


BUSINESS OVERVIEW

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Company Overview

Samsung SDI at a Glance

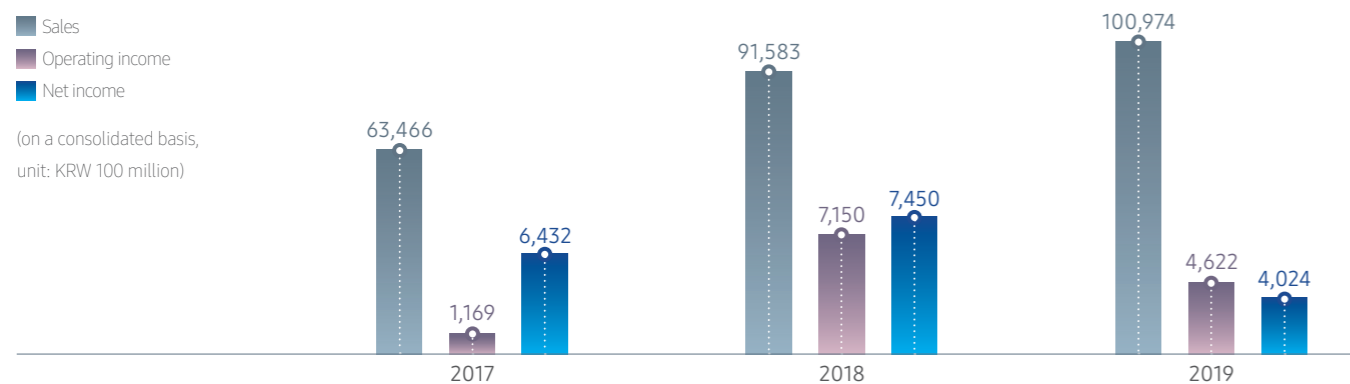
Founded in 1970, Samsung SDI celebrates its 50th anniversary in 2020.

We produce and sell secondary batteries used for IT device, automotive, and Energy Storage System (ESS) applications as well as materials for semiconductors, displays, and photovoltaics, enriching the life of humankind in so doing. Our global network consists of a total of 30 locations, including the Headquarters, the R&D Center, production facilities and sales bases.

Global Network



Financial Performance



Company name	Samsung SDI Co., Ltd.	Date of establishment	January 1970	Shareholders with more than 5% ownership (as of Dec. 31, 2019)	Samsung Electronics: 13,462,673 shares (19.58%) National Pension Service: 7,400,009 shares (10.76%)
CEO	Jun Young-Hyun	Headquarters	150-20, Gongse-ro, Giheung-gu, Yongin City, Gyeonggi Province, Korea		

Sales Breakdown by Region

(as of Dec. 31, 2019, unit: KRW 100 million)



External Sustainability Assessments Made on Samsung SDI



Listed on the DJI World for the 15th time in 2019

Listed on the Dow Jones Sustainability Index (DJSI) World for 15 times



Ranked 80th in 2020, listed for 3 consecutive years

Named one of the Global 100 Most Sustainable Corporations for 3 consecutive years*



Ranked 31st in 2020

Ranked 31st on the 2020 Clean 200 list**

* Supervised by Corporate Knights and published by the World Economic Forum (WEF)
** Ranks companies for their green business practices under the supervision of Corporate Knights in reducing carbon emissions and waste generation, adopting green materials, and opting for alternative energy sources in the product and service manufacturing process

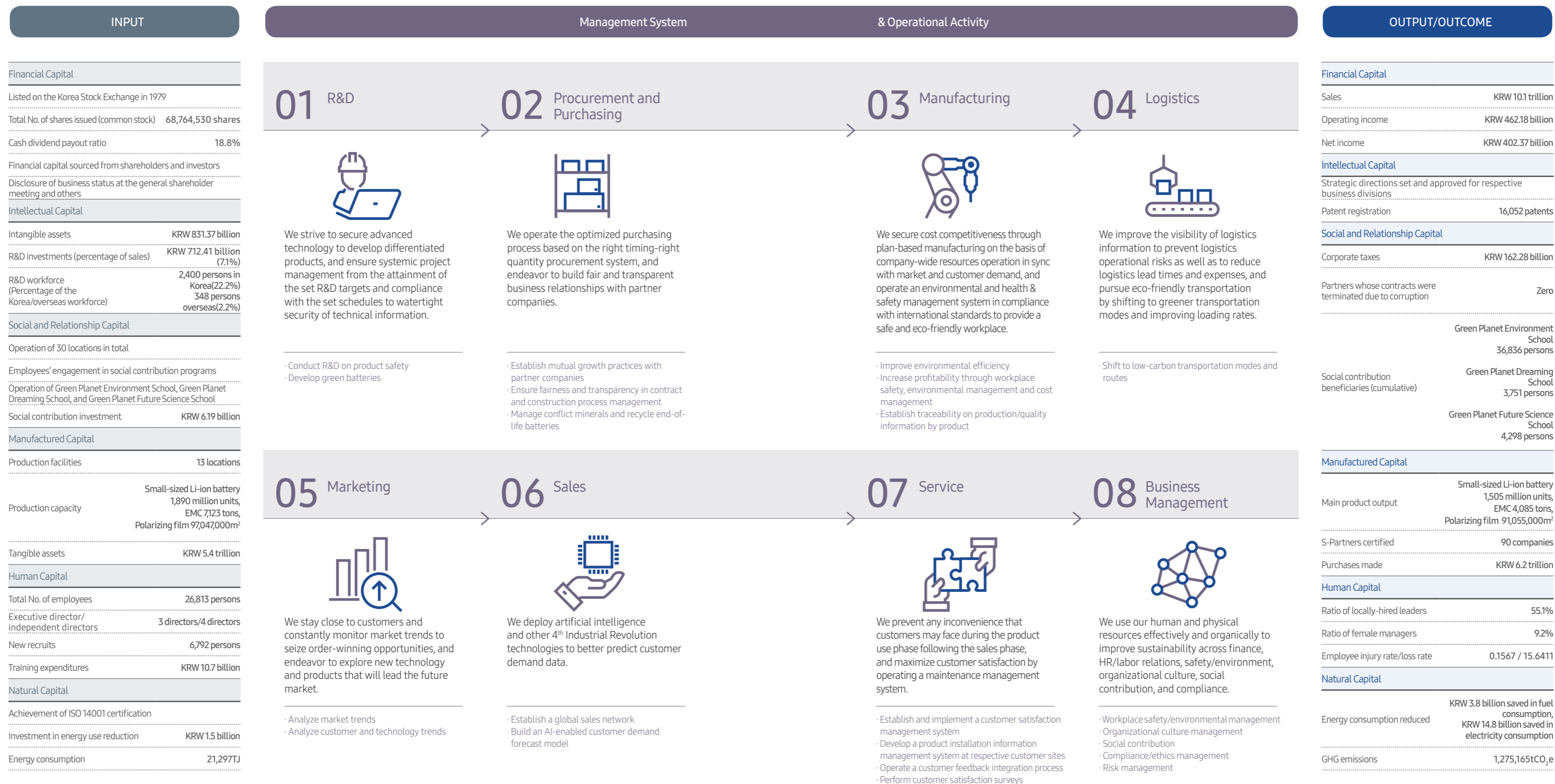
Value Creation Model

Samsung SDI's Value Creation Model

The resources and expertise accumulated through business conduct are fed back into a company's business model to create new value. Samsung SDI establishes a management system that considers sustainability factors throughout the entire business operations, from R&D to product and service offering.

(Economic data: On a consolidated basis Social and Environmental data: Domestic and overseas worksites)

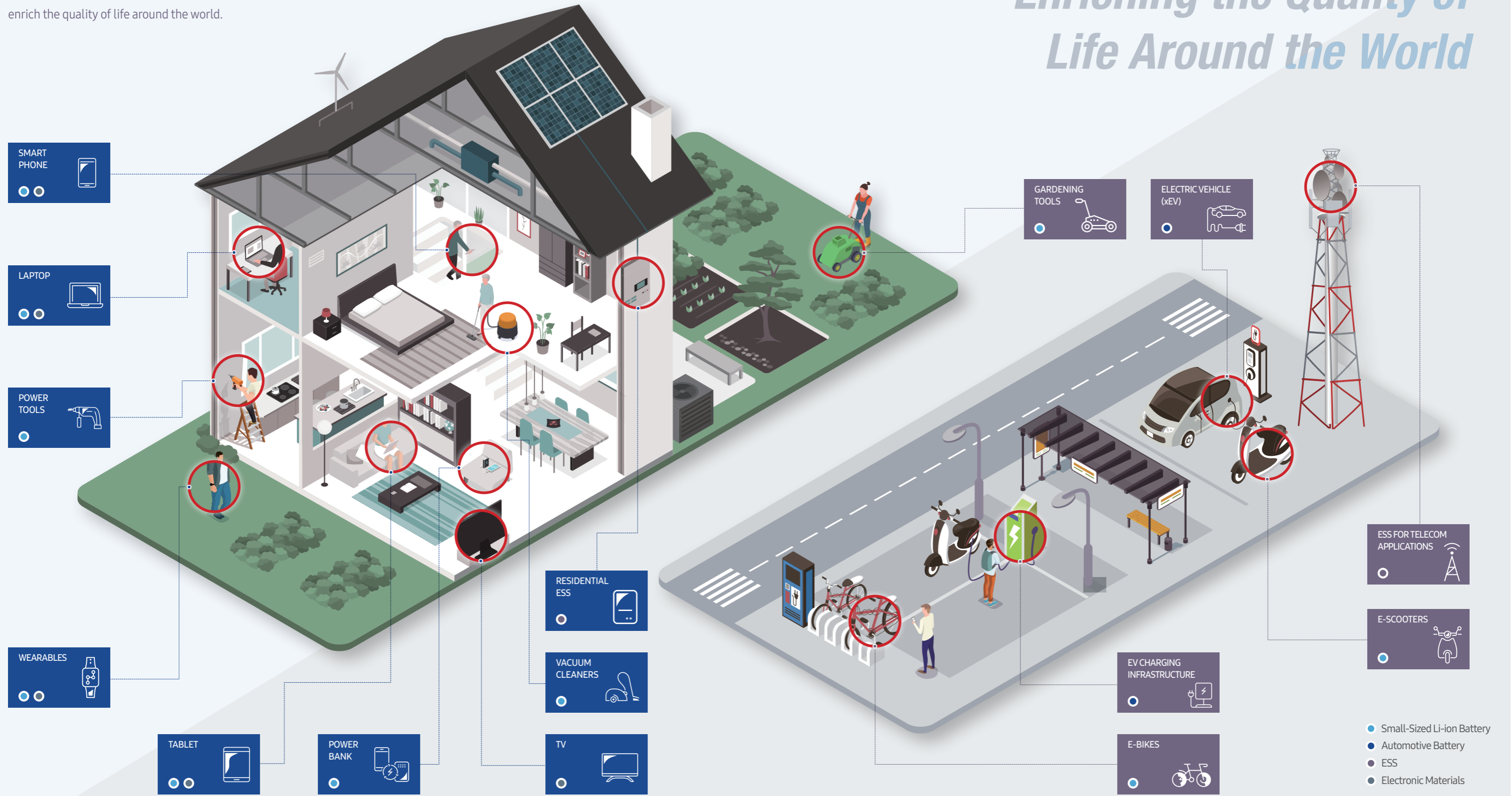
In addition, major factors that contribute to value creation are managed as key sustainability management issues in order to ensure sustained performance generation. Samsung SDI will be committed to the transparent and balanced distribution of its business outcomes to all stakeholders.



Samsung SDI in Our Daily Life

Our products and services are deployed in the underlying fabric of our life beyond our naked eye in order to enrich the quality of life around the world.

Enriching the Quality of Life Around the World



Business Overview and Growth Strategy

Small-Sized Li-ion Battery

Samsung SDI,
Your Ideal
Business Partner






Business Summary

Our Battery Business develops and sells cylindrical, prismatic, and polymer battery cells.

With its quality-first management philosophy and sustained commitment to technology innovation, Samsung SDI maintains a high market share in the global Li-ion battery industry. We are constantly tapping into new market sectors: power tools, gardening tools, e-bikes, and e-scooters whose key requirements are eco-friendliness and high efficiency due to the emerging trends of tightening environmental regulations and green consumption as well as smartphones, wireless earbuds, wearables and other IT devices that hold future growth potential in line with the spread of the 5G network and IoT.

Application

Small-sized Li-ion batteries are used to power the three major IT devices of mobile phones, laptops, and tablets as well as wireless earbuds and to serve non-IT applications including power tools, e-bikes, and e-scooters.

-  **Cylindrical**
Power tools, gardening tools, vacuum cleaners, e-bikes, e-scooters, e-kick scooters
-  **Prismatic**
Feature phones, smartphones, laptops, gaming devices
-  **Polymer**
Smartphones, tablets, wearables, wireless earbuds

Market Outlook

While demand for small-sized Li-ion batteries is not free from uncertainties caused by COVID-19 in 2020, the market is forecast to reach 10 billion cells in total, up by 13% from the previous year.

The IT market is poised to witness a broader application of IoT technology that combines 5G services with artificial intelligence (AI), and specifically, demand for wireless earbuds and wearables is expected to grow.

In the non-IT market, e-scooters and e-kick scooters will drive the growth of the cylindrical battery market in line with the increasing market size of electric vehicles, with Tesla playing a central role, and micro-mobility sharing services. As such, Samsung SDI plans to lead the innovation of rechargeable battery technology in both the IT and non-IT sectors to further solidify its market leadership.

Business Approach

Samsung SDI delivers solutions optimized for diverse IT devices, from smartphones and laptops to wearables. In parallel, we also leverage our differentiated technology in the new small-sized Li-ion battery segment that is growing rapidly in response to the increasing importance of eco-friendliness and high efficiency in order to broaden our business presence and pioneer the market.

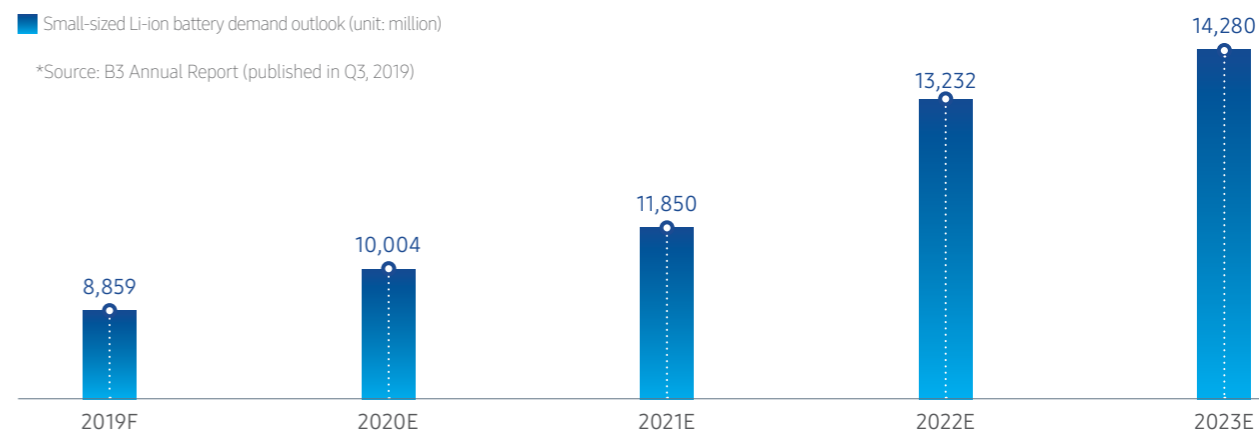
As Samsung SDI surpassed the break-even point in 2019, the Company plans to increase its sales and improve its bottom line to pursue continued growth in 2020. In the polymer battery segment, we will continue to expand our sales with differentiated products equipped with high capacity and fast charging technology to keep pace with the growth of 5G smartphones, foldable phones and wireless earbuds. In the cylindrical battery segment, we will double our endeavors to develop and launch differentiated products in the micro-mobility market including EVs, e-scooters, and e-kick scooters while maintaining our market share in the conventional markets of power tools and others.



Global Small-Sized Li-ion Battery Demand Outlook

■ Small-sized Li-ion battery demand outlook (unit: million)

*Source: B3 Annual Report (published in Q3, 2019)



2019 BUSINESS CASE

Cooperation to Establish Infrastructure in the Electric Motorcycle Market

Samsung SDI signed a memorandum of understanding (MOU) with Daelim Motor to develop electric motorcycle batteries and battery sharing stations. The Korean government set a plan to reach 50,000 units in the distribution of electric motorcycles by 2022 to resolve the particulate matter issue, and is granting subsidies to consumers for their purchase of these green vehicles. While electric motorcycles deliver eco-friendly

transportation without any emission of exhaust gas or particulate matter, their short driving range and lack of battery charging stations are limiting their broader dissemination. This prompted us at Samsung SDI to continuously cooperate with Daelim Motor to develop batteries with improved driving range and to build infrastructure that allows motorists to switch to fully-charged batteries when the need arises.

Business Overview and Growth Strategy

Automotive Battery

Battery is the Key to Sustainable Innovation in Automobiles



Business Summary

The development of Li-ion battery technology is accelerating the transition into the era of electric vehicles. Samsung SDI relentlessly pursues technological advancement to ensure that EV drivers can travel farther while enjoying dynamic yet safer driving experiences. We are also committed to developing low carbon, eco-friendly automotive battery technology, positioning ourselves as a leading provider of clean energy solutions in the automotive market. As Samsung SDI supplies high-efficiency, high-capacity Li-ion rechargeable batteries to global car OEMs, this enables us to minimize CO₂ and other air pollutants emitted from internal combustion engine (ICE) vehicles, advancing sustainability through the products that we serve.

Application

- EV** Electric Vehicle (EV)
We adopt materials that deliver optimal service life and high-capacity features and design optimized battery components to pursue innovation in extending the driving range of EVs.
- PHEV** Plug-in Hybrid Vehicle (PHEV)
As it is essential to strike the right balance between energy density required for electric-mode driving and power density that supports the engine operation, Samsung SDI is in constant search for the optimal point of balance by staying ahead of the competition in developing battery technology.
- HEV** Hybrid Electric Vehicle (HEV)
We provide solutions that improve fuel efficiency and vehicle performance to ensure cost effectiveness against investments while successfully responding to the electrification of vehicles.
- MHEV** Mild Hybrid Electric Vehicle (Mild HEV)*
We continue to develop solutions to bring improved fuel efficiency and vehicle performance to a wide array of vehicle types in a cost-effective and efficient manner.
* Mild HEVs combine the strengths of the Idle Stop and Go (ISG) system and hybrid vehicles by maintaining the voltage of the power supply equipment under 60V

Market Outlook

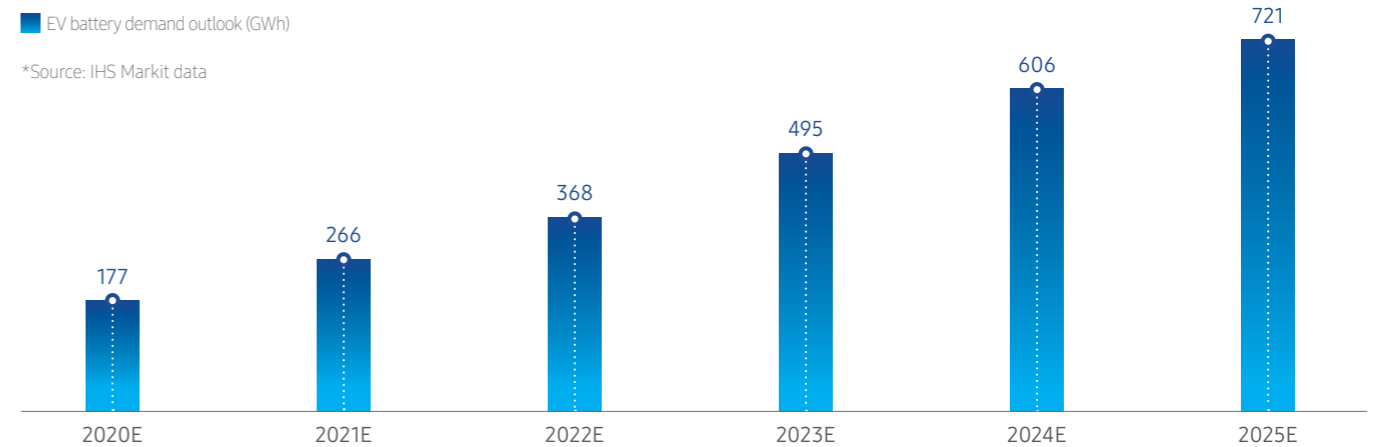


In 2019, the global xEV market posted a 25% y-o-y growth, largely thanks to increases in EV sales in such key markets as China, Europe, and the Americas. Automakers plan to continuously launch more new EV models that travel longer distances, and those models equipped with long range and autonomous driving are expected to drive the market. By 2023, annual EV sales may exceed 15 million units to account for more than 15% of the total automobile market. In Europe, more stringent regulations took effect this year to limit GHG emissions to spur the full-fledged growth of the EV market while the U.K., Norway, the Netherlands, and Sweden are poised to ban the sales or operation of ICE vehicles. In China, the world's largest automobile market, a mandatory quota has been introduced for EVs and PHEVs and this is forecast to significantly grow the EV market over the mid-to-long term.

Business Approach

Countries around the world are introducing varying environmental regulations to curb the emission of CO₂ and air pollutants generated from ICE vehicles. Presently, major global car OEMs are competing to develop EVs at full throttle to cater to market needs and governmental policies. As such, Samsung SDI is focused on the development of high-efficiency high-energy density batteries for low emission vehicles, building on its know-how accumulated in the mobile device battery segment. Notably, we are making continuous investments to launch a wider array of products capable of delivering new technology features including energy density and fast charging in Europe, the Americas, and emerging markets that are expected to enjoy sustained growth. Not only does Samsung SDI deliver optimal automotive battery solutions to car makers, but also the Company is willing to fulfill its role and responsibility as a partner that pursues the mutual growth of both upstream and downstream EV sectors.

Global EV Battery Demand Outlook



2019 BUSINESS CASE

Cooperation with Volvo to Develop Electric Truck Batteries

In 2019, Samsung SDI signed a memorandum of understanding (MOU) to develop electric truck battery packs in conjunction with the global automaker Volvo. While Samsung SDI develops battery cells and modules specialized for Volvo's diverse electric truck models, Volvo will build on this to independently manufacture battery packs to equip its trucks. As battery capacity mounted on every electric truck is approximately 4-7 fold higher than that of passenger cars, and the electrification of trucks is expected to accelerate rapidly in major countries, this cooperation is set to drive the qualitative growth of Samsung SDI's battery offerings in line with the commercialization of Volvo's electric trucks.

Business Overview and Growth Strategy

ESS (Energy Storage System)

From kWh to MWh,
Samsung SDI has
Solutions to Offer



Business Summary

Samsung SDI's ESS business has been fully launched since 2011. Harnessing the stability of our rechargeable batteries achieved in battery business, we post a high market share in the ESS market while deploying EV batteries for ESS applications to establish the qualitative reliability of our ESS offerings. Our products serve a broad range of applications, from general residential to commercial & industrial, utility, UPS, and telecom base stations. Our globally-recognized battery pack design capability and standardized modules enable us to deliver total ESS solutions that cater to diverse customer needs.

Application

- Utility**
 We contribute to ensuring the stability of power grids and standardizing renewable energy power generation in the power supply system spanning from power generation to transmission and distribution. Installation | Power companies, microgrids within industrial complexes, etc.
- Commercial & Industrial (C&I)**
 We improve the stability of power operation and the availability of self-consumption by lowering day-time maximum loads in office buildings including office spaces, public institutions, schools, and hospitals. Installation | Buildings, factories, etc.
- Residential**
 We ensure the 24/7 supply of eco-friendly energy through alignment with photovoltaic power systems. This, in turn, increases energy self-consumption rates while reducing electric bills. Installation | Detached and row houses
- UPS**
 We help protect data centers from unexpected operational disruptions by ensuring reliable power quality and continuity while minimizing total power consumption and reducing facility investments. Installation | Factories, financial institutions, IT companies (servers), etc.
- Telecom**
 We deliver lifetime performance as well as reduced weight, smaller volume, and higher energy density, and bring a dramatic reduction in maintenance expenses through the use of Li-ion batteries. Installation | Base stations, repeaters

Market Outlook

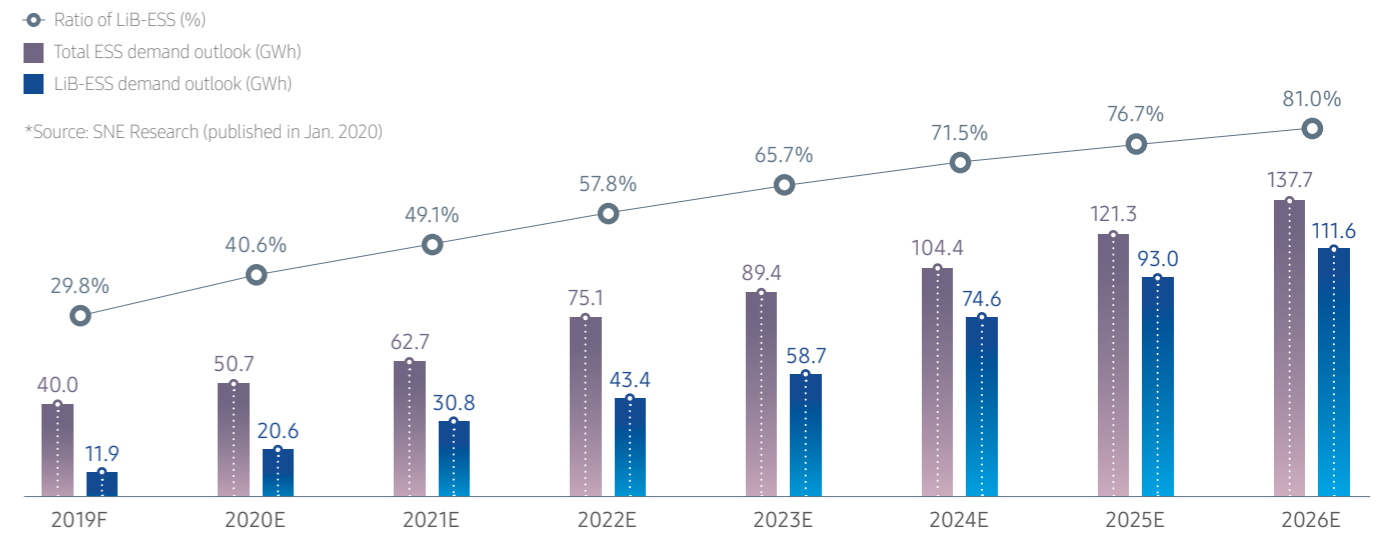
The emerging global trends of denuclearization and decarbonization have given rise to interest in renewable energy, and its wider adoption increases the need for energy storage, emergency power for possible power outages, and efficient power demand management, which further highlights the importance of ESS. As such, the global Li-ion battery ESS market is forecast to continually post a high CAGR of 41%, from 12GWh in 2019 to 93 GWh in 2025.

The U.S. Japan, Australia, and countries in Europe are undertaking large-scale demonstration projects to maintain and repair their aging power grid systems, promote renewable energy, and secure emergency power supply. Furthermore, they provide institutional support for ESS dissemination by passing bills that obligate the installation of ESS and granting subsidies for connecting renewable energy with ESS. In Korea, the government is also promoting the ESS industry in accordance with its 'Renewable Energy 3020 Implementation Plans' and the policy to offer Renewable Energy Certificate (REC) weightings for linking renewable energy power generation facilities with ESS, which is expected to create sustained demand in this sector. Recently, emerging countries are also joining this global trend.

Business Approach

With ESS batteries as a flagship product, Samsung SDI is increasing its ESS market share across Korea, the U.S., Japan, Europe and other mature markets, and is also focused on further advancing into emerging markets. We are also improving the availability of our offerings to span even broader applications from utility and C&I to residential and UPS uses. As ESS is increasingly adopted as a key component in enhancing the efficiency of power grids well into 2020, Samsung SDI will continue to tap into new markets in Southeast Asia and the Middle East in addition to expanding its business presence in such high-growth markets as the U.S. and Europe. In particular, we are developing strategies to meet utility ESS demand as a way to stabilize the power grid system in line with photovoltaic and wind power generation, and plan to increase our sales in commercial & industrial ESS, residential ESS, and other applications in response to the growing needs for Virtual Power Plants (VPP) and photovoltaic self-consumption. In the UPS/telecom sectors where acid-lead batteries account for more than 90% of the total, we will harness our improved performance and affordable prices to drive the shift towards Li-ion batteries.

Global LiB-ESS Demand Outlook



2019 BUSINESS CASE

Developing Li-ion Battery-based ESS to Contribute to Building Greener Ships

Large vessels normally require stronger power for their navigation, and this inevitably generates such environmental pollutants as SOx and particulate matter. As such, the International Maritime Organization (IMO) introduced more stringent regulations on the pollutants emitted from ships from 2020 onwards through the international agreement. In reflection of this industrial trend, Samsung SDI developed an ESS battery system for ships in conjunction

with Samsung Heavy Industries. This system is highly versatile as its modular approach allows for scalability to increase battery capacity according to the size of ships and power consumption, and can be immediately deployed on board to reduce the emission of pollutants and operational expenses. This ESS battery system also became Korea's first to be awarded the type approval certificate from DNV-GL.

Business Overview and Growth Strategy

Electronic Materials

Beyond the Naked Eye,
There is an Underlying Power
of Digital Transformation






Business Summary

Samsung SDI first initiated its electronic materials business by developing EMCs for the semiconductor manufacturing process in 1994. Its spirit of challenging the status quo and pursuit of self-motivated innovation have driven the growth of the Company to develop and sell materials consumed in the semiconductor, display and next-generation energy sectors.

While reinforcing market dominance in the conventional semiconductor and LCD markets, we also strive to establish leadership in the OLED materials, rechargeable battery separator, and other next-generation cutting-edge materials segments. Our advanced technology and expert capability serve not only the semiconductor and display markets but also the rechargeable battery and solar cell materials markets.

Application

- 
Semiconductor
 We produce patterning materials (SOH, SOD, and slurry) used to form semiconductor wafer patterns as well as packaging materials (EMC) that protect semiconductors and chips from the external environment.
- 
Display
 Our electronic materials are mainly adopted for LCD, OLED and other display panels, and are sold in the form of films or base composite materials. They include films such as POL (polarizing film) and FOCA and process materials such as OLED materials and color Photo Resist (color PR).
- 
Next-generation energy
 We produce photovoltaic pastes that are highly-viscous conductive materials that form solar cell electrodes, and membrane separators that serve as an interlayer that prevents short circuits between the cathode and the anode within rechargeable batteries to ensure their safety.

Market Outlook

In 2019, the semiconductor market experienced a rather difficult time, decoupled from the continued boom over the past several years. Even though COVID-19 gives rise to uncertainties in supply and demand in 2020, new semiconductor demand for data server investment and 5G dissemination is forecast to facilitate market recovery.

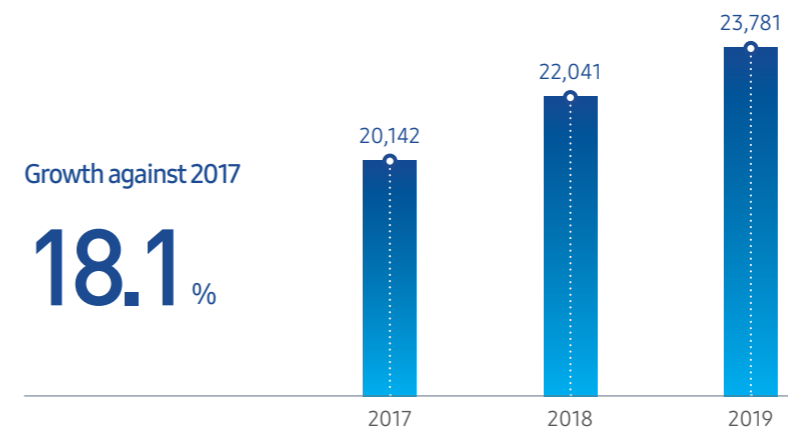
While the display market continues to deteriorate due to overcapacity in China, the launching of various products that leverage OLED as the leading technology is shifting the focus of this market. As demonstrated by foldable smartphones that debuted in the market in 2019, wide-ranging new products powered by bold innovation have been unveiled and this is set to further intensify competition among companies wishing to move ahead of the game with cutting-edge technology.

Business Approach

Companies conducting technology-intensive electronic materials business are required to accurately predict changes in the product cycle and technology trends across the semiconductor, display and other upstream IT segments and to swiftly launch new products based on differentiated technology. Samsung SDI is securing core technology through technology cooperation and R&D with customers to build such differentiated technology competitiveness while creating a business structure that minimizes upstream market risks through rigorous quality management and product portfolio development. As an even fiercer competition is forecast to unfold in the upstream market in 2020, we will further reorganize and reinforce our current profit/loss structure to lay the basis for future growth. This, in turn, will serve to increase our investment in new business items to set the trend in the rapidly-changing technology sector. Building on our accumulated technology capabilities, we will outpace competitors to advance into such high growth potential sectors as Quantum Dot (QD), OLED, foldable display and ultra-fine semiconductor materials in order to establish our technology leadership in these next-generation product categories.

Electronic Materials Sales

Sales (KRW 100 million)



2019 BUSINESS CASE

Technology Development to Improve the Visibility of LCD TVs

Samsung SDI became the world's first to develop technology to improve side visibility on the basis of film making technology accumulated over the years. This is attributable to our bold attempt to think outside the box even amid challenging business conditions of limited growth in the mature upstream market. In combination with polarizing films, this technology can be adopted for premium LCD TVs and significantly improved the visibility of LCD TVs to help customers strengthen their product capacity. This technological breakthrough has also paved the way for Samsung SDI to establish technology dominance in the ultra-large-size, ultra-premium TV segment in the upcoming years, and is expected to serve as a key technology in the 8K LCD TV market.

R&D

R&D Approach

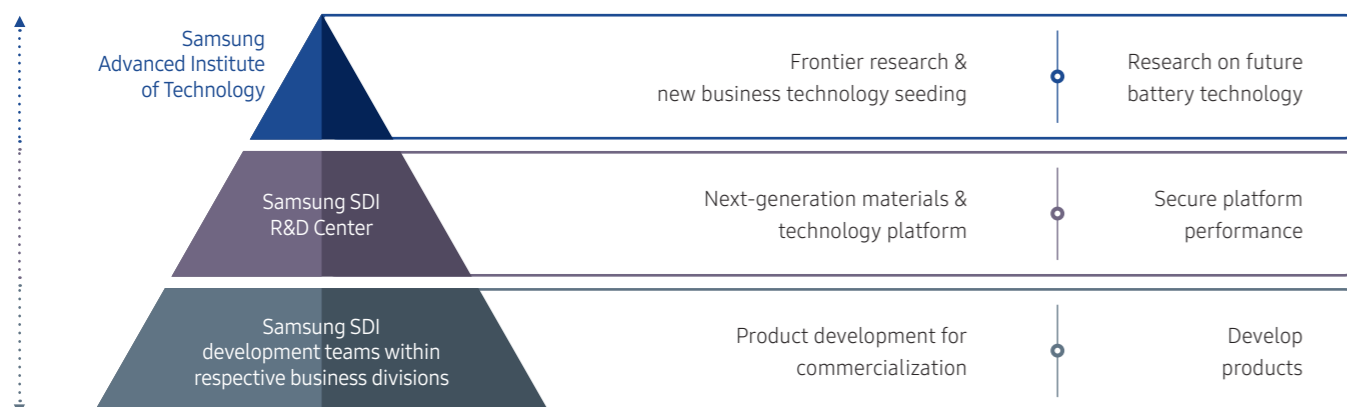
The battery industry is witnessing the diversification of new applications in line with the rising needs for eco-friendliness as well as the increasing demand for battery safety performance. This prompted Samsung SDI to reinforce its R&D on new products and technology to lead the rapidly-shifting technology and market landscape and to secure future growth momentum. As a 'leading total solution provider of world-class eco-friendly materials and energy', we are broadening our business portfolio from parts to advanced materials to elevate our technology competitiveness in energy as well as in secondary batteries, IT devices and automotive materials.

R&D Organization

Samsung SDI operates R&D organizations within Battery Business, Automotive and ESS Business, and Electronic Materials Business in conjunction with the SDI R&D Center, and is reinforcing its global technology leadership through collaboration across these business divisions. We also strengthen our R&D efforts on rechargeable battery materials and ensure a stable supply of raw materials. The characteristics of materials determine the performance of batteries from energy density to service life and power. Most of all, these materials account for a large share of the total costs, which highlights the utmost importance of competitive materials. Our Electronic Materials Business has moved into the Samsung Future Technology Campus (Samsung Electronics Materials Research Complex) to generate synergy through joint R&D endeavors. In 2019, our battery and automotive & ESS business development locations, evaluation facilities, and other relevant functional infrastructure were all placed together at our Giheung worksite to lay the basis to create synergy in battery R&D and improve the efficiency of battery development.

R&D System

Mid-to-long term, innovation-driven



Short term, product-driven

R&D Outcomes in 2019

Research Project	Expected Benefits
IT device rechargeable battery pouch demonstration research to assess their performance and adoption by corporate consumers	Develop high-reliability pouches that meet global industrial standards
Development of high-efficiency, high-stability cell structures for xEVs	Maximize the use of spaces within the battery and improve processability and safety
Development of high-capacity, high-output xEV batteries that meet industry's highest standards	Contribute to moving ahead of the competition in the premium EV market with specialized fast charging performance
Development of functional EMCs	Become the world's first to launch high heat dissipation products applicable to high-end products
Development of next-generation SOH	Contribute to expanding new demand by substituting V-NAND(V-NAND Flash Memory) ACL(Amorphous Carbon Layer)
Development of polarizing films with improved visibility	Create a high-end product market for TV applications and increase sales
Development of optical films for foldable smartphones	Advance into a new OLED materials segment with YOUM* bottom films

* A flexible OLED panel developed by Samsung Display

Expanding Open Innovation

Samsung SDI expands industry-academia cooperation with external institutions and universities to secure next-generation technology while facilitating university-institution exchanges to nurture talented individuals with expertise. Since 2016, we have consistently promoted industry-academia cooperation with Seoul National University, Hanyang University, Sungkyunkwan Univer-

sity, POSTECH and UNIST that are pioneering battery research as a way to develop next-generation battery technology. Such cooperation spans the entire spectrum of battery research, from the development of materials that improve product performance to the development of testing methodology to render our battery products even safer.

In addition, we engage in strategic cooperation with battery pack developers to broaden our market presence and strengthen our competitive edge in future business. In the materials sector, we are pursuing cooperation with specialized institutions and universities in Germany, Japan, and the U.S. to differentiate our technology, and are committed to extending areas of cooperation continuously.

Green R&D

Samsung SDI produces Energy Storage Systems (ESS) required to use Li-ion batteries as a key component of EVs and renewable energy. As OEMs increasingly demand that recycled metals be adopted for battery manufacturing to reduce CO₂ emissions in line with environmental regulations introduced by countries around the world, we are forging strategic partnerships with companies capable of recovering and recycling useful materials qualified for new battery production from end-of-life batteries.

Patent Management

Samsung SDI's patent registration and management aims to lead future technology in the ever-changing technology landscape. In the rechargeable battery segment, our outstanding patent portfolio covers wide-ranging technology areas to cater to respective applications, from small-sized batteries for IT devices to mid/large-sized batteries for automobiles and ESS. In the electronic materials sector, we also possess competitive patents on a broad array of technologies, from display materials (OLED, QD) to semiconductor materials. As a result of such endeavors, the number of patents registered amounts to 4,730 in Korea and 11,322 in the U.S., Europe, China, Japan and other major countries around the globe.

Cumulative Patent Registrations in 2019

unit: No. of patents

