SK CES 2023 PRESSKIT

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1. CES 2023 Press Release

SK to Showcase 40 Carbon Reduction Technologies at CES 2023

- SK and its partner companies will exhibit at CES 2023 products and technologies, such as electric vehicle (EV) batteries and next-generation energy sources, that aim to reduce carbon emissions

- Technology will reinforce the steps SK Group is taking to meet its goal of reducing 200 million tons of carbon emissions by 2030

SEOUL, South Korea, December 20, 2022 – SK Group, South Korea's second-largest conglomerate, will showcase at CES 2023 a broad range of products and technologies from its companies and partners designed to help cut global carbon emissions. CES 2023, a global technology event, will be held January 5-8 in Las Vegas.

SK's booth will include products and technologies from eight of its companies – SK Inc., SK Innovation, SK E&S, SK Hynix, SK Telecom, SK Ecoplant, SKC and SK Biopharmaceuticals – along with 10 U.S.-based partner companies. The exhibit will reinforce SK's commitment to investing in and growing sustainable businesses.

Action: Moving Toward a Carbon-Free Future Together

SK's 2023 CES exhibit builds upon the commitment SK Group made at CES 2022 of reducing carbon emissions by 200 million tons by 2030, or 1% of the global carbon reduction targets needed to address climate change. This year's exhibit will also encourage others to take action towards creating a more sustainable future.

The SK booth will be divided into two segments – the first which tangibly emphasizes how the world will be negatively impacted by extreme environmental issues if individuals and businesses do not address climate change. Viewers will then be guided into a second

segment of the exhibit that will display how future cities can thrive if built around sustainable technologies. This segment will be broken into several zones including: Clean Mobility, Zero Carbon Lifestyle, Waste to Resources, Air Mobility and Future Energy.

"We've designed the SK exhibition hall in a way that visitors can clearly compare and experience the two futures that people on Earth might face when they actively engage in carbon reduction activities and when they do not," said Hyunho Son, Vice President of Strategy Support Team for the SK SUPEX Council, a coordinating body across SK companies.

The Companies and Technologies

The carbon reduction technologies and products that SK and its partner companies will showcase span a wide range of applications including: electric vehicle (EV) batteries, renewable energy, high-efficiency semiconductors, waste-to-energy technology, carbon capture, utilization and storage (CCUS), nuclear small module reactors (SMR), urban air mobility (UAM), and advanced healthcare technology.

For 2023 CES, all of the participating SK companies and partner companies will come together with a goal of providing visitors a chance to experience how they are leading the charge towards a more sustainable, carbon-neutral future.

"We see achieving 'Net Zero' as providing new momentum in the era of 'energy transition,'" Son said. "At this year's CES, we will demonstrate the strides our operating companies have made in R&D and business competitiveness as they further develop eco-friendly technologies and solutions."

A full introduction on the SK exhibition hall and additional company press releases will be uploaded on the following website: https://linktr.ee/skces2023.

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Photo Caption:

SK Group has unveiled a virtual image of "SK, Around Every Corner," the exhibition hall to be showcased at "CES 2023," the world's largest consumer electronics and IT exhibition to be held in Las Vegas, the U.S. in January next year. SK plans to exhibit around 40 carbon reduction technologies to overcome the climate crisis at 'CES 2023'

2. Introduction to SK Group

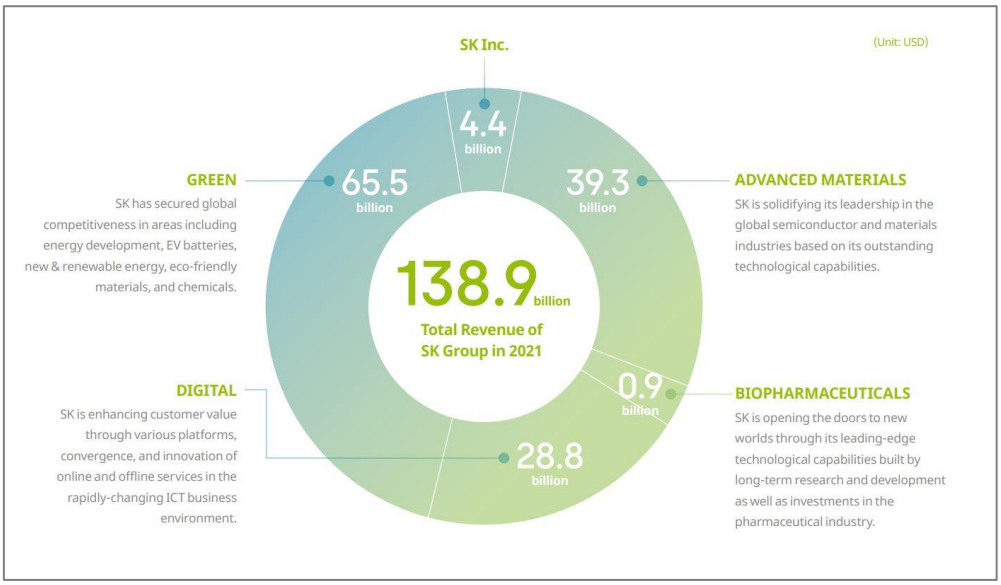
❑ Overview

- SK Group, a Fortune Global 500 business and the second-largest conglomerate in South Korea, has grown into a globally renowned organization by constantly pursuing changes and challenges.

Amid a rapidly changing business environment, the SK Group has selected four core business areas – Green, Digital, Advanced Materials, and Biopharmaceuticals – as future growth engines, and is pursuing business model innovation and sustainable growth.

The SK Group has 186 affiliate companies, and they share the group's management culture: realizing the value of 'Separately but Together,' so they 'separately' develop capabilities that fit each company's business environment and structure, but, at the same time, they seek ways to enhance synergy effects 'together,' to secure stability and growth.

SK is creating its own 'Financial Story' that pursues growth from the perspective of 'Total Value,' which includes not only economic value such as financial performance, but also all elements of corporate value such as Environmental, Social and Governance (ESG) principles and a focus on employee happiness. Based on such 'Financial Story,' SK wants to create a new corporate value that can gain the respect and trust of all stakeholders, including customers, investors, and shareholders.



❑ Management Philosophy

- SK aims to create sustainable happiness for its employees and all stakeholders based on its unique management philosophy, SKMS (SK Management System), which was first established in 1979.

SK defines social value as all the values that the company creates for the happiness of stakeholders, and since 2018, it has introduced 'Double Bottom Line (DBL)' management that pursues both economic and social value creation throughout its business activities. In addition, through ESG management, the SK Group is striving to solve social problems and expand the roles of companies to meet the needs of the times.

First, SK became the first Korean company to declare 'Net Zero,' an enterprise-wide environmental initiative, and is striving to achieve net zero emissions ahead of the global carbon neutrality target of 2050.

Seven affiliates, including SK Inc., SK Telecom, SK Hynix, SK IE Technology, SKC, SK Siltron, and SK Specialty, were the first Korean companies to participate in the global RE100 initiative and pledged to switch to 100% renewable energy sources by 2050. In addition, SK has set a bold goal of reducing carbon emissions by 200 million tons, which is 1% of the global reduction target of 21 billion tons in 2030, and is actively promoting investment in eco-friendly businesses and development of carbon reduction technologies.

SK is also leading the way in researching methodologies for measuring social value. We measure the social value created by 14 SK companies every year and identify each company's expanded role and value creation factors through performance analysis and communicate with various stakeholders by disclosing them to the outside.

Furthermore, as Vice Chairman of Value Balancing Alliance (VBA), a cooperation initiative among companies to establish a global social value measurement system, we are developing social value measurement methodologies together with major global companies.

SK has declared its commitment to Board of Director-centered management and established and implemented its 'Governance Story' for the continuous and systematic imple-

mentation of such a management system. We comprehensively review and analyze expertise such as knowledge, experience, and ability required by the board of directors, as well as diversity aspects such as gender, age, and field of expertise.

In addition, we are expanding outside director training programs and BOD activity evaluations to continuously improve the BOD's professional capabilities. At the same time, all SK companies have established specialized committees under the board of directors to perform major functions such as personnel management, strategy establishment and audit to enhance the professionalism and independence of the board of directors, strengthening the deliberation authority and role of each committee.

❑ History of SK Group

- For the past 70 years, the SK Group has played a pivotal role in Korea's economic growth based on its energy and chemical, information and communication, and semiconductor sectors.

Sunkyong Textile, predecessor to the SK Group, was established in 1953 amidst the ruins of the Korean War. In 1969, the company built the first polyester yarn factory in Korea, and in 1980 acquired the Korea Oil Corporation (Yukong) to achieve the goal of vertical integration 'From Petroleum to Fibers.'

In 1988, Yukong (now SK innovation) succeeded in overseas crude oil exploration and production for the first time among Korean companies, diversified its portfolio into petrochemicals, and grew into a global energy company with the world's largest oil refinery and an integrated petrochemical complex.

SK entered the information and communication technology (ICT) industry by acquiring the Korea Mobile Telecommunications Corporation (currently SK telecom) in 1994. SK telecom successfully launched CDMA (2G), HSDPA (3G), LTE-Advanced (4G), and 5G mobile telecommunication services for the first time in the world, establishing itself as the No. 1 mobile carrier in Korea. We are also putting AI technologies at the core of our business

and driving new innovations in areas such as media, AI service, metaverse, cloud service and connected intelligence.

In 2012, SK acquired hynix (currently SK hynix), a global semiconductor manufacturer, thereby securing a third growth engine. Through bold investments, we built the world's largest DRAM fab, invested $3.5 billion in NAND memory chip maker Kioxia (formerly Toshiba Memory) in 2017, and acquired Intel's NAND memory business unit in 2020, expanding its flagship products from DRAM to NAND flash and SSD. In particular, the acquisition of Intel's memory business was the largest overseas acquisition of a Korean company (USD 9 billion), providing the SK Group with an opportunity to become a global leader in the semiconductor field. In addition, the establishment of Sapeon Inc. in the U.S. in early 2022 demonstrates that the company has grown both quantitatively and qualitatively in the semiconductor business over the past 10 years.

In 2015, we acquired SK materials (now SK specialty), an affiliate specializing in gas products and materials for semiconductors and displays, and laid the foundation for growth in the semiconductor materials business. Then, in 2017, we acquired SK siltron, a silicon wafer manufacturer, to complete its business portfolio ranging from semiconductors to materials.

Today, we also continue to innovate and challenge ourselves for sustainable growth. We are continuing to invest in and nurture four core businesses and our future growth engines: Green, Digital, Advanced materials, and Bio, and continue to innovate to become a trusted company supported by all stakeholders.

3. Introduction to SK Subsidiaries Participating in CES 2023

❑ SK Inc.

- SK Inc., a holding company of the SK Group, consists of the investment division that identifies and develops future growth engines through continuous business portfolio innovation and the business division that operates a comprehensive suite of IT services based on digital technologies. Declaring its vision to become an 'investment specialist that creates a sustainable future for all,' SK Inc. has been continuously making proactive investments in four key business areas for the future: advanced materials such as semiconductor and battery materials, biotechnology such as new drug development and CDMO, green business such as new energy sources and sustainable food, and digital areas such as AI and data, thereby driving innovation with SK Group portfolio.

❑ SK innovation

- SK innovation is the holding company of eight subsidiaries, including SK energy, SK geo Centric, SK on, SK enmove, SK incheon Petrochem, SK trading International, SK ie technology, and SK earthon. Aiming to become more than a leading energy and chemical company in Korea, SK innovation is evolving into a 'Green Energy & Materials Company' through its continuous investment in high quality fuels, eco-friendly plastics, batteries, and materials.

❑ SK energy

- SK energy is Korea's leading energy company that began in 1962 as Korea Oil Corporation,the first oil refinery in Korea, and has since contributed to national economic development. Equipped with worldclass facilities and operational competitiveness, its Ulsan re-

fining complex can process up to 840,000 barrels of crude oil per day. The company continuously improves the speed and flexibility of the enterprise value chain to proactively respond to the price volatility of oil and petroleum products.

❑ SK geo centric

- Having started operation of Korea's first naphtha cracker in 1972, SK geo centric has led the development of the domestic chemical industry with continuous innovation and technology development. It is now becoming the world's first recycling-based chemical company that seeks to build a circular economy for the entire plastic recycling value chain with the goal of "Green for better life."

The company will recycle waste plastics made from petroleum at Ulsan Recycling Cluster to extract oil and create a circular economy using new technologies that turn them into new resources, and based on such efforts, it will provide solutions that meet various customer needs.

❑ SK on

- In 2021, SK on was split off from SK innovation in a move to ensure independent management of the battery business with the goal of gaining business expertise and improving management efficiency. SK on manufactures and sells batteries for electric vehicles (EVs) and energy storage systems (ESS) and is also pushing for the implementation of a service business that covers the overall battery lifecycle (Battery as a Service). The company has established battery production hubs in major EV markets including the U.S., Europe, and China to operate a global mass-production system to supply batteries for EVs manufactured by automakers around the world.

❑ SK telecom

- SK telecom is the leading Information & Communications Technology (ICT) company in Korea with over 30 million mobile subscribers, which account for nearly 50 percent of the

market. Since its establishment in 1984, the company has been leading the global mobile industry by achieving the world's first commercialization of CDMA (2G) in 1996, LTE-A (4G) in 2013 and 5G in 2019. Now, it is taking customer experience to new heights by extending beyond connectivity. By placing artificial intelligence (AI) at the core of its business, SK telecom is rapidly transforming into an AI company that brings benefits to customers through technology and service innovation. It is focusing on driving innovations in areas of fixed and mobile telecommunications, media, enterprise, AIVERSE (AI+Metaverse) and Connected Intelligence.

❑ SK E&S

- SK E&S not only operates an eco-friendly energy business for the future such as renewable energy, hydrogen, and energy solutions, which are new areas being tapped into, but also runs a traditional energy business including liquefied natural gas (LNG) and city gas. Founded in 1999 as the holding company of its city gas business, SK E&S was the first company in the domestic private sector to build a complete LNG value chain. SK E&S occupies the largest market share in city gas, and at the same time, contributes to the stable domestic supply of electricity through the operation of LNG power plants. More recently, SK E&S has begun expanding its renewable energy business while, at the same time, kickstarting its business in hydrogen, the energy source of the future.

❑ SK hynix

- Since its successful pilot production of Korea's first 16Kb SRAM in 1984, SK hynix has led the memory semiconductor industry. SK hynix manufactures memory semiconductors including DRAM, NAND flash, and multi-chip package (MCP)—the core components of a wide array of ICT devices such as servers and mobile devices as well as new digital technologies such as AI and autonomous driving—and system semiconductors such as CMOS image sensors (CIS), providing innovative solutions.

❑ SKC

- SKC is evolving into a provider of high-performance materials with a focus on materials for rechargeable batteries and semiconductors as well as eco-friendly materials. In 2020, SKC entered the business for rechargeable battery materials by launching 'SK Nexilis' a producer of copper foil with global technology leadership. Copper foil is a key component of rechargeable batteries. In addition, SKC built a foundation for its growth in the global market by spinning off its chemical business division to launch a joint venture called 'SK Picglobal' Subsequently, SKC acquired a 100% stake in SKC Solmics to consolidate its semiconductor businesses to accelerate growth. In 2021, SKC declared its commitment to transformation as a 'Global ESG Material Solution Company' taking its business portfolio innovation to new heights.

❑ SK ecoplant

- In 2021, SK ecoplant began to see growth as an environmental operator that leads the way for ESG. After renaming itself in May 2021, SK ecoplant has completed building a circular economy system based on its vision for "Waste Zero, Waste to Energy, Net Zero" and is evolving into a solutions provider that addresses global environment and energy issues. Seeking to become more than Korea's largest environmental services provider, SK ecoplant is evolving into a global environmental solutions provider, expanding its portfolio from energy business to new and renewable energy business and building the foundation to supply clean energy. In addition, SK ecoplant plans to continue to bolster its engineering expertise and sharpen its competitive edge in engineering, procurement, and construction (EPC) business.

❑ SK biopharmaceuticals

- As part of the effort to develop the next growth engine of SK Group, SK biopharmaceuticals began its development of new drugs in 1993. As the only Korean pharmaceutical company to have two innovative new drugs (cenobamate and solriamfetol) approved by

the FDA, the company has achieved FDA and EMA approvals and completed its entry into the four major pharmaceutical markets, including the U.S., Europe, Japan, and China. Based on the R&D capabilities built over the years in central nervous system (CNS) disorders, the company plans to accelerate its new drug development in various other areas including psychiatric disorders, brain tumors, and cancer. The company aims to grow into one of the global top 50 pharmaceutical companies by 2025. It is also gearing up its efforts to evolve into one of the global top ten companies by 2030 by expanding its portfolio into various healthcare areas.

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4. Introduction to Exhibition Items and Technologies

1) SK Inc.

❑ Sustainable Food – (Partner companies) Perfect Day, Nature's Fynd

• Exhibition Area: Outdoor Food Truck

- Perfect Day, an investment of SK Inc., succeeded in producing dairy protein through fermentation by combining microorganisms with protein-generating genes for the first time in the world in 2019. This protein can be used as an ingredient in ice cream, chocolate, cream cheese, and smoothies. In particular, under the international standard for carbon footprints (ISO 14067), Perfect Day dairy protein was recognized for its eco-friendliness, such as reducing greenhouse gas emissions by 97%, water consumption by 99%, and energy consumption by 60%.

Nature's Fynd, another sustainable food company investment of SK Inc., succeeded in culturing microorganisms found in Yellowstone in the U.S., into proteins using its own fermentation technology, and introduced cream cheese and patty products made with it.

SK Inc. will operate outdoor food trucks at this CES and provide visitors with K-bingsu, a Korean shaved ice cream dessert, made with these sustainable foods.

❑ Ultra-fast Charger V2 – SK signet

• Exhibition Area : ① Clean Mobility

- SK signet is an electric vehicle (EV) charger manufacturer with over 50% market share in the U.S. for Ultra-Fast Chargers (No. 1 U.S. / No. 2 Global). SK signet's Ultra-Fast Chargers make it possible for you to travel up to 32 km / 20 miles within a minute's charge and can charge an EV from 20% to 80% in 18 minutes. With a single charging session, you can add about 400 km / 248 miles in range, which makes it possible to go from Seoul to Busan without having to stop in between.

SK signet has announced its plans to establish a factory in Texas in 2022 and the latest V2 products will be the first to be manufactured in the U.S. from 2023. SK signet's V2 chargers will not only be faster and safer but also provide a battery diagnosis function, which enables users to check their vehicle status.

SK signet's Ultra-Fast Chargers go beyond fast charging speed and safety by providing various functions to ensure a seamless charging experience. We've enhanced user experience by adding an LED indicator option which can display charger availability, charging status and much more. On top of that, our beautiful 32-Inch display can be utilized by Charge Point Operators (CPOs) for advertisements targeting EV drivers, as an additional business model.

❑ SSCB (Solid State Circuit Breaker) - (Partner company) Atom Power

• Exhibition Area : ① Clean Mobility

- Atom Power's 'Solid State Circuit Breaker (SSCB)' utilizes silicon carbide (SiC) power semiconductors to digitally cut current and is able to detect power consumption in real-time. Also, it can flexibly control high-voltage current loads, and has a wide range of applications such as EV charging infrastructure.

A circuit breaker is a device that must be installed in distributed power systems, and it enables data collection on power consumption, using a CT sensor built into the device. The collected data can be used for various energy solution projects such as establishing optimal charging and discharging plans for EVs and ESSs.

With the rapid spread of electric vehicles in the United States, a solution for efficient power supply / distribution is required. As one of the most direct alternatives that can respond to the need, a solid-state circuit breaker is emerging as a gateway device that can flexibly control power consumption for each occasion.

❑ Smart Glass – (Partner company) Halio

• Exhibition Area : ② Zero Carbon Lifestyle

- Halio's Smart Glass is a photochromic glass that can adjust the transparency of the glass using electricity. It is considered as an eco-friendly, innovative material that can improve energy efficiency by reducing heating and cooling costs in buildings and blocking infrared rays. Smart Glass automatically tints according to weather changes, getting rid of the need to use blinds or curtains and providing users with a comfortable environment that they have never experienced before. Halio's Smart Glass is a highly durable and low-power product and is the world's fastest-tinting electrochromic glazing product available. It is currently on sale in North America and Europe. Based on the technology for electrochromic glass for buildings, the company is expanding its product line to color-changing films for automobiles.

❑ VESTATION - (Partner company) Teraon

• Exhibition Area : ② Zero Carbon Lifestyle

- It is a heating element composition in which CNT (Carbon Nano Tube) and graphene flakes are mixed. The heating material and film heater have high heat resistance of over 250℃ and flexibility. Regardless of hundreds of resistance recipes and patterning technologies, fast heating rate, low power consumption, and curved surfaces, uniform heat generation is possible across the entire surface. In particular, it allows 3D curved surface molding and stable heat generation, making it more applicable to areas where existing heater technologies cannot be adopted.

❑ Radiant heating panel

• Exhibition Area : ② Zero Carbon Lifestyle

- It can be remotely controlled (with an app) and has heat resistance and waterproof and dustproof functions (IP55). It provides fast warmth by emitting far-infrared rays (can be installed on the ceilings of bathrooms, living rooms and offices), and prevents mold formation and has deodorization effects using far-infrared radiation.

2) SK innovation

❑ Super Fast Battery (NCM811) – SK on

• Exhibition Area : ① Clean Mobility

- SK on is a leader in EV battery fast charging technology. Our Super Fast Battery (SF Battery) can be charged up to 80% within 18 minutes. This is the fastest charging performance of any battery in the world. Award-winning EV cars, Hyundai Ioniq 5 and Kia EV 6, are currently equipped with the SF Battery. This outstanding charging solution comes from SK's unique cell design, material and production process.

❑ NCM9+ – SK on

• Exhibition Area : ① Clean Mobility

- NCM9+ is an upgraded version of SK on's NCM9 battery, which powers Ford's F-150 Lightning pickup. The NCM9+ battery has improved not only the charging performance but also the energy density without any compromise in other performances including safety.

❑ S-Pack – SK on

• Exhibition Area : ① Clean Mobility

- S-Pack is an EV battery applied with SK on's exclusive EV CTP (Cell-to-pack) technology. Our EV CTP battery incorporates cutting-edge technology to enhance safety and prevent thermal propagation. By simplifying internal structure and its parts, S-Pack maximizes the cell volume ratio of the pack up to 75%. SK on also has applied its self-developed fire-protective technology to ensure no thermal propagation to the system or vehicle in case of cell ignition from abnormal uses.

❑ All-Solid-State Battery – SK on

• Exhibition Area : ① Clean Mobility

- In late 2021, SK on announced a partnership with Solid Power, an industry-leading developer of all-solid-state battery cells and electrolyte materials. All-solid-state batteries use a solid electrolyte in place of the liquid or gel electrolytes used in lithium-ion batteries today. Solid-state batteries may offer advantages compared to lithium-ion batteries, including higher energy, improved safety or additional pack-level cost reduction benefits. The cell displayed at CES is an early prototype of Solid Power's sulfide-based all-solid-state battery with a silicon anode and high nickel cathode. Solid Power is working with automakers and partners like SK on to develop this cell for potential use in EV's over the coming years.

❑ Quick Battery Diagnostics – SK on

• Exhibition Area : ① Clean Mobility

- SK on offers a faster, approachable, and economical battery diagnosis service for EVs. In 30 minutes of fast charging, our solution informs users battery SOH (State Of Health) and possible abnormalities. Our goal is to make a battery diagnosis service to become univer-

sal for everyone in need of battery Valuation & Safety, leading a market standard of battery indices. Based on the years of lab and field data collection and trial runs, our battery diagnostics solution achieved 95% confidence levels at pilot test.

❑ BMR – SK innovation

• Exhibition Area : ③ Waste to Resources

- With regards to BMR (Battery Metal Recycle), a waste battery recycling business, SK innovation has developed a technology to recover high-purity lithium hydroxide.

Since December 2021, to commercialize the technology to recover lithium contained in end-of-life lithium-ion batteries in the form of lithium hydroxide, a demonstration plant has been operated in the SK innovation Institute of Environmental Science & Technology in Daejeon, South Korea, and a commercial plant is scheduled to operate in 2025. Extracting lithium hydroxide from waste batteries can reduce carbon emissions by about 40-70% compared to mining lithium from mines or salt lakes.

❑ Liquid Immersion Cooling for Data Centers – SK enmove

• Exhibition Area : ⑤ Green Digital Solutions

- Data center immersion cooling is a next-generation thermal management technology that cools data servers by directly immersing IT hardware in cooling oil, and it is also a method that has excellent cooling efficiency. Compared to traditional air cooling, immersion cooling requires much less power to run, which can reduce total power consumption by about 30%, thereby reducing carbon emissions.

SK enmove ranks No. 1 in the global Group III and Group III+ premium lube base oil market. Based on the outstanding capabilities acquired from existing businesses, its goal is to focus on fostering heat management businesses as future growth engines such as

liquid immersion cooling, which utilizes premium lube base oil with excellent cooling performance as cooling oil.

❑ CCUS – SK energy & SK earthon

• Exhibition Area : ⑥ Future Energy

- CCUS stands for carbon capture, utilization, and storage, and refers to the process of capturing generated carbon dioxide, transporting it; and then storing it deep underground. It is emerging as a key technology to solve the global warming issue by removing carbon dioxide from the atmosphere.

SK Innovation affiliates such as SK Energy and SK Earthon are securing competitiveness by participating in domestic and overseas national projects such as the Donghae Gas Field CCS demonstration project or the Shepherd CCS project, a carbon capture, transportation, and storage project between Korea and Malaysia, based on their CO2 storage exploration capabilities. They plan to accelerate the achievement of Net Zero emissions by reaching the mid-term goal of securing more than 2 million tons of storage annually around 2030.

❑ SMR – SK innovation

• Exhibition Area : ⑥ Future Energy

- SMR (Small Modular Reactor) is a small-sized nuclear reactor with an output of less than 300MW and is considered easier to control and cool down than existing large nuclear power plants. As it is smaller in scale, it is more economical than large-scale power plants, which is difficult to procure construction costs and select a site. In particular, there is no need to secure a lot of cooling water from the sea, and since it can be installed in the form of a module, in terms of construction cost and period, it has more advantages than general nuclear power plants.

Depending on the coolant, SMR is divided into a light water reactor, high-temperature gas-cooled reactor cooled by helium, molten-salt-cooled reactor, and a sodium-cooled

reactor. SK Inc. and SK Innovation invested 300 billion won (approximately $250 million) in TerraPower, a U.S. company with a sodium-cooled fast reactor (SFR) design technology. SFR technology is a method of transferring heat generated from nuclear fission using fast neutrons to a liquid sodium coolant and producing electricity by generating steam in the process. It is considered a key technology among next-generation SMR technologies as it can drastically reduce nuclear waste and at the same time secure high safety.

❑ LiBS (Lithium-ion Battery Separator) - SK ie technology

• Exhibition Area : ① Clean Mobility

- LiBS, a key component in lithium-ion batteries, is a microporous film that ensures cell safety by blocking direct contact between anodes and cathodes within a cell. Being used in EV batteries that require high stability and power, SK ie technology's LiBS applies the eco-friendly ENPASS™ Ultrathin Ceramic Coated Separator (CCS), which has strong heat resistance, and the world's first Sequential Stretching technology, which can freely extend the separator with uniform quality.

SK ie technology is leading the premium wet-laid separator market as the global No.1 maker with outstanding quality and safety.

❑ UD Tape / UD Laminate Sheet – SK geo centric

• Exhibition Area : ① Clean Mobility

- UD (Unidirectional) Tape is an intermediate substrate manufactured by impregnating polymers with reinforcements in one direction and then winding it in the form of a tape. Like the steel-concrete structure of a building, fiber-type reinforcements maximize mechanical properties of materials. Through optimized structural design and forming method, it can be used for aircraft, automotive / commercial vehicle parts, and high-strength frames

❑ Electric Vehicle Fluid – SK enmove

• Exhibition Area : ① Clean Mobility

- SK enmove has extensive experience in a variety of fluid technology and began development of new EVF technology from 2010, working with EV powertrain and vehicle manufacturers to improve range efficiency and maintain durability of EV components.

With the competitive advantage, SK enmove is being selected by leading EV manufacturers and continues to work on bespoke EVF projects in North America, Europe, China and Korea.

❑ Data Center Liquid Immersion Cooling – SK enmove

• Exhibition Area : ⑤ Green Digital Solutions

- Liquid immersion cooling solutions are the key technology for next generation thermal management, maximizing data center cooling efficiency by eliminating costly and wasteful air cooling and instead immersing servers in high-performance, non-conductive coolant.

SK enmove, with its industry-leading partner GRC, is moving forward to become a global liquid-based thermal management solution provider, reducing power consumption and carbon emission in data centers worldwide.

❑ Plastic circular economy – SK geo centric

• Exhibition Area : ③ Waste to Resources

- SK geo centric is creating a recycling cluster in Ulsan, South Korea, by bringing together three plastic recycling technologies for the first time in the world to build a plastic circular economy. Ulsan Advanced Recycling Cluster plans to realize the vision of building a plastic circular economy by creating synergy effects in the processes that adopt ▲ polymerization technology that recycles colored / contaminated PET and polyester fibers that would otherwise be incinerated, ▲ solvent extraction technology that recycles poly-

propylene (PP), which accounts for 25% of all plastics used in automobile interior materials, home appliances, etc. and ▲ pyrolysis technology that applies heat to incinerated plastics to create pyrolysis oil, using its own pyrolysis post-processing technology.

Scheduled to operate in 2025, it will be able to process 250,000 tons of waste plastics annually and produce and supply recycled materials in cooperation with various global companies.

3) SK telecom

❑ Urban Air Mobility (UAM)

• Exhibition Area : ④ Air Mobility

- UAM, a zero-pollution, low-noise and timesaving means of transportation, is expected to be a game changer in future mobility. As the first member of the UAM Team Korea, SK telecom is working to achieve early commercialization of UAM in Korea. It also joined hands with Joby Aviation, a world-leading eVTOL company, to secure market leadership. Leveraging its expertise in network infrastructure and the mobility platform business, SK telecom aims to offer an end-to-end integrated UAM service in collaboration with diverse partners in this field.

[UAM]

❑ AI Semiconductor, SAPEON

• Exhibition Area : ④ Air Mobility

- SK telecom spun off SAPEON Inc. in December 2021 to further promote the development of artificial intelligence (AI) semiconductors and create global market opportunities. AI semiconductor SAPEON is optimally designed to process artificial intelligence tasks faster, using less power by efficiently processing large amounts of data in parallel. SAPEON X220 has been shown to be about 2.3 to 4.6 times faster and 2 times more energy-efficient than Graphics Processing Units (GPUs) on the MLPerf benchmark. Applied to UAM, SAPEON chip will enable the provision of a wide range of innovative AI-based services, while reducing carbon emissions.

❑ Virtual Power Plant (VPP) for Reusable Energy

• Exhibition Area : ④ Air Mobility

- A virtual power plant (VPP) is a cloud-based distributed power plant that aggregates and manages the capacities of heterogeneous distributed energy resources in an integrated manner. When applied to UAM, VPP will play a pivotal role in reducing CO2 emissions by providing energy in a more stable and efficient manner

4) SK E&S

❑ GenDrive & GenFuel - (Partner company) Plug Power

• Exhibition Area : ① Clean Mobility

- Plug Power's hydrogen fuel cell 'GenDrive' and hydrogen charger 'GenFuel Dispenser' Hydrogen fuel cells emit no greenhouse gases and have an air purification function that inhales and removes fine dust in the air, so they are considered as a key technology for carbon reduction.

GenDrive is an all-in-one package and can be simply installed in the battery room of existing battery-based electric forklifts, so it has the advantage of being applicable to more than 100 electric forklift models around the world.

[GenDrive & GenFuel]

❑ EV charger – EverCharge

• Exhibition Area : ① Clean Mobility

- EV chargers of EverCharge, acquired by SK E&S in March 2022, not only effectively manage and control the power load of an entire building based on the 'Dynamic Load Management' technology, but also monitor charging patterns of the electric vehicles that are being charged. By analyzing and distributing power efficiently, the installation and operation efficiency can be increased up to five times compared to those of other companies without construction for power expansion.

[EverCharge EV charger]

❑ Liquid Hydrogen Drone

• Exhibition Area : ④ Air Mobility

- SK E&S's liquid hydrogen drone was airborne for 13 hours and 24 minutes in February 2022, the longest continuous flight in the world among liquid hydrogen drones. Liquefied hydrogen drones cool gaseous hydrogen to minus 253°C and use it as fuel. As it is based on liquefied hydrogen with high energy density, it can fly up to 26 times longer than conventional drones powered by lithium-ion batteries and 6 times longer than gaseous hydrogen drones. Compared to gaseous hydrogen, liquefied hydrogen has a high storage density, which makes it possible to reduce the weight of the fuel tank, and has the advantage of high stability as the storage pressure is at the atmospheric pressure level. SK E&S is taking the lead in early commercialization by supporting research and development of small and medium-sized venture companies in the field of liquefied hydrogen drones.

[Liquid Hydrogen Drone]

❑ Clean Energy (CCUS / Renewable Energy / Hydrogen / Energy Solution)

• Exhibition Area : ⑥ Future Energy

- SK E&S is committed to achieving global carbon reduction targets with carbon dioxide capture / storage (CCS) and renewable energy, hydrogen, and energy solutions. In particular, CCS is key to usher in a low-carbon energy future envisioned by SK E&S.

We plan to capture and remove carbon dioxide generated in the natural gas production process by applying CCS technology to the Barossa-Caldita offshore gas field project currently being promoted in Australia. In addition, CCS technology will be also applied to the hydrogen production process in the future to produce clean hydrogen that has removed CO_2 from a hydrogen production plant that will be built near Boryeong, Chungcheongnam-do, in South Korea from 2025.

Furthermore, we are investing in the world's largest CCS project aimed at collecting and storing up to 12 million tons of carbon dioxide annually along with Continental and other U.S. energy companies, and since September, we are actively expanding our CCS business by acquiring the right to operate the mine in the bidding for the CO_2 repository exploration located in the northern Australian sea.

[Future eco-friendly city built on clean energy technologies]

5) SK hynix

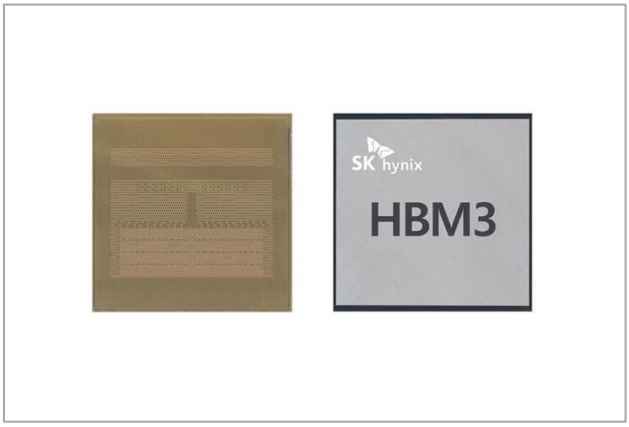
❑ HBM3

• Exhibition Area : ⑤ Green Digital Solution

- It is the Gen 4 HBM (High Bandwidth Memory) product, a high value-added, high-performance DRAM that has dramatically increased data processing speed compared to existing DRAMs by connecting multiple DRAMs vertically and is also the world's best performing product among DRAM products.

It can process up to 819 GB of data per second and has secured high efficiency by improving power efficiency by 23% compared to HBM2.

Recently, HBM3 is being used in fields such as artificial intelligence (AI) and supercomputer (High Performance Computing or HPC) that handle massive amount of data processing, and the scope of application is expected to expand in the future.



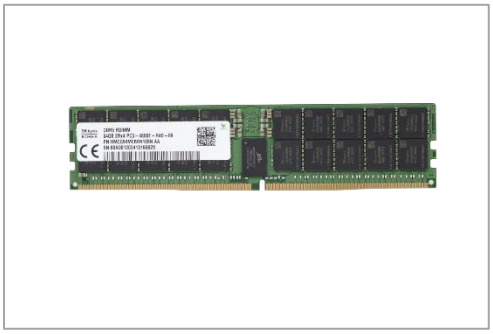
[HBM3]

❑ DDR5 RDIMM

• Exhibition Area : ⑤ Green Digital Solution

- It is a DRAM for data centers and supercomputers (High Performance Computing, HPC), which SK hynix launched for the first time in the world, and has high capacity, high speed, and stability, replacing the previous generation DDR4. It will be a flagship product in the DRAM market in the future.

Based on the 10-nano 4th generation (1a) DRAM that introduced the extreme ultraviolet (EUV) process, production efficiency has improved by implementing 24Gb, the largest capacity in the industry, as a single DRAM chip. It can contribute to carbon reduction by reducing energy input in the manufacturing process.



[DDR5 RDIMM]

❑ PS1010 E3.S

• Exhibition Area : ⑤ Green Digital Solution

- Enterprise SSD (eSSD) with PCIe 5.0, the latest data interface method, provides twice the bandwidth compared to the previous generation PCIe 4.0, realizing the best performance among enterprise SSDs.

This product, developed from 176-layer NAND flash, is expected to contribute to reducing power operating costs and carbon reduction in data centers based on performance per watt (performance per power unit) improved by about 75% compared to previous 128-layer NAND-based products.

[PS1010 E3.S]

❑ LPDDR5X

• Exhibition Area : ⑤ Green Digital Solution

- This product is a low voltage mobile DRAM product and compared to the previous generation, LPDDR5, it reduces power consumption by 25% while operating speed is 33% faster up to 8.5Gbps. It is expected to expand its use to the automotive DRAM market.

In particular, HKMG (High-K Metal Gate) process was introduced for the first time in the world for a mobile DRAM. The HKMG process is a next-generation process that prevents leakage current and improves capacitance by using a material with a high dielectric constant for the insulating film inside the DRAM transistor. It has the advantage of reducing power consumption while increasing speed.

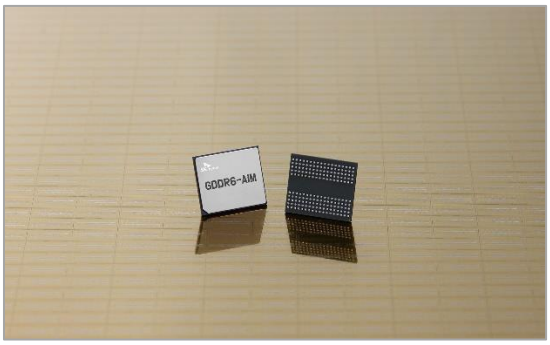
[LPDDR5X]

❑ GDDR6-AiM

• Exhibition Area : ⑤ Green Digital Solution

- It is a product that applies PIM (Processing-In-Memory), a next-generation intelligent memory semiconductor that adds computational functions to memory semiconductors only for storing data.

It operates at 1.25V, which is lower than the working voltage of GDDR6 of 1.35V, and performs some calculations inside DRAM without data transmission between CPU or GPU and DRAM, reducing energy consumption by 80% compared to existing products.



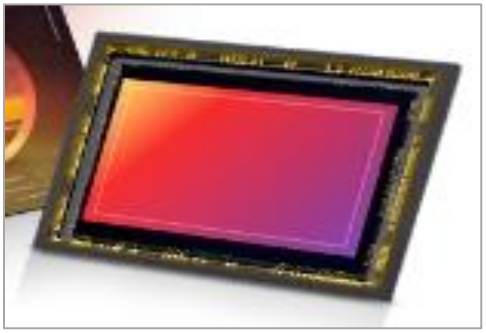
[GDDR6-AiM]

❑ Hi-5011Q

• Exhibition Area : ⑤ Green Digital Solution

- It is a CIS (CMOS Image Sensor) product with large pixels of 1.0 ㎛ (micrometer). SK hynix's independently developed APC [A4C (All 4 Coupled) Phase Correction] technology is applied to enable fast and accurate focusing.

In addition, Quad-to-Bayer (Q2B) technology is also adopted, which can obtain bright and clear high-resolution images even when the amount of light is insufficient at night, so it can be used in various fields such as AI and metaverse.



[CMOS Image Sensor]

6) SKC

❑ Copper Foil

• Exhibition Area : ① Clean Mobility

- Battery copper foil is a thin, core material for lithium-ion batteries with a thickness of less than 10㎛ (micrometer, 1 millionth of a meter). SKC and its subsidiary SK Nexilis produce the world's thinnest (4μm), longest (77km) and widest (1.4m) copper foil. The thinner the film of copper foil, the more lithium ions can be stored, which can increase battery efficiency.

In addition, adopting the world's best process technology, SK Nexilis has developed and is now mass-producing ultra-high-strength copper foil and high-elongation copper foil with significantly increased tensile strength, elongation and the physical properties required by customers. SK Nexilis plans to increase its current annual production capacity of 52,000 tons to 250,000 tons by 2025 at production facilities in North America, Europe and Southeast Asia.

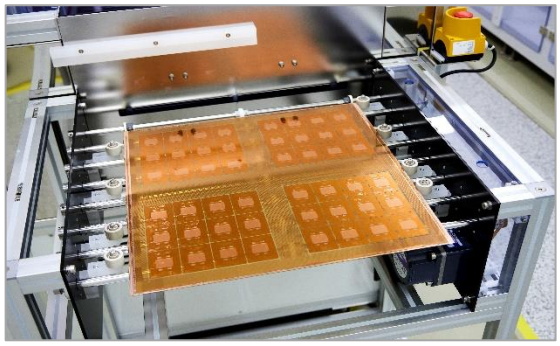
[SKC Copper Foil]

❑ Glass substrate for semiconductor packaging

• Exhibition Area : ⑤ Green Digital Solution

- Semiconductor glass substrate, which SKC and its subsidiary Absolics are promoting commercialization for the first time in the world, is a futuristic material that is considered a 'game changer' in the semiconductor packaging field. It has a smooth surface and a structure that can hold a built-in MLCC. As it can used to produce large square panels, it can respond to the trend of larger size products as well as the miniaturization of semiconductor packaging. In addition, the SKC glass substrate does not require an interposer, reducing its thickness to 1/4 compared to the existing plastic substrate and raising its power efficiency by more than 30%. Therefore, it is indeed suitable for IDC and AI semiconductors that require large-scale data processing.

In November 2022, Absolics began construction of a production plant with an annual capacity of 12,000 square meters in Georgia, USA. Moving forward, the company will also consider expanding its annual production capacity to 72,000 square meters.



[Glass substrate for semiconductor packaging]

❑ Silicon anode

• Exhibition Area : ① Clean Mobility

- Compared to graphite anode materials, which are mainly used in electric vehicle batteries, silicon anode materials take only half the battery charging time and have about four times the energy storage capacity. As a result, it is attracting attention as a next-generation material in the EV market as it can significantly increase the battery charging speed and electric vehicle mileage.

In cooperation with Nexeon, a British technology company, SKC introduced a new process that combines various existing processes to lower the production cost of silicon anode materials and improve quality. The company will begin construction of a production plant in 2023, signaling that full-scale commercialization will soon begin.

❑ PBAT

• Exhibition Area: Outdoor Food Truck

- PBAT (polybutylene adipate terephthalate) is a fossil fuel-based biodegradable plastic. It decomposes quickly in nature, and it is highly flexible and has excellent processability. SKC's high-strength PBAT uses nanocellulose extracted from trees as a reinforcing material, overcoming the disadvantage of tearing easily of existing PBAT and securing the same level of strength as general plastic. Accordingly, it can be used for more diverse applications than existing biodegradable materials.

SKC started construction of a PBAT production plant with an annual capacity of 70,000 tons in December 2022 at the SK Ulsan Complex in Korea. Against this backdrop, it is expected to establish itself as a PBAT manufacturer with the world's second-largest production capacity.

[PBAT]

❑ Biodegradable LIMEX

- Limex is made by mixing more than 50% of limestone with general plastic resins such as polyethylene (PE) and polypropylene (PP) and is eco-friendly because it uses less plastic. Furthermore, biodegradable Limex, which is being commercialized by SKC and its subsidiary SK TBM Geostone, has further achieved greater eco-friendliness by applying biodegradable materials such as PBAT instead of general plastic resin.

❑ Pyrolysis oil from plastic waste

• Exhibition Area : ③ Waste to Resources

- Waste plastic pyrolysis technology is considered a technology that can significantly increase the plastic recycling rate as it allows pyrolysis oil extraction regardless of whether various materials are mixed. SKC's pyrolysis technology enables rapid thermal decomposition at a lower temperature than other methods, and enables continuous input of waste plastics, resulting in high yield and productivity. SKC recently completed the construction of a pilot facility for waste plastic pyrolysis oil at the SK Ulsan Complex in Korea and is preparing for commercialization.

7) SK ecoplant

❑ Waste battery recycling

• Exhibition Area: ③ Waste to Resources

-The waste battery recycling project is about first collecting exterior materials such as iron and aluminum from waste batteries, and then recovering rare metals such as lithium, cobalt, and manganese through crushing and grinding and wet processes.

SK ecoplant is concentrating its efforts on establishing a global network and securing technology to create a value chain for the waste battery market. It pursues a 'Hub & Spoke' strategy that focuses the volume of each branch and classifies it back to the point, just as the hub and spokes of a bicycle wheel are spread out. TES, a subsidiary of SK ecoplant, has know-how in all areas of the waste battery recycling process, including recycling and reuse such as pre-treatment and post-treatment, as well as waste battery recovery. It is also in the midst of securing bases for waste battery disposal in Rotterdam, the Netherlands, one of the largest ports in Europe, and western Sydney, Australia. The company continues global cooperation to expand its business by investing in an American company, 'Ascend Elements' with an innovative technology to produce precursors (the base materials for cathode materials, the core material of batteries) after removing impurities from waste batteries, and promoting joint entry into the European waste battery recycling market with China's CNGR, which is a global precursor company and participating in the 'European Battery Alliance' formed by the EU Global cooperation.

[TES workers scratching graphite from waste batteries from press filters]

❑ E-Waste (electrical and electronic waste) recycling

• Exhibition Area: ③ Waste to Resources

-The waste battery recycling project is about first collecting exterior materials such as iron and aluminum from waste batteries, and then recovering rare metals such as lithium, cobalt, and manganese through crushing and grinding and wet processes.

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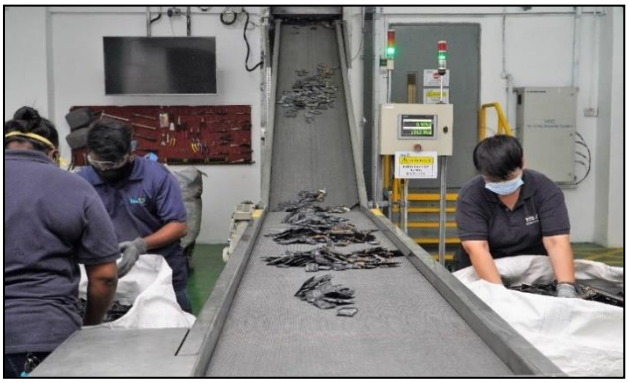


[Waste IT device recycling process operated by TES]

❑ Waste management digital solution WAYBLE

• Exhibition Area : ③ Waste to Resources

- The E-waste (electrical and electronic waste) recycling business recovers raw materials and rare metals from waste IT devices such as end-of-life smartphones, laptops, servers, and storage devices, as well as waste batteries, waste home appliances, and end-of-life photovoltaic components and reuses them as raw materials for new products.

We are seeing an increased importance in ITAD (IT Asset Disposal) service, which supports reuse and recycling after complete data destruction from used laptops, smartphones, memory chips and hard disks of data center equipment. In addition to strictly protecting personal information and brand integrity, it is also necessary to observe national laws and regulations.

[WAYBLE]

❑ Waste plastic recycling

• Exhibition Area: ③ Waste to Resources

SK ecoplant is engaged in a physical recycling business that produces waste plastic pellets (small, uniformly sized granules extracted after melting waste plastic pieces at high temperatures). It also plans to have separate facilities to remove impurities or produce uniform materials that determine the competitiveness of high-quality renewable materials.

SK ecoplant is pushing for localization of high-quality waste plastic flakes and pellets, which are currently highly dependent on imports. In addition, efforts are being made to

establish a virtuous cycle in all stages of waste plastic value chain, including recycling B2B (Bottle to Bottle). The goal is to upgrade related markets and realize economies of scale.

❑ Future Energy Value Chain

• Exhibition area: ⑥ Future Energy

- From offshore wind power to green hydrogen, the entire value chain in the renewable energy sector has been completed. SK ecoplant is a developer in the field of floating and fixed offshore wind power. In particular, it was the first Korean company to secure the entire value chain in the offshore wind power sector, including business development, licensing, structure manufacturing, EPC (engineering, procurement, and construction), and power generation business operation. In the photovoltaic field, it has also built a value chain across the entire field, including business development, power plant construction and operation, and solar module manufacturing.

SK ecoplant plans to link offshore wind power and solar power, representative renewable energy sources, with the hydrogen business that is already being actively pursued. It is also promoting a business model that produces green hydrogen using electricity produced from renewable energy and then converts it into green ammonia and transports it. By implementing those plans, it seeks to solidify its position as a leader equipped with green hydrogen production, transportation, and supply capabilities, leading the global market and supporting domestic and overseas companies to achieve RE100, a global corporate renewable energy initiative bringing together hundreds of large and ambitious businesses committed to 100% renewable electricity.

❑ Green hydrogen (SOEC water electrolysis)

• Exhibition area: ⑥ Future Energy

- In February, SK ecoplant succeeded in demonstrating the production of eco-friendly hydrogen that separates hydrogen from water without emitting carbon dioxide using a

solid oxide electrolysis cell (SOEC). Although general electricity was used for this demonstration, if renewable energy produced by solar and wind power is used in the future, it will be possible to produce green hydrogen with no carbon emissions in the entire process. Based on these achievements, it is also participating in a large-scale green hydrogen production demonstration project led by the Korean government and has also established an integrated solution to produce green hydrogen using renewable energy such as offshore wind power. A project to transport and distribute green ammonia is also underway.

[SOEC Demonstration Facility]

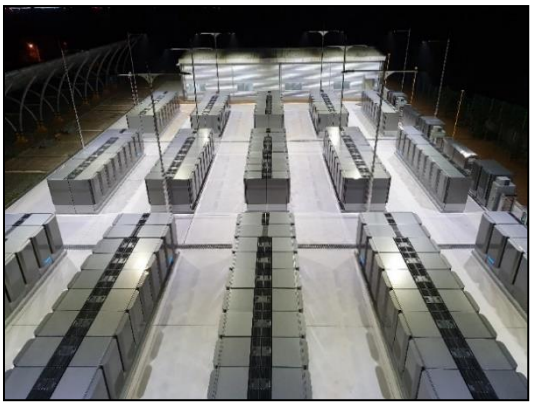
❑ Hydrogen Fuel Cell (SOFC)

• Exhibition area: ⑥ Future Energy

- It is also showing a steep growth in the fuel cell power generation market. As of January to November this year, SK ecoplant is ranked first in orders in Korea. The total cumulative order reached 430.2MW. Another notable achievement is the completion of the value chain in all areas of fuel cells from fuel cell production to business development and EPC (engineering, procurement, and construction) through the establishment of a domestic manufacturing plant of a joint venture with Bloom Energy of the United States, which has been cooperating with SK ecoplant since 2018.

In addition to the existing power generation market, SK ecoplant plans to dramatically expand its business scope to commercial markets such as data centers and refrigerated

warehouses. By doing so, the company plans to establish a bridgehead to advance into the global market, including Southeast Asia, beyond being No. 1 in the fuel cell business in Korea.



[Fuel cell power plant]

8) SK biopharmaceuticals

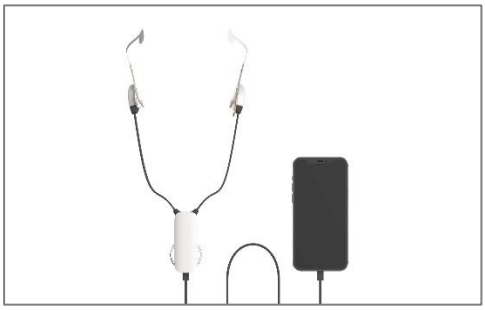
❑ Zero Glasses™ & Zero Wired™

• Exhibition area: ② Zero Carbon Lifestyle

- "Zero Glasses™" and "Zero Wired™," which have been developed by SK biopharmaceuticals, are wearable devices that can measure bio-signals such as brain waves, heart rate variability, and body movements. Both products can record and transmit vital signals in real time through SK biopharmaceuticals' mobile app, "Zero App™," and can be easily used by medical professionals as well as patients. Of these, Zero Wired™ and Zero App™ will be developed into medical devices for detecting seizures after conducting clinical trials.

"Zero" reflects the company's commitment to realizing social value and vision by striving for the potential "zero seizures" for patients with epilepsy.

[Zero Glasses™]



[Zero Wired™]

5. CIs of SK Subsidiaries Participating in CES 2023

SK Inc.

SK innovation

SK telecom

SK E&S

SK hynix

SKC

SK ecoplant

SK biopharmaceuticals