characteristics, quality satisfaction, etc.) and make necessary improvements.

Our Electronic Materials Business was not able to conduct customer satisfaction surveys in 2020 due to COVID-19. In 2021, on the condition that social distancing rules are eased, we will survey customers on the five categories of quality, technical support, development capacity, supply, and sales response to identify issues and make necessary improvements.

### Customer Satisfaction Scores by Business Division in 2020

(unit: point)



## Expansion of Quality Improvement Support

### Support for Partner Companies with Quality Improvement

In response to the spread of COVID-19 in 2020, we assisted partner companies in building independent quality capabilities by establishing their own quality assessment and approval process. Our partner company quality management monitoring system extended its scope to allow for the preemptive monitoring of quality anomalies through the data monitoring system, and system improvements were made to support the automatic uploading of their test certificates. New evaluation metrics were added for materials and components to improve the inspection process so that intensive inspections could be performed on key inspection metrics while efforts were made to strengthen the inspection process infrastructure and automate the inspection process to help partner companies improve their detection performance.

Our Electronic Material Business is also establishing quality system management infrastructure to deliver better quality in partnership with overseas partner companies working in relation to mobile and IT device polarizing films as well as domestic partner companies who consume high-resolution polarizing films. Collaboration is underway to pursue quality improvement through regular consultations with and visits to partner companies.

### Support for Overseas Corporations with Quality Improvement

With a goal of building a differentiated global competitive edge, Samsung SDI is upward standardizing quality across domestic and overseas production locations. Our early warning system was supplemented on the basis of measurement data from respective unit processes through the improvement of quality gates that aimed to reinforce the mass production quality assurance, and improvement practices were applied equally to overseas corporations to elevate our management performance at all levels. In the face of the COVID-19 pandemic, the Headquarters dispatched its technical staff to support overseas corporations with key quality operations – setting up a new production line and checking the line in initiating the manufacturing of new products – for their quality stabilization, and switched to virtual modes in providing training and addressing issues to help them with quality management and stabilization, turning these challenging conditions into an opportunity for overseas corporations to build their self-reliant capabilities.

We continue to operate a data monitoring system so that our overseas corporations remain a self-sustaining business even when the support function of the Headquarters is disrupted amid the on-going pandemic. We will supplement our diverse data analytics program and our automatic data collection functionality to ensure business continuity beyond any limitations of time and space.

Our Electronic Materials Business ensures that its domestic quality improvement competencies are disseminated to overseas corporations. Domestic experts working at our Cheongju worksite in the areas of manufacturing, technology and quality attend meetings to transfer their knowledge in manufacturing polarizing films to locally-hired staff and expatriates and engage in discussions to solve problems to help employees at overseas corporations improve their work skills.



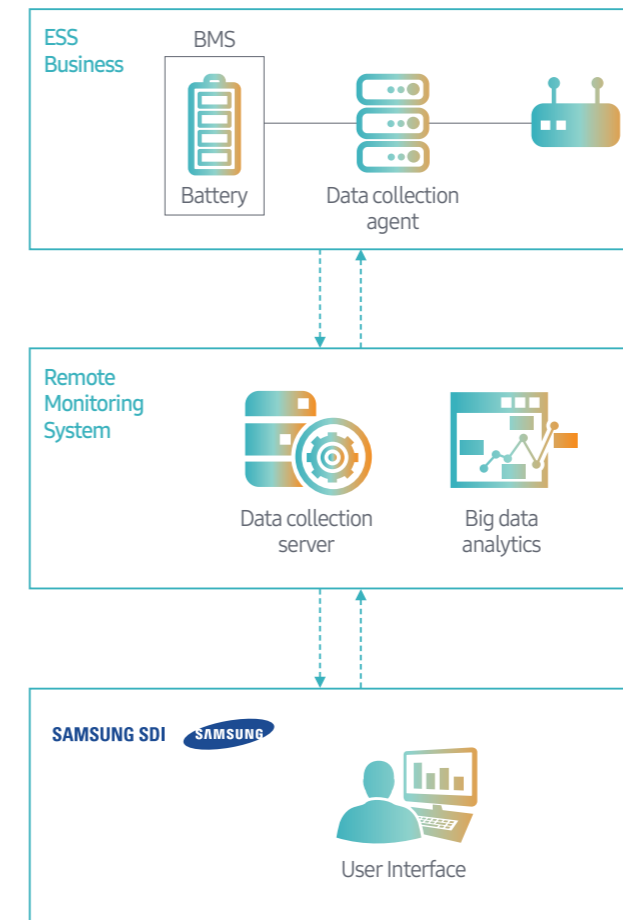
## Strengthened Battery Safety

### Building a Remote Depository for Strengthened Battery Safety

In September 2020, we established a remote depository that complies with the ESS (Energy Storage System) installation standards<sup>1)</sup> stipulated by the Ministry of Trade, Industry and Energy while strengthening battery safety through the monitoring of ESS operational data and the application of anomaly detection algorithms. Building a data depository and an analytical system on the cloud service platform, this depository fulfills such core functions of analyzing and managing data on the status of the site, anomaly detection and emerging trends. The NDAP (NexR Data Analysis Platform) was also deployed so that database inquiries could be made on unidentifiable data.

Besides, alarm/protection monitoring enables us to take action even before receiving Voice of Customers and to compare critical data on the cell and rack level and detect anomalies on a daily basis. Collected data is visualized in chart and graph formats to improve convenience for data reviewers, and all data is downloadable for further analyses. This, in turn, supports the preemptive analysis of cell anomalies through the combination of BMS FW (Battery Management System Firmware) protection and the monitoring-based analysis system, reinforcing our real-time response capabilities as a result.

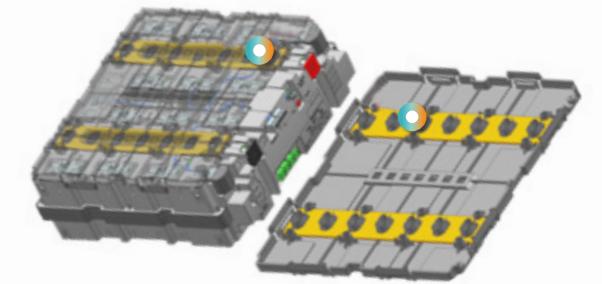
1) Article 296 Clause 3 of the Energy Storage System Technical Standards



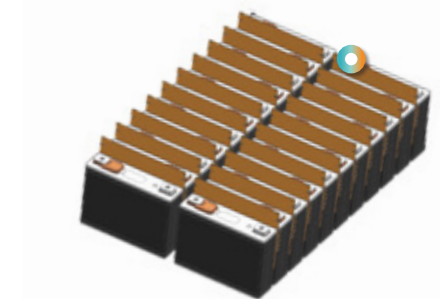
### Improving Safety in Constructing and Installing ESS

As an additional measure to establish the safety of our ESS, we endeavor to improve safety during construction and installation and reinforce the automatic detection of anomaly signs. As such, each and every installed site currently under operation in Korea as well as any and all our products that have been manufactured since October 2019 are equipped with fire extinguishing sheets created through the application of cutting-edge chemicals that enable automatic spraying and prompt fire extinguishing in the event of detecting signs of fire. In addition, a special fire extinguishing system is installed that employs a whole new type of thermal diffusion inhibitors made of composite materials to improve insulation performance.

#### Fire extinguishing sheet



#### Cell-to-cell insertion of inhibitors





## Management Strategy and Approach

### Definition and Selection of Partner Companies

Samsung SDI classifies its supply chain partners into first, second, and third-tier partners and manages them accordingly. First-tier partners supply raw materials and components that go into our components and products, and second/third-tier partners provide raw/subsidiary materials to first-tier partners. We specifically define the suppliers of key raw materials and components whose suspended supply may immensely impact our manufacturing and business operations as primary partners, and continue to promote wide-ranging cooperation and support to pursue win-win partnerships.

In selecting and managing partner companies, we perform rigorous paper-based screenings and due diligence to build transparency and fairness into the entire supply chain.

### Supplier Code of Conduct

We established the 'Samsung SDI Supplier Code of Conduct' that sets out proper behavioral guidelines for partner companies to follow, and made it mandatory for all our partner companies to comply with these guidelines. The Code spans the aspects of human rights, labor, health & safety, environment and ethics, and is based on the Responsible Business Alliance (RBS) Code of Conduct as well as ILO and ISO standards.

Each and every partner company is required to sign the consent form to observe the Code in entering into any contract with us to strengthen their commitment to sustainability management. As to any non-compliance with the Code on the part of partner companies, we recommend them to take corrective measures, and if such non-compliance continues or no corrective measures are taken, we impose restrictions on our future contracts with them.

### Win-Win Cooperation Promotion System



## Compliance with Fair Trade

### Fair Trade Policy

To establish reasonable and fair trade practices, we make it a rule to use standard contract forms in doing business with partner companies, and observe the following four action principles stipulated and amended by the Fair Trade Commission to promote compliance with subcontract regulations.

### 4 Action Principles



### Establishing a Culture of Fair Trade along the Supply Chain

Samsung SDI's endeavors to create a culture of fair trade extend beyond its first-tier partners and into second/third-tier partners. We support partner companies to conclude the fair trade agreement among themselves and encourage them to improve their payment criteria so that payments could be made in cash within 30 days. Official documents are sent to call for cooperation in mainstreaming the signing of standard subcontract agreements between first and second-tier partners, and the application of such agreements is monitored.

### 2020 Performance in Supporting the Signing of the Fair Trade Agreement

Category	Unit	2018	2019	2020
Samsung SDI - first-tier partners	No. of companies	111	109	110
First-tier - second-tier partners	No. of cases	129	120	129
Second-tier - third-tier partners	No. of cases	-	42	40

## Capacity-Building for Partner Companies

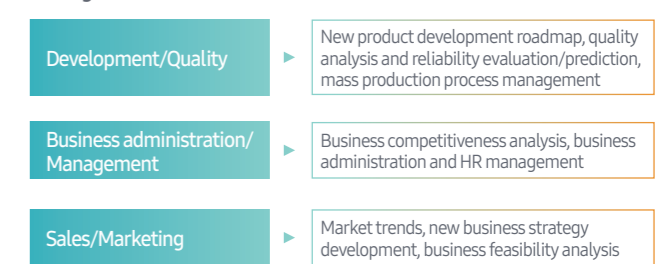
### Operation of the Samsung SDI Partners' Association

The Samsung SDI Partners' Association (SSP), which consists of the three subcommittees of materials, components and equipment, aims to promote interactions among partner companies. The SSP is newly launched every two years, and the 9th SSP established in 2020 was joined by a total of 41 partner companies to share information on internal and external management status and strengthen strategic partnerships. The general meeting for 2020 was held through virtual means due to COVID-19, and the SSP will continue with its benchmarking, seminars, subcommittee meetings and Shared Growth Day events.

### Introduction of Win-Win Cooperation Consulting

Samsung SDI has provided win-win cooperation consulting (management advisory) since 2020 to support partner companies with efficient business conduct. Consultants, who previously served as professional executives at Samsung SDI, draw on their extensive field experience, management know-how and expert knowledge to provide management advice in their areas of expertise to meet the needs of partner companies, thereby assisting partner companies in improving their management competency and strengthening their overall competitive edge. These consultants also engage in VOC activities to collect complaints raised by partner companies and make necessary improvements to serve as a bridge in promoting win-win cooperation. In 2020, such management advisory activities benefited nine partners, and VOCs were collected from 11 partners.

### Management Advice Provided



### Benefit Sharing System

Samsung SDI operates the benefit sharing system to facilitate win-win cooperation with SMEs. Under this program, companies placing orders and companies landing such orders collaborate in diverse ways to attain the set common goal, and share the benefits generated accordingly. In 2020, we identified six tasks and collaborated with a total of six partner companies in the first and second half of the year. Both Samsung SDI and participating companies reached all of the set common goals, including reducing defects and improving production quantity per man hour and quality, and partner companies were able to elevate their manufacturing competitiveness in line with process improvements and the resulting productivity gains.

### Assistance in Recruiting Outstanding Talent

Leveraging the training system and infrastructure available at our Consortium for HRD Ability Magnified Program, we assist partner companies in providing training to employees and strengthening their employee competency in so doing. The training curriculum consists of 22 courses on job skills, quality management, process management, and business administration, and was attended by 851 employees from a total of 89 partner companies in 2020. We also help partner companies offer talent development training to job candidates and align this with recruitment so that our partners hire talented individuals armed with the job skills and personality that will expedite their onboarding at partner companies. As of 2020, two partner companies created jobs for 51 persons under this recruitment support program.



## Laying the Basis for Sustained Growth

### Operation of the S-Partner Certification System

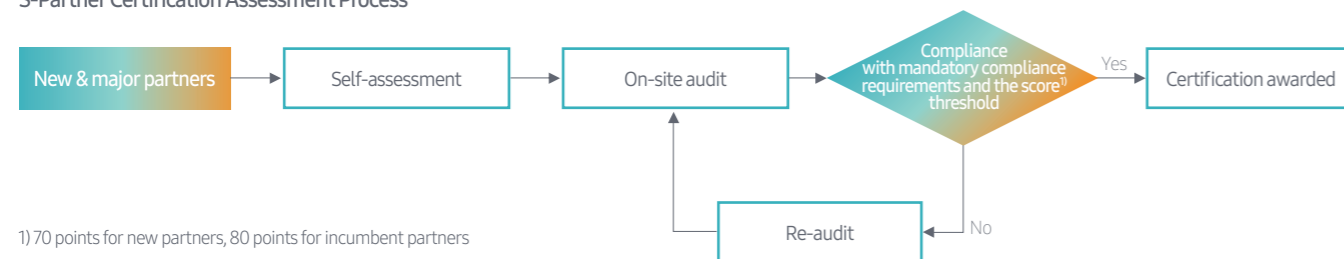
Samsung SDI provides annual ESG awareness-building training to partner companies to render its supply chain even more sustainable. In tandem with this, we also operate the S-Partner certification system to biennially evaluate and certify partner companies for their compliance with our 'Supplier Code of Conduct' which is based on the Responsible Business Alliance (RBA) Code of Conduct to help our partners fulfill their social responsibility and make relevant progress. Evaluations are performed on major raw/subsidiary material suppliers and new partner companies in the following risk areas of labor, ethics, environment, and health & safety. In 2020, compliance with COVID-19 prevention guidelines and implementation of their detailed rules were added to the scope of evaluations to tighten the monitoring of health risks. The evaluation process begins with preliminary self-assessments made by partner companies and then proceeds to on-site audits performed by external professionals. For issues identified as a result of on-site audits, partner companies are required to submit their improvement plans within one month, and re-audits are performed for those who failed to meet mandatory compliance requirements or the set score threshold. Specifically for such critical categories as child labor, forced labor, pollutant discharge, and environmental approval, the zero tolerance principle is applied to demand their thorough compliance. In 2020, on-site audits were conducted on 29 domestic partner companies, and 26 overseas partner companies received paper-based audits instead due to COVID-19.

### S-Partner Certification Assessment Outcomes in 2020

(unit: No. of companies)

Category	2018	2019	2020	
Domestic	Certification terminated	41	50	24
	New partner	14	16	2
	Re-audit	5	4	3
	Total	60	70	29
Overseas	Certification terminated	17	20	26
	New partner	14	-	-
	Re-audit	-	-	-
	Total	31	20	26
Total	Certification terminated	58	70	50
	New partner	28	16	2
	Re-audit	5	4	3
	Total	91	90	55 <sup>1)</sup>

### S-Partner Certification Assessment Process



1) 70 points for new partners, 80 points for incumbent partners

### Areas Where Major Improvements Were Made under the S-Partner Certification System in 2020

- 1. Environment**
  - Effluent and solid waste management programs and procedures
  - Placement of protective equipment within areas where chemicals are handled
  - Six major GHG management and documentation
- 2. Environment/Health & Safety System**
  - Risk assessments on core business operations
- 3. Health & Safety**
  - Procedures to protect workers from high-risk machinery
  - Provision of protective equipment for safety hazards and creation of relevant supporting documents
  - Appropriate placement of fire and emergency response manuals prepared in working languages
- 4. Labor**
  - Operation of regulations on maternity protection concerning work hours, overtime work and high-risk work
  - Compliance with holiday regulations to provide regular breaks for workers
  - Operation of regulations for disciplinary purposes concerning penalties and pay cuts
- 5. Ethics**
  - Assessment of compliance with ethical regulations and other requirements and operation of regular internal audits
  - Operation of anti-corruption programs and procedures in entering into contracts with partner companies, contract parties and dealers

### Corrective Actions Taken under the S-Partner Certification System

(unit: No. of companies)

Category	2020	
Partners who received assessments	Partners who are assessment targets <sup>2)</sup>	63
	Partners who received actual assessments	59
Corrective actions taken for identified issues	Partners identified as in need of improvement	55
	Partners who submitted improvement plans	55

1) Excluding four companies that have been assessed for COVID-19  
 2) Small/medium-sized suppliers of raw/subsidiary materials with transaction value of KRW 400 million or over in 2019

### Support for Manufacturing Innovation along the Supply Chain

Pursuing win-win partnerships with partner companies and sourcing top-notch quality components in so doing is at the core of building globally-recognized product competitiveness. Samsung SDI contributes to partner companies' improving their fundamentals through the sustained manufacturing innovation activities undertaken along the supply chain. In 2020, we assisted Shinheung SEC, a battery component supplier with 40-year history, in securing its manufacturing and quality competitiveness. To take a systemic approach, weekly innovation TF meetings were held with attendance of our organizations responsible for automation, manufacturing technology and quality operations as well as external professional consultancies. Innovation tasks were categorized into the three areas of total facility efficiency, productivity and process quality, and status analyses were performed on each of these categories and detailed tasks were identified. This was followed by improvement activities on chronic defects and process optimization, and 21 out of 22 tasks in total were completed.

### Innovation Task Execution Outcomes

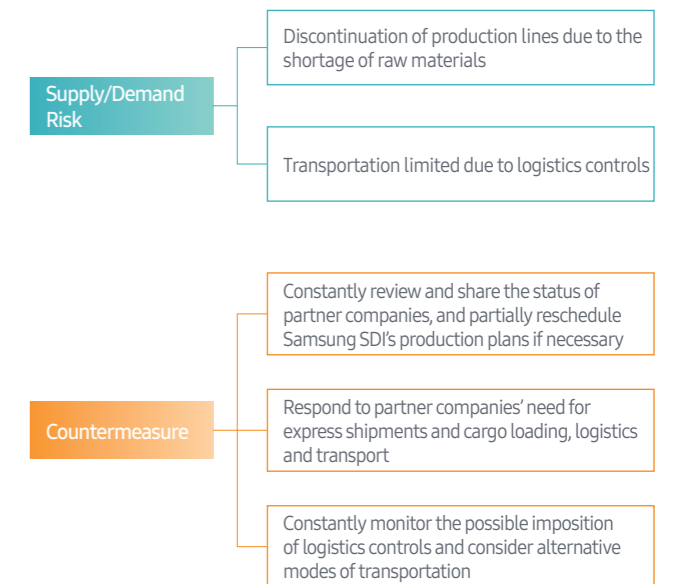
(unit: No. of tasks)

Category	Total Facility Efficiency	Productivity	Process Quality	Total
Tasks executed	9	5	7	22
Tasks completed	9	5	6	21 <sup>1)</sup>

1) As to the one task not completed, this was reviewed by Samsung SDI's relevant departments and was notified as not applicable (customer requirement).

### Managing Supply Chain Risks amid COVID-19

Samsung SDI has established a swift response system to identify potential supply/demand risks that occur as a result of COVID-19 and to minimize impact on its manufacturing and sales. In addition to the on-going COVID-19 pandemic, a wide array of issues are emerging, ranging from natural disasters (typhoon, earthquake) to export restrictions imposed by Japan, to highlight the need to manage risks associated with the supply/demand of materials. Samsung SDI is committed to ensure the uninterrupted sourcing of materials by securing liquidity and performing preliminary verifications across its supply bases for the four primary materials of cathodes, anodes, electrolytes and separators and for major at-risk materials and components.



## Responsible Minerals Sourcing

In line with the rapid growth of the Li-ion Battery market, social responsibility issues are emerging in relation to child labor, human rights violation, and environmental pollution in the process of extracting and sourcing minerals consumed as primary raw materials. This prompted us at Samsung SDI to establish transparent and responsible sourcing practices across the whole of our supply chain, from mineral extraction to processing and procurement. We also form partnerships with customers, partner companies, industry initiatives and other stakeholders to step up our efforts in resolving these issues.

### Joining Global Initiatives

#### Responsible Minerals Initiative

To improve a wide array of issues present in the mineral supply chain, it is critical that we build consensus and closely cooperate with a number of stakeholders within the supply chain. In a move to join in the concerted efforts made by the international community to improve mineral sourcing practices, Samsung SDI joined the RMI (Responsible Minerals Initiative) in May 2020. This membership provides us with the supply chain information held by the RMI on conflict minerals and minerals from high-risk areas (cobalt) as well as their place of origin and smelters & refiners, and we will leverage such information in conducting supply chain due diligence and helping our partner companies make necessary improvements.

#### 'Cobalt for Development' Project

Since 2019, we have teamed up with likeminded companies to undertake the Cobalt for Development Project in conjunction with the German development agency (GIZ) with an aim to improve working and living conditions in cobalt mines and their surrounding communities in the Democratic Republic of the Congo. Wide-ranging improvement activities are implemented, including training provided to create better labor conditions for miners and improve their local communities and the expanded dissemination of personal protective equipment.

#### Ban on DSM

With mounting interest in the use of mineral resources retrieved from the sea bed as well as from the ground, questions are being raised on their potential harm and impact on the deep sea ecosystem. In March 2021, Samsung SDI announced a statement to call for moratoriums on deep seabed mining (DSM) conducted for commercial purposes in partnership with the international environmental organization WWF (World Wide Fund for Nature), BMW, Volvo and Google. Companies who signed up to this initiative commit not to extract minerals from the deep seabed until the safety of deep seabed mining and its environmental impact is scientifically established and not to source resources supplied through DSM to protect the marine ecosystem.

#### Responsible Sourcing Policy

In 2017, Samsung SDI established its responsible minerals sourcing policy and supply chain code of conduct in conformity with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas. We have since insisted that all our suppliers of raw/subsidiary materials comply with these norms, and have performed continued monitoring and improvement. In addition, regular trainings and meetings are held to publicize our policy and improve awareness among internal/external stakeholders including customers, investors, senior management and the purchasing department as well as partner companies.



## Supply Chain Traceability and Risk Management

Each year, Samsung SDI surveys all its suppliers using cobalt and other minerals that raise social responsibility issues to establish the traceability of their supply chains. Since 2020, we have gradually extended the scope of such surveys from the four conflict minerals of tantalum, tin, gold and tungsten to nickel, lithium, mica, graphite, and all other minerals identified as having adverse impact from the environmental and social aspects.

In 2020, we surveyed our cobalt supply chain and verified five places of origin and a total of 24 smelters and refiners. Going forward, we will use information available from external initiatives and pay visits to partner companies to ensure full traceability along the cobalt supply chain and reinforce our risk management, thereby further validating the consistency of survey outcomes.

### Third-party Audit

Samsung SDI ensures that all its verified smelters and refiners complete either the third-party audits performed by the RMI or other corresponding independent audits. To this end, we send official documents or hold meetings to firmly demand that all smelters and refiners who have yet to join the RMI Responsible Minerals Assurance Program (RMAP) participate in this program designed to conduct third-party audits on smelters and refiners. Out of 24 smelters and refiners verified in 2020, eight of them are RMI-Conformant, 13 of them are included in the active list and currently engaged in the RMAP process, and one of them was reported to have completed corresponding independent third-party audits.

## Managing Conflict Minerals and Assuming Extended Responsibility for Such Minerals

Conflict minerals refer to Tantalum, Tungsten, Tin and Gold (3TG) that are sourced in conflict-affected zones in the Democratic Republic of the Congo and its adjacent countries. Samsung SDI established its own policy to prevent environmental pollution, human casualties, labor exploitation and human rights infringements that often occur in these conflict areas and is excluding the use of conflict minerals from the raw material procurement phase. To this end, we are building a supply chain survey and management system, and demand that all our partner companies do business with RMI-Conformant smelters and refiners. As a result of our 2020 survey, all smelter and refiners of 3TG minerals used for Samsung SDI products were fully conformant with the RMI certification standards.

As managing social and environmental risks is gaining increased importance in the mineral mining and procurement process, this also raises the need for risk management on an extended scope of minerals. Samsung SDI is stepping up its efforts to establish traceability along the supply chain and improve risks on all major minerals consumed for its product manufacturing.

### Responsible Sourcing Management Process



### List of Cobalt Smelter and Refiners

No.	Cobalt Smelters and Refiners	Country	No.	Cobalt Smelters and Refiners	Country
01	Dynatec Madagascar Company	Madagascar	14	Kamoto Copper Company	DRC
02	Chemaf Etoile	DRC	15	Lanzhou Jinchuan Advanced Materials Technology Co., Ltd.	China
03	Chemaf Usoke	DRC	16	New Era Group Zhejiang Zhongneng Cycle Technology Co., Ltd.	China
04	Ganzhou Yi Hao Umicore Industry Co., Ltd.	China	17	Quzhou Huayou Cobalt New Material Co., Ltd.	China
05	Ganzhou Tengyuan Cobalt New Material Co., Ltd.	China	18	SungEel HiTech Co., Ltd.	Korea
06	Gem (Jiangsu) Cobalt Industry Co., Ltd.	China	19	Tianjin Maolian Science & Technology Co., Ltd.	China
07	Guangdong Jiana Energy Technology Co., Ltd.	China	20	Umicore Finland Oy	Finland
08	Hunan Yacheng New Materials Co., Ltd.	China	21	Umicore Olen	Belgium
09	Hunan Zoomwe New Energy Science & Technology Co., Ltd.	China	22	Vale	New Caledonia
10	Jiangsu Xiongfeng Technology Co., Ltd.	China	23	ZheJiang Huayou Cobalt Co., Ltd.	China
11	Jiangxi Jiangwu Cobalt industrial Co., Ltd.	China	24	Zhuhai Kelixin Metal Materials Co., Ltd.	China
12	Jingmen GEM Co., Ltd.	China			
13	JSC Kolskaya Mining and Metallurgical Company (Kola MMC)	Russia			

### Cobalt Countries of Origin

