

Investments in Low-Carbon R&D

There are various environmental technologies, which are newly developed but lack maturity, and hence it is critical to develop competitive technologies to perfection and internalize them. SK Innovation focuses its efforts on discovering prospective technologies in partnerships with domestic and overseas universities, institutions, and companies and raising their perfection levels by combining them with its existing capabilities. At the same time, we strive to enhance our excellence in technology aligned with the expansion of our business portfolio.



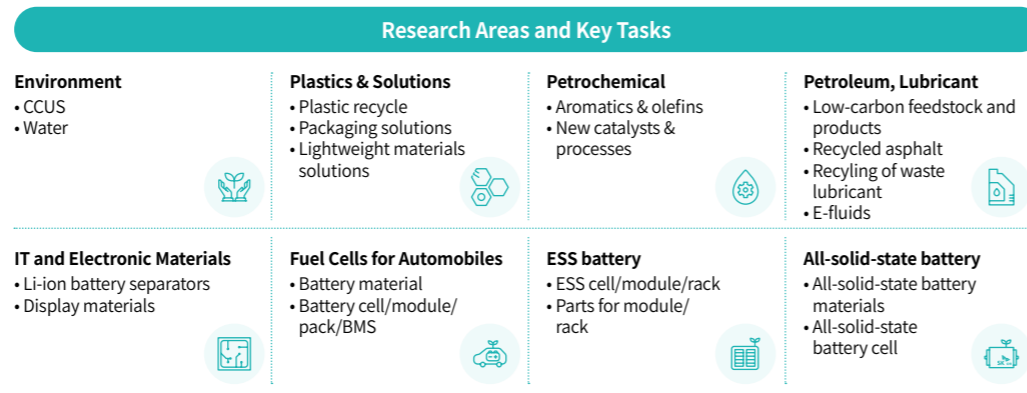
2025 Targets

Accumulated R&D investments

KRW 1.2 trillion

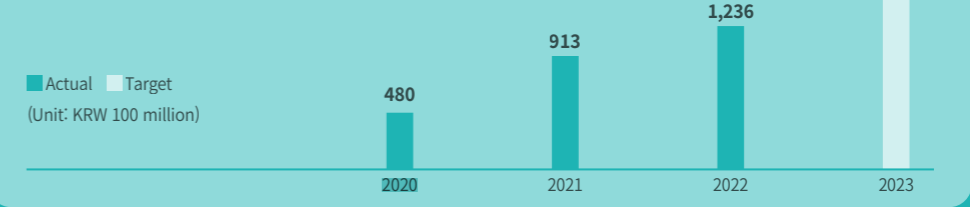
Strategies to Achieve Key Tasks (Mid-to Long Term)

The innovation of portfolio and business model for carbon reduction and resource circulation is an important determinant of corporate survival at a time when companies are pressed to deal with growing carbon costs worldwide, the transition to renewable energy, the spread of low-carbon vehicles, and higher recycling rates. This led SK Innovation to declare “Financial Story 2.0: Green Energy & Materials Co”. as our future direction. The company combines its accumulated internal capabilities with external resources to turn the existing businesses greener (Green Transformation) and take bold steps into new business areas (Green Anchoring), and enhances the impact of ESG management by tapping into its competence in life cycle assessment. SK Innovation will have invested KRW 1.2 trillion, in aggregated total, in low-carbon R&D activities between 2022 and 2025, to explore new business opportunities considering the market environment, such as the shift in the global energy mix, and continue to expand our business portfolio.



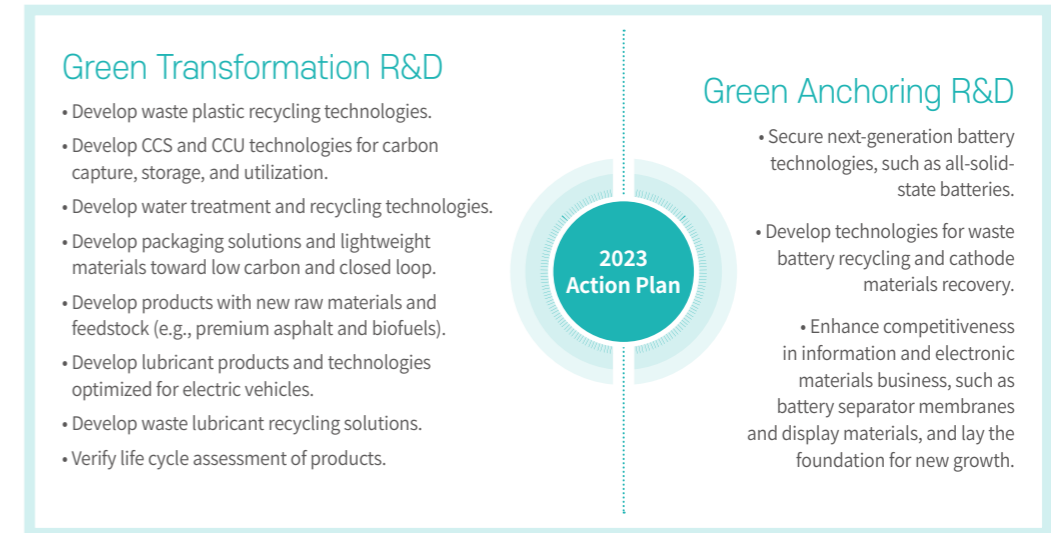
Progress & Roadmap

R&D investments in total



Major Activities Planned for 2023

Developing new technology is key to our Carbon to Green strategy. SK Innovation will mobilize its capabilities in promoting plastic chemical recycling, battery meter recycling, and upcycling waste lubricants for high quality lube base oil production. We will also tap into our accumulated capabilities to discover new growth pillars. SK Innovation is a global market leader of batteries and will pursue new materials and processes and R&D infrastructure to develop battery technology leading the industry with high energy density and reliability matched by no other.



SK Innovation is making investments in R&D for Green Anchoring and Green Transformation following its Carbon to Green strategy and made meaningful progress in R&D by developing technologies for next-generation batteries, and post-treatment of pyrolysis oil.

Activities and Achievements in 2022

Our Commitment



We will refine and upgrade technologies to make our existing businesses more sustainable, while at the same time address carbon issues and create a green portfolio through new approaches and perspectives.

SK Innovation will address carbon issues with the innovative technologies that we have secured by applying our capabilities from the past 60 years into new areas.

- Interview on the 60th anniversary of SK Innovation

Lee Seong-jun, Head of Institute of Environmental Science & Tec, SK Innovation



Achievement 1 Green Anchoring R&D

Development of Next-Generation Battery Technologies

Based on global partnerships, SK On is expanding the scope of its next-generation battery development and battery services, while enhancing its technological competitiveness through advancements in battery technology. All-solid-state batteries are hailed as innovative technology due to their use of solid electrolytes, in contrast to the liquid electrolytes found in lithium-ion batteries. They offer higher energy density, better stability, and more cost-saving benefits compared to their lithium-ion counterparts. More recently, SK On has been collaborating with Solid Power, a U.S. solid-state battery technology developer, to work on the development of solid-state battery cells. At CES 2023, they showcased a prototype of a solid-state battery using a silicon anode material and a high-nickel cathode material.



SK On won the Best Innovation Award for its SF battery (Super Fast Battery) at the CES 2023.

Growing Investments in R&D for Next-Generation Batteries

SK On is actively increasing its investments to strengthen its R&D infrastructure for Next-Generation batteries and more. Notably, a KRW 470 billion project is underway to enhance its battery research institute in Daejeon and establish a pilot plant for Next-Generation batteries, along with a global quality control center by 2025. Of particular significance, the pilot plant will feature a specially designed experimental environment dedicated to material development for all-solid-state batteries, along with pilot production lines aimed at securing mass production technology. The company aims to unveil prototypes by the latter half of 2024, with plans for commercialization by 2028. SK On is committed to diligent efforts in expanding its R&D infrastructure and enhancing its technological prowess.

Achievement 2 Green Transformation R&D

Post-Treatment Technology for Waste-Plastic-Based Pyrolysis Oil

SK Innovation has developed a post-treatment technology to run pyrolysis over waste plastics that are not feasible for mechanical recycling, such as contaminated packaging materials and multi-layered films, and reuse pyrolysis oil produced therefrom as petrochemical feedstock. The construction of a commercial plant to manufacture such pyrolysis oil is slated for completion in 2025. By drawing on our accumulated competence and knowhow in the refining and petrochemical businesses, we can effectively clear pyrolysis oil of impurities, such as nitrogen, chlorine, and heavy metals. After post-treatment, pyrolysis oil can be used as value-added feedstock for petrochemicals, solvents, premium refining products, and lubricants, or otherwise it would end up in low-quality fuel for industrial boilers due to impurities. SK Innovation leads the circular economy for plastic with innovative technologies.

New Catalyst Development for Electrochemical CO₂ Conversion

The company has developed an electrocatalyst that can convert CO₂, a main cause of global warming, into CO and has laid the foundation for its commercialization. These electrochemical technologies turn CO₂ into useful chemical intermediates such as CO using electricity and are regarded as new promising means to reduce greenhouse gases. Moving forward, SK Innovation plans to strengthen its core R&D capabilities involving catalysts, processes, and organic synthesis, and to secure large-scale electrochemical conversion systems through partnerships with professional institution.

Waste Lubricant Upcycling Technology

The institute has successfully developed a technology to upcycle waste lubricant into premium lube base oil (Group III YUBASE) for the first time in Korea by tapping into its vault of lube base oil catalyst and process technologies. The company will commercialize this upcycling technology and foray into overseas markets, pursuing social and economic value and creating a sustainable future.

Achievement 3 Accelerating Technology Innovation through Open Innovation

The “Open Innovation Post” was established in Silicon Valley in November 2022 to accelerate our innovations toward a green portfolio and we have since mapped out specific paths to promote partnerships with global companies and research institutions. Through the “Open Innovation Post”, we plan to run up-close tech sensing involving global technical experts and institutions in the industry so that we can detect and verify new green technologie faster and more precisely ahead of the competitions and secure new R&D competencies.

Department's Comments +

Learn more about Investments in Low-carbon R&D. >

ESG SPECIAL PAGE

All Time Net Zero Idea Contest

Background and Purpose

SK Innovation declared “All Time Net Zero” on its 60th anniversary in October 2022. This is our new vision to clear the carbon emissions we have left over the past 60 years as well as our current and future carbon emissions by the timeline set for 2062, which marks the company’s centennial anniversary. The company held an idea contest for All Time Net Zero, as a way to engage and induce our employees to explore practical methods to slash carbon emissions. A total of 127 valuable ideas were collected through this one-month-long competition.

These collected ideas went through two rounds of meticulous screening by an evaluation committee composed of internal and external professionals. 30 ideas were shortlisted in round 1, and 10 winners were chosen for grand, excellence, and special prizes in round 2. All of the winners received partial subsidies for purchasing electric vehicles.

Vice Chairman Kim Jun of SK Innovation attended the ceremony for encouragement.



Winners of All Time Net Zero Idea Contest

Major Achievements and Expected Benefits

SK Innovation encouraged its employees’ voluntary participation and raised their awareness of All Time Net Zero by holding an idea contest on the occasion of the 60th anniversary.

Among the winning ideas, those expected to enable cost-effective carbon reduction in the short term were selected to implement as official tasks this year and, by doing so, we expect to make tangible progress towards net zero with a substantial reduction of carbon emissions in the short term.

The company will further diversify activities to engage its employees, making more systematic and practical progress toward net zero.

Interview with the Winners



I believe we need to make concerted efforts to realize our grandiose vision of All Time Net Zero. The starting point of all that is the idea contest. I hope there will be more of these opportunities in the future, so the company can step closer to our vision.

PM Lee Jun-won Net Zero Office, SK Energy



The battery business is one of the major pillars of SK Innovation’s ESG management and it costs a lot of resources across the business site, which is why all members of the battery business find it critical to save resources. Our team’s idea was selected in the idea contest and is expected to be put into action for actual impact, fueling SK Innovation’s drive toward net zero.

PM Hwang Chang-mook Cell Standard Model Development Unit, SK On



While working on the Muffin Truck Manager app, I spent sleepless nights thinking about how to reduce carbon emissions from trucks. It seemed worth the effort now that I received the excellence prize. I hope to provide better services to our customers, hopefully helping to reduce carbon emissions.

PM Baik Ji-yon Solution & Platform Promotion Team, SK Energy