# World's Leading GREEN ENERGY AND MATERIAL PROVIDER





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## From Global Nonferrous Metal Leader to Renewable Energy and Sustainable Materials Company

## **Chairman's Message**



At Korea Zinc, we are committed to creating a sustainable future by embodying our mission and core values.



KZ Mission Book

### Core Values

Honesty

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Engagement

Agility

Communication

Teamwork

In 2024, Korea Zinc proudly commemorated its 50th anniversary. Since our founding in 1974, we have grown into the world's leading comprehensive nonferrous smelter, overcoming challenges such as limited technology, a lack of specialized personnel, and insufficient production infrastructure in resourcescarce South Korea with remarkable determination. By focusing solely on smelting operations, we have significantly contributed to the growth of the domestic economy and enhanced the quality of life by providing essential nonferrous metals that form the foundation of a wide range of industries.

After experiencing significant growth and development over the past five decades, Korea Zinc is poised to embark on a new journey. Expanding beyond our global smelting business, we are embracing the future through our "Troika Drive" strategy, which includes initiatives in renewable energy and green hydrogen, critical materials for secondary batteries, and resource recycling efforts.

In Australia, home to Sun Metals Corporation's (SMC) zinc smelter-recognized as the world's most environmentally friendly—we are actively advancing eco-friendly energy initiatives. Our efforts encompass developing renewable energy from solar and wind power, as well as producing, transporting, and supplying green hydrogen and ammonia. We are also addressing the growing battery industry's needs by establishing Cathode Active Material value chain, from nickel raw materials to nickel sulfate and precursors, and manufacturing critical secondary battery materials like copper foil. Furthermore, we are enhancing our eco-friendly competitiveness by promoting a resource recycling system that efficiently recovers valuable metals from electronic waste, including solar panels, leveraging our advanced smelting expertise.

To build on our 50-year legacy and prepare for the next century of success, we launched the Big Question Project in 2020, a four-year initiative involving all employees. This effort resulted in a mission book that outlines our new mission and five core values: Honesty, Engagement, Agility, Communication, and Teamwork. These principles will guide us through future challenges and drive initiatives like the Troika Drive toward success. By embracing our new mission and core values, leveraging the technological advantages and market competitiveness we have developed over five decades, and investing in production infrastructure and safety, we aim to establish ourselves as the world's leading eco-friendly energy and materials company. This approach will enable us to navigate new horizons and shape our future trajectory.

As we expand our business portfolio, we are also sharpening our focus on fostering innovation within our organizational culture, work environment, and talent acquisition and development. We actively embrace and integrate the rich diversity of our business sectors, geographical locations, and workforce into our corporate ethos. To strengthen our soft power, we are making significant investments in talent development and capacity building, ensuring that all employees are adaptable, strategic, and capable of responding to uncertainties as a unified team.

Finally, we are committed to sustainability. The responsibility of corporations in addressing the complex challenges facing humanity, particularly the environmental crisis driven by climate change, is becoming increasingly significant. As a conscientious global corporate citizen, we are motivated by a strong sense of purpose and aspire to be a company that embraces sustainability beyond our immediate business stakeholders. We actively engage in various social contribution initiatives for our country, society, and future generations.

We appreciate your continued interest in the bold steps Korea Zinc is taking as we move forward.

Sincerely, Yun B. Choi Executive Chairman Korea Zinc

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# **Troika Drive**

New Growth Engine of Korea Zinc

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Korea Zinc leverages our present competitiveness to discover future possibilities. By tapping into our competitive edge in technology and infrastructure of nonferrous metal refining business, as well as synergies among our global affiliates, we are aggressively driving new projects for future innovations.

Our Troika Drive, the future growth strategy of Korea Zinc, will accelerate our vision to become a global leading green energy and materials company by creating new value and driving sustainable growth.

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# **Business Model**

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As a global comprehensive nonferrous metal company, Korea Zinc established itself as a leader in the global zinc and lead market with its industry-leading products and services. Looking ahead, we are building a firm foundation for sustainable growth by tapping green businesses to be new growth engines and linked to our refinery business.



## Achieving 100% Green Metal Production by 2050



Business		Strategy	Opportunity
Refinery Business	Advancing refinery technology	Organizing operations, streamlining processes, and maximizing production efficiency	Increasing business     efficiency and
Dusiness	technology	<ul> <li>Investing in ongoing research &amp; development and securing technology</li> </ul>	productivity to enhance competitiveness
		Maximizing the recovery of valuable metals through integrated zinc and lead processes	
		Securing pyro-hydro combined recycling technologies	
		Producing green metals	
Renewable Energy	Transitioning to green energy     Generating renewable energy	<ul> <li>Supplying 124 MW of power to SMC's zinc refinery in Australia through solar power generation</li> </ul>	<ul> <li>Responding to the energy paradigm</li> </ul>
and Green	- Operating green hydrogen	Founding Ark Energy, a renewable energy company	shift proactively and
Hydrogen	production, storage,	- Securing a 30% stake in McIntyre Wind Farm in Australia	creating new business
	distribution, and supply	- Developing 9 GW of wind and solar power by 2040	opportunities
		<ul> <li>Launching the Han-Ho H<sub>2</sub> Hydrogen Consortium to build a supply chain for exporting more than 1 million tons of green ammonia annually</li> </ul>	
		Groundbreaking of the Sun Hydrogen Hub (SunHQ), a green energy hub in Australia, producing 280,000 tons of green hydrogen annually by 2030	
		$\cdot$ Completing hydrogen refueling station for hydrogen forklifts at the Onsan Refinery	
Secondary Battery Materials	Promoting secondary battery materials market	Strengthening the value chain of critical materials for secondary batteries and building its ecosystem	Securing future     business
	- Providing end-to-end	· KEMCO	opportunities while
	solutions for key materials for	- Breaking ground on the All-in-one nickel smelter	upgrading technology
	secondary batteries, including nickel sulfate, precursors,	- Producing nickel sulfate	· Localizing raw
	cathode active materials, and EOL battery recycling	KPC     Producing precursors	materials and ensuring
		KZAM	supply stability
		Producing copper foil     Expanding factory and production capacity	Establishing an eco- friendly, decarbonized
		Recycling End-of-Life Batteries and manufacturing scrap	circular economy
Resource	Building a resource recycling	· Recycling EAFD	<ul> <li>Saving resources by</li> </ul>
Recycling	ecosystem - Recycling waste	<ul> <li>Recycling e-scrap</li> <li>Acquiring IGNEO Holdings, an e-waste recycling company</li> <li>Acquiring Kataman Metals, a global scrap metal materials trading company</li> </ul>	resource recycling
		Recycling solar waste panels	
Global	Sourcing and supplying	$\cdot$ Building and diversifying a global supply chain for key countries	· Ensuring a stable
Network	raw materials globally	· Establishing raw material supplier subsidiaries in Latin America,	supply chain
	Securing production bases	Australia and the U.S.	<ul> <li>Responding quickly to customer needs and building trusted relationships</li> </ul>
		Diversifying raw material procurement     Building global partnerships	

Troika Drive —

**Green Energy** 

Transitioning to a Green Energy Company

# Steering Towards a Sustainable Future Troika Drive

To ensure growth for the next five decades, Korea Zinc has launched the Troika Drive initiative. This comprehensive strategy focuses on three key areas: renewable energy generation and green hydrogen production, secondary battery material development, and resource recycling. By pursuing these interconnected paths, we are committed to transforming Korea Zinc into a leading eco-friendly green metal company, ready to meet the challenges and opportunities of a sustainable future.

## Troika Drive $-\parallel$

# **Battery Materials**

Secondary Battery Materials Crafted by a Global Leader

## Secondary Battery Materials Business

Utilizing our proprietary smelting technology, we are focused on building a value chain to reliably supply battery materials to manufacturers. Our subsidiaries, KZAM and KEMCO, have begun producing copper foil and nickel sulfate respectively, while our joint venture, KPC, is in the process of producing precursors. Additionally, our All-in-one nickel smelter, set to be completed in 2026, will produce enough high-purity nickel for 1 million electric vehicles. This initiative aims to reduce South Korea's dependence on imported critical minerals for cathode production and enhance our competitiveness in K-batteries.



## **Renewable Energy / Hydrogen Business**

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Leveraging Australia's abundant renewable energy resources, we are expanding our renewable energy and green hydrogen business to achieve carbon neutrality. As the first company in South Korea's smelting industry to declare RE100, we completed a 124 MW solar power plant in 2018, the largest in Australia, through our subsidiary Sun Metals Corporation (SMC). In 2021, we established Ark Energy in Australia to concentrate on renewable energy and green hydrogen initiatives. That same year, Ark Energy acquired Epuron, a specialized company renowned for its expertise in renewable energy development and operations, significantly enhancing our renewable energy portfolio. Additionally, our investment in the MacIntyre Wind Farm, the largest wind farm in Australia, has laid a strong foundation for the development and introduction of renewable energy to South Korea.



We are creating an eco-friendly process that minimizes landfill by-product by sourcing such as Electric-Arc Furnace Dust (EAFD), electronic waste, and metal scraps to extract valuable metals. In 2022, we acquired IGNEO Holdings, a U.S. e-waste company, through our subsidiary Pedalpoint Holdings. In the same year, we also acquired Steel Cycle SC, a steelmaking dust recycling company in South Korea. Both acquisitions were made to strengthen our resource recycling business. In 2024, we acquired Kataman Metals, a global scrap metal trading company, to ensure a stable supply of secondary raw materials as we expand our copper production facilities.





Generating green

hydrogen energy

Ark Energy
 Developing renewable energy and

producing green hydrogen

SMC (Sun Metals Corporation)
• Producing zinc, sulfuric acid, etc.
and generating solar energy

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> Storing and exporting hydrogen and ammonia

KEMCO

Breaking ground on the All-in-one nickel smelter Producing nickel sulfate

KPC

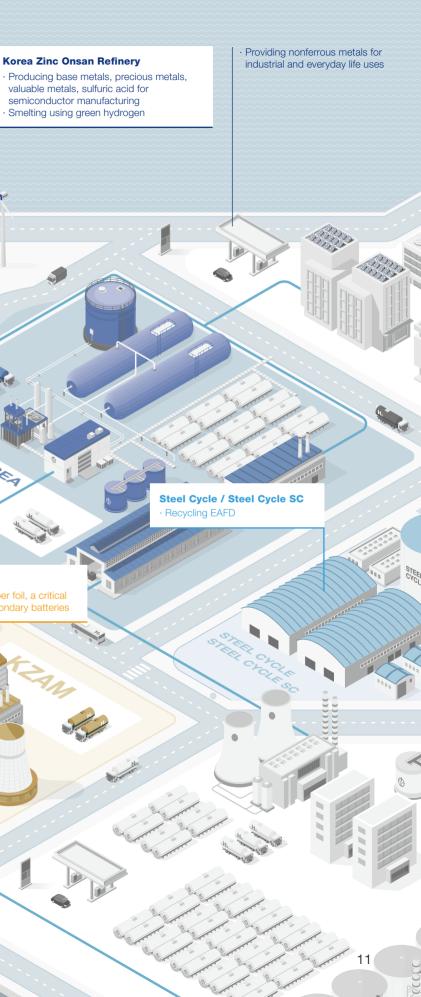
 Producing precursor, a critical material for secondary batteries

Transporting green ammonia Producing green metals Utilizing hydrogen for green mobility

# **Business Roadmap**

We create new value with the world's highest-quality smelting technology

Korea Zinc has a clear roadmap for the future, transitioning from a smelting business to a green energy and materials enterprise. As we implement this blueprint, we are expanding our operations from South Korea to the global stage. KZAM
 Producing copper foil, a critical material for secondary batteries



# **Global No.1 Smelter**

## World-Class Nonferrous Metal Smelting Company

Since establishing the Onsan Refinery and pioneering the domestic nonferrous metal smelting industry, Korea Zinc has emerged as a global leader through continuous technological innovation and production capacity expansion. Our world-class production base, coupled with differentiated technology, increased use of clean energy, and development of eco-friendly processes, positions us at the forefront of sustainable green metal production.

## **Unparalleled Annual Production Capacity**

Located on over 15 million square feet site, Korea Zinc's Onsan Refinery is a symbol of our industrial strength. This massive facility, unmatched in size and output, produces an impressive 1.2 million tons of nonferrous metals each year. From zinc and lead to copper and more, Onsan's production capabilities have made Korea Zinc a leader in the global market for zinc and lead. With 68% of our sales coming from international markets, Onsan is not just a smelter-it's the core of our global metal business.

# **Integrated Smelting**

At Korea Zinc, we enhance production efficiency and maximize the recovery rates of valuable metals by seamlessly unifying all smelting operations. Our proprietary technology minimizes by-products through an integrated approach, enabling us to process secondary raw materials effectively. This unique capability gives us a distinct competitive edge in the global market.

# **Green Smelter**

## **Pioneering Eco-Friendly Refining**

## Large Capacity & **Market share**

## Synergistic Excellence through Process Integration

Environmental responsibility is woven into every step of our smelting process. We are committed to increasing our use of secondary raw materials and embracing renewable energy sources, such as solar power. Our relentless focus on energy efficiency has dramatically reduced pollutant emissions. Through our cutting-edge, eco-conscious refining technologies, we are setting new standards for sustainable smelters worldwide.









Troika Drive

# **Green Energy**

We transform ourselves from an energy-intensive company to a green energy leader

Korea Zinc recognizes the energy-intensive nature of nonferrous metal refining and is committed to fulfilling its environmental responsibilities while enhancing business competitiveness. To this end, we have been actively investing in renewable energy, including solar power. Building on these efforts, we have set a long-term vision to produce green metals using green hydrogen generated from renewable energy sources. Additionally, we are continuously expanding our green energy initiatives to position ourselves as a leader in the future energy market.



## **Realizing Net Zero**

SMC, our Australian subsidiary and the world's most environmentally sustainable refinery, was the first refinery globally to commit to the RE100 initiative. Approximately 25% of its electricity needs are fulfilled with a 124 MW solar plant. Korea Zinc also declared RE100, the first of its kind for a nonferrous metal company in South Korea, and is implementing a renewable energy roadmap with a target completion date of 2050.



## Renewable Energy

## **Energy Business**



# Green Ha

## **Building a Green Hydrogen** Value Chain

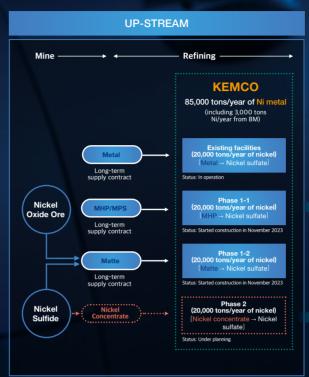
We are developing a comprehensive value chain for hydrogen, encompassing production, storage, transportation, and export, all powered by renewable energy. This strategy aims to generate new demand and penetrate emerging markets. Throug our subsidiary, Ark Energy, we are pioneering South Korea's first overseas green hydrogen production. We have officially broken ground on SunHQ, a green energy hub that will feature an electrolyzer, hydrogen refueling stations, and additional facilities. Alongside this development, we are launching a hydrogen commercial mobility demonstration project. Additionally, we have formed the Han-Ho H<sub>2</sub> Hydrogen Consortium (Korea-Australia Hydrogen Consortium), which plans to develop a supply chain to export over 1 million tons of green ammonia annually from Australia to South Korea by 2030.

Troika Drive - |

# Strengthening the Renewable

We are swiftly expanding our renewable energy business, beginning with SMC's solar power generation. After establishing Ark Energy for renewables and green hydrogen in 2021, we acquired Epuron, developer, to boost our generation capacity. We also acquired a 30% stake in the McIntyre Wind Farm, the largest wind farm in Australia.

## Korea Zinc Nickel Business Value Chain

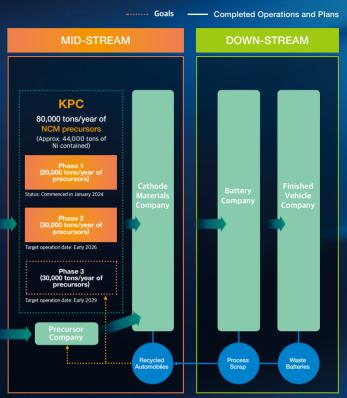


Troika Drive — II

# **Battery Materials**

We create a driving force for the future world

Korea Zinc's venture into the secondary battery materials sector is a natural evolution, leveraging our decades of expertise and technological prowess. As the electric vehicle revolution gains momentum, we are poised to ride the wave of significant growth in the battery materials market. With state-of-the-art smelting technology and the construction of an All-in-one nickel smelter, we are establishing the supply chain of critical materials across the secondary battery value chain and proactively responding to rising demand.

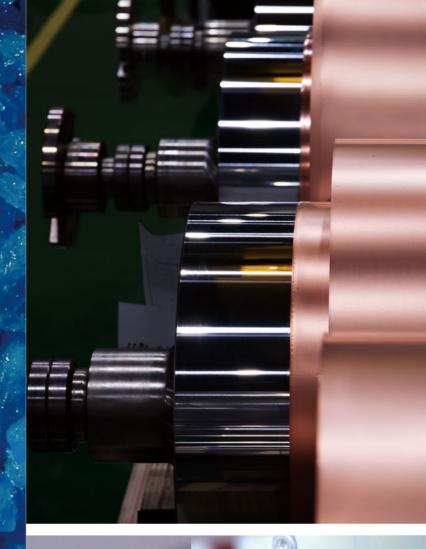


## Nickel(II) Su / Precursor

usiness Highlight

## Expanding Cathodes, Critical Materials for Our Secondary Battery Business

Our state-of-the-art All-in-one nickel smelter, which broke ground in 2023, is designed to meet the surging demand for nickel, a critical mineral in electric vehicle batteries. This cutting-edge facility will boast an annual capacity of 42,600 tons of nickel metal, complementing KEMCO's existing nickel sulfate production subsidiary's 22,300-ton output. Together, they will achieve a combined annual production of approximately 65,000 tons of nickel. This advanced smelter will process waste battery black mass rich in valuable metals like nickel, alongside primary raw material intermediates such as nickel matte and Mixed Hydroxide Precipitate (MHP). The facility will yield a diverse range of products, including liquid and crystallized nickel sulfate, cobalt sulfate, lithium carbonate, battery precursors, and other critical materials for sustainable technologies. As the world's largest and most sophisticated All-in-one nickel smelter, it will significantly strengthen the nickel value chain crucial for the electric vehicle battery industry.





## Electrolytic Copper Foil

## Producing Anode, a Critical Material for Secondary Batteries

Electrolytic copper foil is a pivotal component of electric vehicle battery anode. Leveraging cutting-edge electrolytic technology, we established KZAM in 2020 for electrolytic copper foil production. With a 2023 capacity of 13,000 tons/year and ongoing expansion to 60,000 tons/year, we are addressing the booming battery material demand while maintaining industry equilibrium. Our dedication to sourcing raw materials through recycling underscores our commitment to crafting superiorguality, eco-friendly copper foil.

## Battery Recycling

## Aligning with Our Waste Battery Recycling Business

The secondary battery materials business is also closely related to our resource recycling business, which we have been developing for many years. Our pyro-hydro combined recycling technology maximizes the recovery of valuable metals from waste batteries in large quantities. while allowing high-volume processing. We will use waste batteries as another resource for secondary battery materials, improving business efficiency and creating a virtuous circle of resources.

Troika Drive —

# **Circular Economy** We turn today's resources into tomorrow's new value

Using innovative technology, Korea Zinc creates infinite value from the circular economy. To achieve this goal, we are developing technologies and expanding business models that recycle resource materials to create new value by reusing resources throughout entire business cycle, from raw material procurement to production and sales. These green and circular initiatives help us to generate higher productivity with less resources, while contributing to global environment protection by reducing waste.



Leading the Resource Recycling among Industries through EAFD Recycling

HZO (Crude zinc oxide)

STEEL CYCLE

# E-Waste Recycling

# Urban Mines in the 4th Industrial Revolution Era

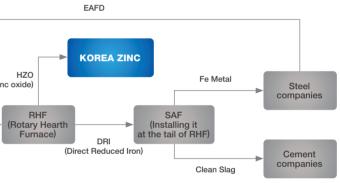
The rapid advancement of electrical and electronic devices is leading to a substantial increase in electronic waste. We recycle electronic waste, also known as e-scrap—including smartphone lithium-ion batteries, computers, and PCB boards in network equipment—to extract valuable metals such as copper, gold, silver, and palladium. The copper extracted in this process is recycled as a raw material for copper foil, serving as a an anode current collector for secondary batteries. Korea Zinc's distinctive smelting technology has paved the way for resource recycling and the secondary battery material business, forming the foundation of the Troika Drive initiative.



## Recycling Eco-System

## Steelmaking / Smelting / Steelmaking

Our subsidiaries of Steel Cycle and Steel Cycle SC recycle waste, such as EAFD, which is generated by the production process of steelmakers. In turn, they produce crude zinc oxide, which is the raw material of zinc. The recycled materials are then put through the zinc smelting process for zinc recycling. And the direct reduced iron, a by-product of the crude zinc oxide production process, is supplied to steelmakers as a raw material for the steelmaking process. Through smelting technology, we are building an environmentally friendly ecosystem of resource recycling among industries, from steelmaking to smelting and back to steelmaking again. We are also taking the lead in protecting the global environment by reducing landfill costs and lowering the demand for raw material mining.



## Expanding a Recycling Business

## Diversifying Waste Recovery Operations Across Multiple Streams

To foster a circular economy, we are enhancing our recycling operations by reclaiming landfill waste from diverse industries and everyday life, including discarded solar panels, and plastics. Notably, our acquisition of Kataman Metals, a global leader in scrap metal trading, has provided a stable supply of secondary raw materials, further strengthening our competitiveness in the recycling sector.

For 50 years, Korea Zinc has been discovering new possibilities through the eyes of pioneers.

Growing through

hallenge

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We have grown steadily by achieving the first and highest records, one by one, and establishing ourselves as the No.1 company in the global market.

With our superior global competency, we are now building future capabilities to lead the next 50 years through constant challenges.

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# At a Glance

From becoming a global No.1 nonferrous metal company to an eco-friendly material one, we are shaping the future of sustainability as we pursue eco-friendly values and unparalleled technological competitiveness.

# **Financial Highlights**

Leveraging its secure financial framework, Korea Zinc is proactively restructuring its operations towards eco-friendliness, while maintaining its trajectory of growth.

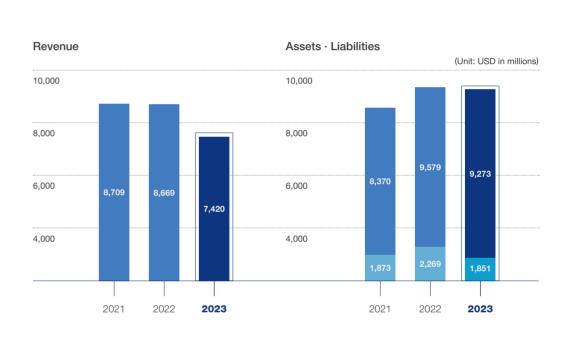
Company **Overview** 



Korea Zinc Co., Ltd.







## **Mission and Core Values**

MISSION

Korea Zinc's mission is to transform diverse raw materials and energy sources into the forms of materials and energy the world needs, utilizing them in the safest, most environmentally responsible, and most efficient way possible.

## CORE VALUES







Be Fair and Honest, and Face Issues Head-on





Bring Together Diverse Talents to Create Powerful Synergies

Teamwork

**Operating Income** 

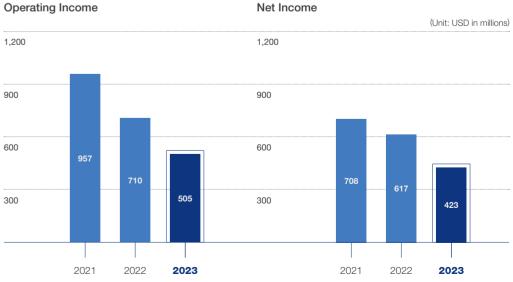
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\* Revenue, operating income and net income are converted into US dollars at the average exchange rate of USD 1= KRW 1,145.56 in 2021, KRW 1,294.20 in 2022 and 1,307.76 in 2023.

**Business** 

Performance

\* Assets and liabilities amount are converted into US dollars at the December 31 closing exchange rate of USD 1= KRW 1,190.50 in 2021, KRW 1,263.00 in 2022 and KRW 1,299.00 in 2023







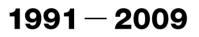
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# **Milestones**

Faced with the challenge of a country lacking natural resources, Korea Zinc has grown to become the world's leading nonferrous metal company by turning crises into opportunities through constant technology development and innovations.



- 1992 · Built DRS lead refinery · Built Slag Fumer plant
- 1993 Built cogeneration power plant (Capacity: 43,500 kW electricity and 175 tons/hr steam)
- 1994 · Built Direct Leaching plant
- 1995 · Built No.1 Fumer plant
- 1996 · Established SMC in Australia
- 2000 · Built TSL plant
- 2004 · Built copper refinery (20,000 tons per year) and indium plant
- 2006 · Awarded \$1 Billion Export Tower



## **Business Growth**

Expanding into global markets with innovative technology

## 1974 - 1990

## Foundation and Business Growth

Building the foundation for South Korea's nonferrous metal industry

- 1974 · Established the Korea Zinc Co., Ltd.
- 1978 · Built zinc refinery (Annual production of 50,000 tons of zinc ingots)
- **1982** Built copper refinery
- 1986 · Built lead refinery (Annual production of 35,000 tons of leads)
- 1990 · Listed on the Korea Stock Exchange









# 2010 - 2019

**Worldwide Advancement** 

Leading the market as a global No.1 nonferrous metal company

- 2010 Built zinc electrolytic plant
  Built TSL plant
  2011 Built lead refinery and precious metal plant
  Awarded \$2 Billion Export Tower
  2013 Awarded \$3 Billion Export Tower
  2015 Built 2nd nonferrous metal complex (420,000 tons per year)
  2016 Established Steel Cycle Corporation after acquisition
  Established Townsville Logistics, Australia
  2017 Established ZOC (Zinc Oxide Corp.) Vietnam
  2018 Established Townsville Marine Logistics, Australia
  - · Invested capital to rationalize the leaching process

## 2020 - Present

## **Global Broadening**

Proactively responding to the changing global market by investing in new growth engines

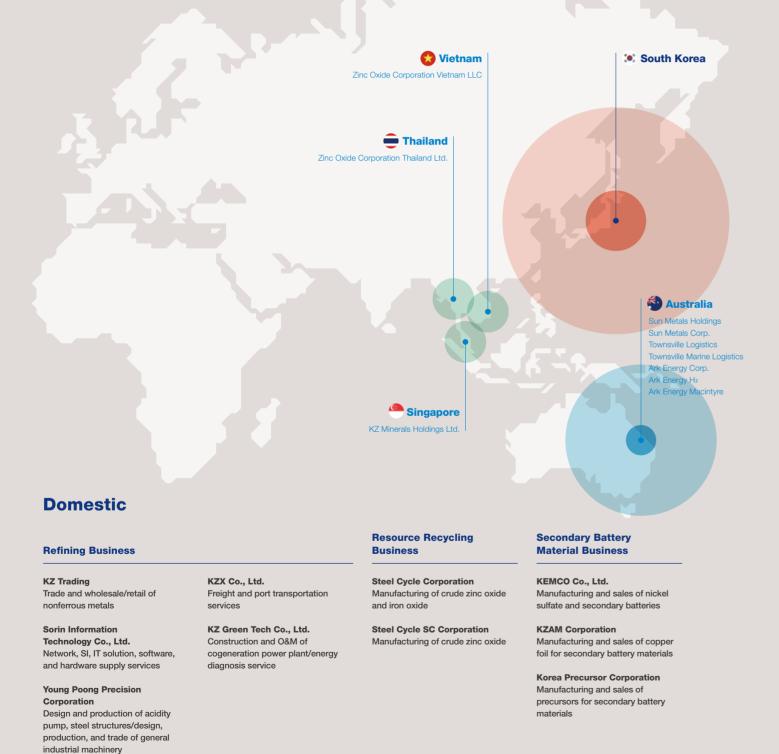
2020	<ul> <li>Built LNG combined cycle power plant</li> <li>Established the subsidiary KZAM</li> </ul>
2021	<ul> <li>Established Ark Energy, Australia</li> <li>Acquired renewable energy developer Epuron</li> <li>Established Pedalpoint Holdings</li> </ul>
2022	<ul> <li>Declared the Troika Drive initiative</li> <li>Established KPC</li> <li>Acquired steel dust recycler</li> <li>Steel Cycle SC Corporation (formerly GSDK)</li> <li>Acquired IGNEO Holdings, an e-waste recycler</li> </ul>
2023	Broke ground for the All-in-one nickel smelter     Broke ground on the SunHQ demonstration     project, an integrated green hydrogen production     and refueling facility
2024	· Acquired Kataman Metals, a global scrap metal



materials trading company

# **Global Network**

Korea Zinc proactively responds to the rapidly changing global business environment using innovation and creative synergies in each business sector around the world. We are committed to leading the market and expanding our business territory.





## **Overseas**

#### **Refining Business**

Sun Metals Corporation Refining, manufacturing and sales of zinc and sulfate

Townsville Logistics Zinc and zinc concentrate transportation service

**Townsville Marine Logistics** 

Zinc and zinc concentrate

transportation service

Pan Pacific Metal Mining Corp. Mine development

Logistics ICM Pachapaqui S.A.C. ac concentrate Mine development

> KZ Minerals Holdings Ltd. Investing in mining development company

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IGNEO Holdings, LLC Kataman Metals, LLC

(
 Peru
 ICM Pachapaqui S.A.C.

#### Resource Recycling Business

Zinc Oxide Corp. Vietnam, LLC Manufacturing of crude zinc oxide and iron oxide

Zinc Oxide Corp. Thailand Ltd. Import and export of nonferrous metals

Pedalpoint Holdings, LLC Resource recycling business

IGNEO Holdings, LLC E-waste recycling business

Kataman Metals, LLC Scrap metal materials trading

#### Secondary Battery Material Business

Ark Energy Corporation Renewable energy development

# **Collaborative Synergy**

Strengthening global collaboration to accelerate synergy across businesses.



## Korea Zinc Onsan Refinery

Onsan Refinery produces more than 1.20 million tons annually including base metals, such as zinc and lead. In addition, the refinery produces more than 10 nonferrous metals, such as precious metals and rare metals, making it the highest production capacity of any single refinery in the world.



## SMC Sun Metals Corporation

SMC produces high-quality zinc and secondary products, including sulfuric acid. By realizing the provision of eco-friendly self-energy through solar power generation, the company is recognized as the world's most environmentally sustainable refinery and one with excellent cost competitiveness.



## 🔮 Ark Energy

Ark Energy, a subsidiary of Korea Zinc, has established itself as one of the key leaders in the green hydrogen and renewable energy sectors. The company was founded with a strategic vision to advance SMC's RE100 initiative and significantly contribute to enhancing Australia's green energy capacity.



## **KEMCO / KPC**

With global top-notch metal smelting and recycling technologies, KEMCO produces nickel sulfate, a key material for secondary battery precursors. In partnership with LG Chem, we established Korea Precursor Corporation, a joint venture to produce precursors for secondary battery materials. This helps us to strengthen our value chain in this area, from nickel sulfate to precursors to battery recycling.

## Pedalpoint Holdings

Korea Zinc's global recycling business is led by its U.S.-based subsidiary, Pedalpoint Holdings. This subsidiary manages two key operations: IGNEO Holdings, an "urban mining" company that collects and processes e-waste in the U.S., the world's largest consumer of electronics, extracting valuable intermediates that can be smelted into precious metals, and Kataman Metals, a recently acquired scrap metal trading company. Kataman trades over 300,000 tons of metal scrap annually, including copper, aluminum, and iron, across more than 50





## Steel Cycle / Steel Cycle SC

Steel Cycle and Steel Cycle SC produce zinc oxide from steelmaking dust, which is a by-product of steelmaking in electric furnaces. The zinc oxide is then used as a secondary raw material for Korea Zinc, replacing zinc concentrate. This cross-industry resource recycling business model is helping Korea Zinc to lead the way in eco-friendly business practices.



## **KZAM**

Leveraging its proprietary smelting and electrolysis technology, KZAM produces copper foil, a critical component for secondary batteries. Our eco-friendly approach involves recovering materials from various sources, including electric copper, smelting by-products from Korea Zinc, and electronic waste. This process allows us to manufacture recycled copper foil, contributing to sustainable resource utilization.

countries. Through this integrated approach, Pedalpoint Holdings creates synergies by establishing a robust value chain that ensures a stable supply of secondary raw materials and efficient processing capabilities for intermediates, ultimately leading to the production of final products by Korea Zinc.

# Leading by Innovation

Korea Zinc is omnipresent in our daily lives, from every landscape we encounter to every product we create.

Our products are used for base materials across a wide range of industries, moving the world forward and contributing to a more convenient life.

As we strive toward a more sustainable tomorrow, we are transforming and innovating the world where we live in.

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# **Advanced Technology**

With the world's first commercialized lead smelting process and integrated zinc and lead production process, Korea Zinc improves productivity while increasing the recovery ratio of valuable metals. And our continuing R&D investment has enabled us to advance our refining technology and produce high-quality products with high purity levels. We are also focusing on developing future technology through research on sustainable eco-friendly technologies.

## 01. Roasting

Sulfuric acid.

950°C.

## 02. Leaching

A process for producing zinc calcine and sulfuric removing most impurities acid by oxidative roasting of zinc-containing sulfide concentrates with sulfuric at a temperature of around

A process of separating and by leaching zinc calcine and acid solution followed by iron oxide residues precipitation. sulfate solution.

## **TSL (Top Submerged Lance)** Technology

TSL technology recovers valuable metalssuch as zinc, lead, copper, etc.-from byproducts generated during the nonferrous metals refining process or from waste generated by other industries. It then turns the residue into eco-friendly insoluble slag, minimizing impact on the environment.

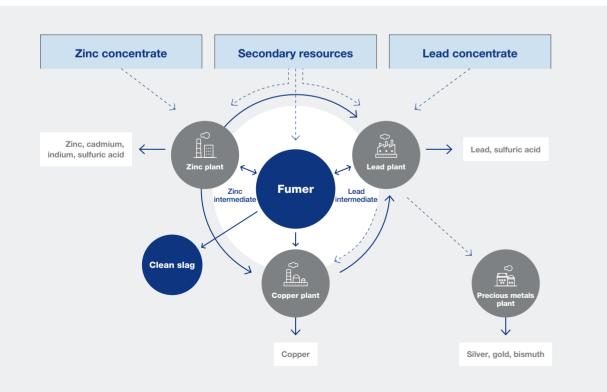
## **DRS (Direct Redox Smelter)** Lead Smelting Technology

As the world's first commercialized lead smelting technology, the DRS process integrates oxidation and reduction into a single process of smelting reduction. This advanced green technology can reduce energy consumption and pollution across variety of raw materials processing processes.

## **Green Metal** Roadmap

Pioneering the creation of green metals with minimal carbon emissions is central to our mission. This comprehensive roadmap encompasses the entire production cycle, including raw material extraction, transportation, and manufacturing. Our goal is to foster global eco-consciousness and achieve carbon neutrality. Our dedication is evident through rigorous carbon footprint calculations, certifications, and meticulous management.

## **Integrated Zinc and Lead Production Process**



## 01. DRS

A process of separating and producing lead bullion, slag, and sulfuric acid through oxidation-reduction reaction of sulfide containing about 60% lead at a temperature of about 1200°C.



A process of casting anode plate for the electrolysis process by removing

2. Anode Casting

impurities in lead bullion.



## 03. Purification

A process of eliminating impurities that remained after the previous process using metal zinc powder in order to produce a purified zinc

Copper, cadmiun cobalt, nickel

ZINC SMELTING

PROCESS



A process of recovering zinc ions from the purified zinc sulfate solution by depositing them onto cathodes using electrowinning, a specialized form of electrolysis.

The electrodeposited zinc is stripped and sent to the casting process.

## 05. Casting

A process of manufacturing 99.995% pure zinc ingot by smelting zinc cathodes in an electric furnace at a constant temperature of 470~500°C

Integrated Production Process of Zinc, Lead, and Copper

> LEAD SMELTING PROCESS



## 03. Electrolysis



A process of producing high-purity lead from the lead in anode plate by using electrolysis process.

Products produced by the process	
Gold, silver, palladium	

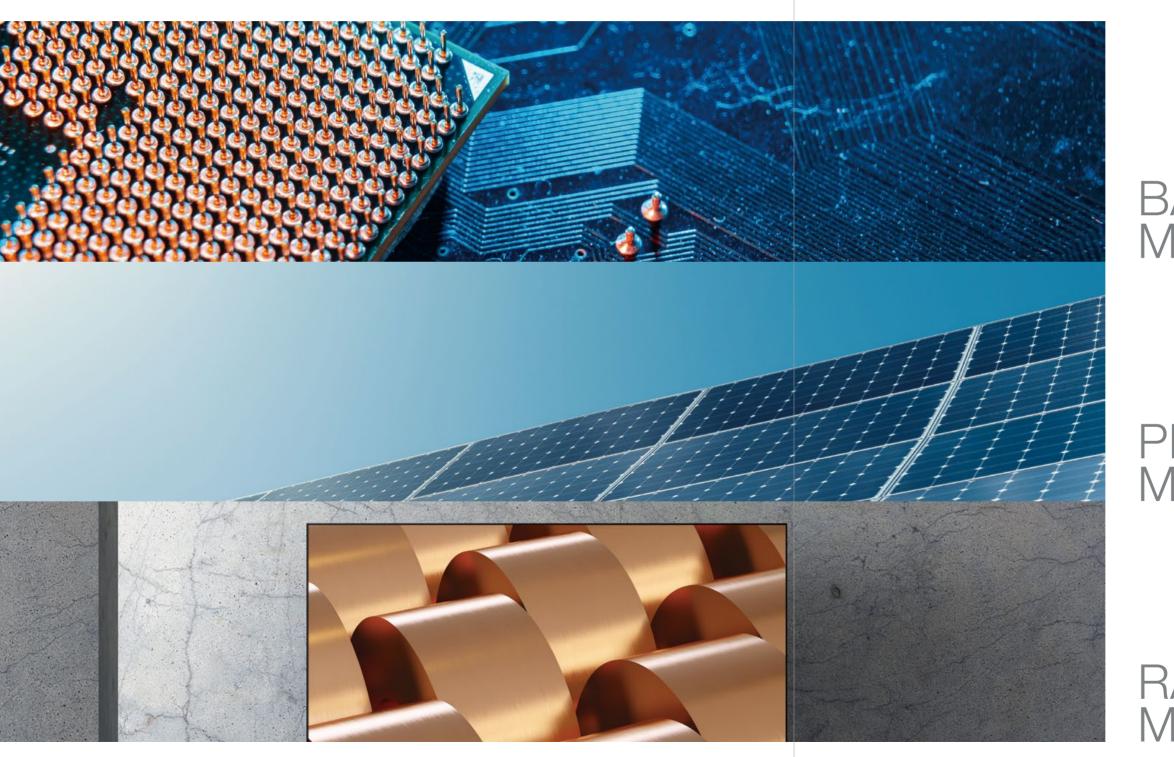
## 04. Casting

A process of manufacturing high-purity lead ingot and alloys by smelting 99.995% pure lead obtained from the electrolysis process, at a temperature of 450°C.

Products produced by the process	
Lead	

# **Product Portfolio**

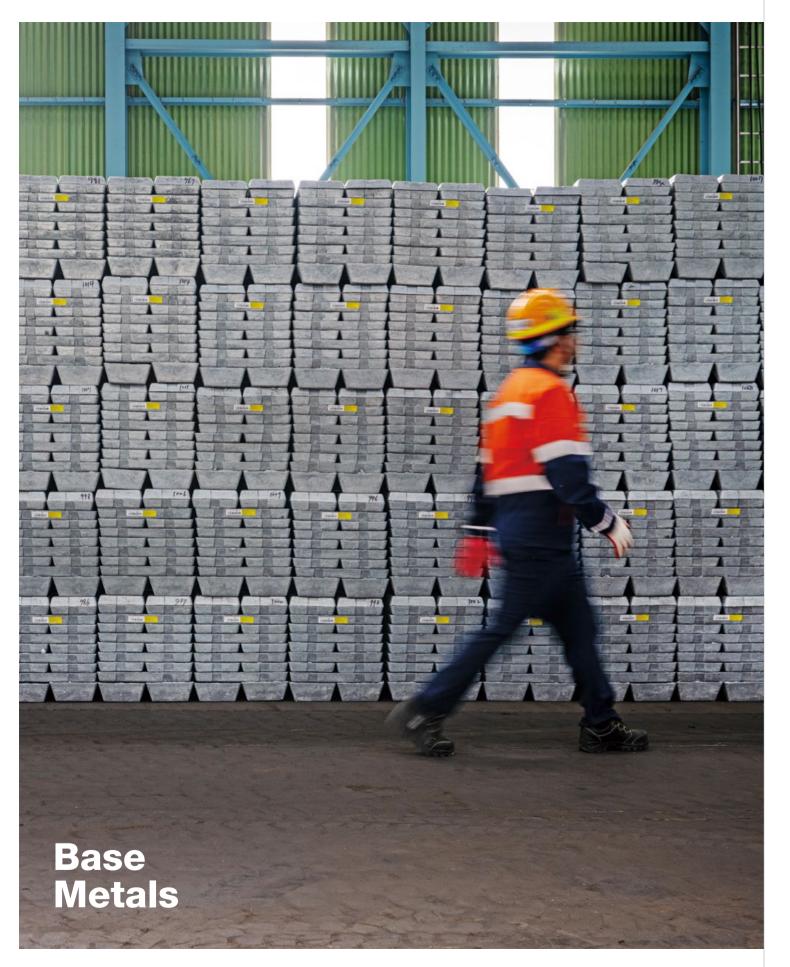
Korea Zinc produces base metals, precious metals, rare metals, as well as high-quality zinc, which are widely used in steel plating, machinery parts manufacturing, and other daily products. By diversifying our product portfolios, we are focused on producing high-value-added products while meeting the needs of changing trends and environmental issues.



















Lead, a silver-hued, ductile metal, boasts a low friction coefficient with other metals, and ample corrosion resistance. Korea Zinc crafts premium 99.99% pure ingots, finding applications in diverse fields like automotive batteries, wire sheathing, and radiation shielding.

Production Volume 413,328<sup>Tons</sup> \* As of 2023 Applications Storage batteries, wires

## Zinc

Zinc, a bluish-gray metal, functions as a fundamental building block for humans, animals, and plants. At Korea Zinc, we produce zinc ingots of exceptional quality, with purity levels surpassing 99.995%. These ingots hold versatile applications, serving as corrosion-resistant steel plating and being alloyed for mechanical parts, brass production, and additives in paints and tires. Seamlessly integrating into daily life, they also serve in galvanized steel sheets, accessories, batteries, mechanical and electronic items, and automotive components.

Production Volume 640,020<sup>Tons</sup> \* As of 2023 Applications Automotive, construction, home appliances





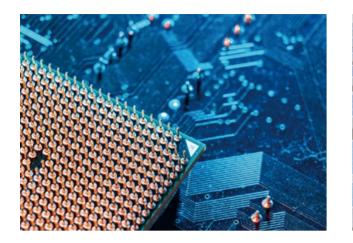
Copper, a corrosion-resistant and acid-resistant metal, easily alloys with other metals. Korea Zinc consistently produces premium electric copper via the KCP (Korea Zinc Copper Process), an exclusive method, achieving purity surpassing 99.9935%. We offer superior copper foil, crucial for secondary battery cathodes. Moreover, it finds utilization in industries such as mechanical parts, construction materials, and wiring.

Production Volume 31,050<sup>Tons</sup> \* As of 2023

#### Applications

Secondary batteries, machinery, construction

# **Precious Metals & Etc.**







Gold stands as a prime precious metal, radiating a brilliant golden luster. We manufacture gold bars weighing 1kg, boasting a purity exceeding 99.99%. Its key applications include jewelry, electroplating items, medical equipment, semiconductors, displays, and bonding wires.

Production Volume	
9.22 <sup>Tons</sup>	
* As of 2023	

Applications Jewelry, pharmaceuticals, displays



Silver exhibits high conductivity, corrosion resistance, and antibacterial/ antibiotic properties. Our silver granules and ingots, boasting over 99.99% purity, garner acclaim from globally recognized bodies like the UK's LBMA and the U.S.'s COMEX. Silver finds extensive usage in industries such as solar cells, jewelry, electroplating, and conductive electronics.

**Production Volume** 1.974Tons

\* As of 2023

Applications Solar cells, semiconductors, wireless communication products





Semiconductor wafer cleaners

During semiconductor wafer processing, the addition of high-purity sulfuric acid facilitates the oxidation and removal of organic and metal contaminants adhering to the silicon surface. At our Onsan Refinery, we operate 17 production lines to ensure a reliable supply of high-purity sulfuric acid.

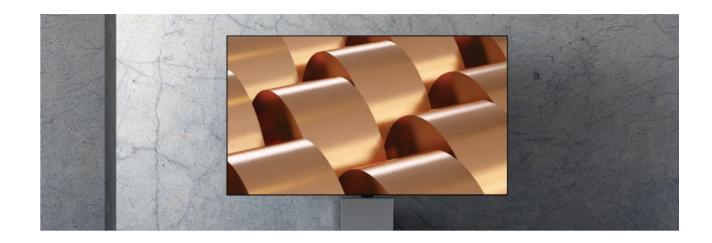
Applications

## Production Volume

170.080<sup>Tons</sup> \* As of 2023



# **Rare Metals**



## Indium

Indium, a rare earth metal characterized by its silvery-white color, softness, malleability, and low melting point, is frequently produced as a by-product of zinc extraction. This versatile material plays a crucial role in the semiconductor and display industries. Its excellent electrical conductivity makes it invaluable in semiconductor manufacturing, serving as a key material for electrodes and connections. Moreover, it plays a crucial role in display technology, forming transparent electrodes for lightemitting diodes (LEDs) and liquid crystal displays (LCDs).

# Cadmium

Production Volume 4,475<sup>Tons</sup> \* As of 2023

Applications Batteries, alloy

Tellurium



**Production Volume** 176<sup>Tons</sup> \* As of 2023

Applications Storage batteries, thermometers, thermoelectric devices Production Volume

93Tons \* As of 2023

Applications Displays, electronics devices, solar cells



Production Volume 965<sup>Tons</sup> \* As of 2023

**Bismuth** 

Applications Pharmaceuticals, cosmetics



Production Volume 3,136<sup>Tons</sup> \* As of 2023



Applications Flame retardants, batteries, medicines

# **Shaping a Sustainable Future** for a Better Tomorrow

To fulfill its social responsibilities as a corporate citizen, Korea Zinc is committed to harmonious coexistence with people, society, and the environment, creating a better future in the process. We are dedicated to building a sustainable tomorrow for all.

**ESG Management** for a Sustainable Future



Sustainability is our top priority. Having pioneered the innovation of industries and markets, we now aim to deepen ESG management throughout our business. This approach helps us respond to evolving times, lead sustainable future growth, and share values with various stakeholders.

## **Environment**

Growth that Coexists with the Environment

At Korea Zinc, we recognize environmental sustainability as both our greatest challenge and a value we must uphold. It is also an issue that can become a solid competitive advantage in the future. Through eco-friendly management, we are establishing a system to address climate change. This includes enhancing process efficiency through advanced technology, reducing carbon dioxide emissions by removing pollutants and minimizing waste.

## **Environment Growing with Society**

Our employees, partners, and local communities are the driving force and foundation behind our growth. We understand that local communities' calls for corporate social responsibility resonate deeply with our customers' desire for ethically produced products. To this end, we are dedicated to fostering a corporate environment that not only thrives alongside society but also ensures a safe and secure workplace for all.

## Governance **Responsible Growth**

We minimize risks through transparent and sound management practices. We prioritize the expertise and diversity of our Board of Directors, ensuring a wide range of perspectives and skills. By fortifying our compliance and ethical management practices, we build unwavering trust with our stakeholders.







Growing in Harmony with the Environment

## **Creating Green Value by Growing in Harmony with the Planet**

## Aiming to be an Environmentally Friendly Company

At Korea Zinc, our vision is to be an environmentally friendly company where nature, people, and businesses thrive together. Through our Environmental Management Division, we are crafting and executing robust environmental management strategies to tackle pressing environmental challenges. Our commitment is evident in our substantial investments in state-of-the-art facilities and the establishment of rigorous management protocols aimed at reducing air and water pollutants during the production process.

## Taking Proactive Steps to Reduce Carbon

At Korea Zinc, our commitment to carbon neutrality by 2050 is unwavering. We are progressively increasing our reliance on green energy sources, such as renewable energy and hydrogen, to meet this goal. Our comprehensive four-step roadmap is designed to produce green metals, ensuring a sustainable future. We meticulously calculate our carbon footprint using the Life Cycle Assessment (LCA) methodology for key products like zinc, silver, and copper. Our dedication to sustainability has earned us significant accolades, including being the first metals company to join the Dow Jones Sustainability Index (DJSI) in 2022 and receiving the Carbon Disclosure Project (CDP) Korea Awards for Carbon Management in Climate Change.

- Has been included in the Dow Jones Sustainability Index (DJSI) for the second consecutive year (2022-2023)
- Winner of the CDP Korea Awards for Climate Change
- · LCA-Carbon Footprint Certificate (Zinc)
- LCA-Carbon Footprint Certificate (Lead)



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## Monitoring GHG Emission and Managing Environmental Impact

In our commitment to transitioning to a low-carbon economy and adhering to evolving carbon emission regulations, Korea Zinc is dedicated to achieving carbon neutrality. We are continuously managing and monitoring greenhouse gas emissions across our workplaces. Our efforts go beyond mere compliance; we actively strive to minimize environmental impacts by meticulously tracking carbon dioxide emissions and energy use indicators in real time, sector by sector.

 Achieved a 49% reduction in total air pollutant emissions in 2023 compared to 2022



## Eco-friendly Campaigns to Save Ecosystems

In our quest for carbon neutrality, Korea Zinc has launched a series of impactful eco-friendly campaigns. One of our flagship initiatives is the "Eumui Forest" campaign, in collaboration with the social enterprise Tree Planet. Through this campaign, we have created forest ecosystems both domestically and internationally, planting trees in areas affected by forest fires, such as Uljin, Gyeongbuk, and in regions devastated by landslides and earthquakes in Lombok, Indonesia. Within the company, we foster a culture of sustainability through various campaigns, including an Upcycling Campaign to collect waste PET bottle caps and plogging volunteer services. These efforts not only promote eco-friendly living among our employees but also heighten environmental consciousness.

- · Created the first forest in the Uljin wildfire area, Eumui Forest
- Established the second Eumui Forest in the landslide area of Lombok, Indonesia
- Launched an internal Upcycling Campaign

## Social Growing with Society Creating Social Value by Growing Together

## Worker Safety Management

We prioritize creating a safe and healthy working environment for our employees across all our workplaces. With our advanced safety and health system, we have standardized safe work practices that all employees are required to follow. To foster a strong culture of safety, we have established Safety Experience Training Centers that provide continuous education to internalize safety awareness and practices. Additionally, we support our suppliers by enhancing their safety and health capabilities through dedicated seminars for their employees.

### Work-Life Balance

Driven by the belief that family and personal life are the most significant motivators for our employees, we have implemented various systems and programs to support work-life balance. Our flexible work system allows employees to autonomously adjust their working hours and formats, maximizing efficiency. We also strive to foster a family-friendly culture by offering welfare benefits tailored to different life stages, such as wellequipped housing, dormitories, and daycare centers.

- Standardizing safe work practices
- Supporting for occupational safety certification acquisition
- Establishing Safety Experience Training Centers
- Enhancing suppliers' safety and health capabilities
- · Introducing four flexible work arrangements
- Supporting family-friendly programs and family housing
- · Promoting the new employee buddy program



## Supporting Internal and External Suppliers

To foster a culture of win-win cooperation with our suppliers, we provide them with comprehensive support. We have established the Shared Growth Promotion Committee to offer not only financial assistance but also support for technology development and quality improvement, aiding in their journey towards technological independence. In addition, we provide capacity-building programs, including environmental and safety training. Through this multifaceted approach, we help our suppliers enhance their competitiveness and achieve mutual growth.

- Achieving shared growth through targeted business support
   agreements
- Jointly promoting safety and health management systems for internal suppliers and creating a KRW 40 billion Win-Win Fund
- · Providing performance-based incentives for outstanding suppliers



## Fostering Future Talent

Korea Zinc is dedicated to nurturing future leaders by providing generous support to help individuals become the driving force for a better tomorrow. Each year, we donate to over 10 elementary, middle, and high schools in the Ulsan area, ensuring that young minds have the resources they need to thrive. As the number of multicultural families in the region grows, we collaborate with the Ulsan City Office of Education and other organizations to offer essential Korean language and cultural education. Since 2004, our "Onsan Junior Engineering Lab" has sparked an interest in science among students, thanks to contributions from our employees. Additionally, our Youth Dream Support Project has empowered vulnerable children for the past 12 years, providing them with opportunities to develop their talents.

- Donating to the Ulsan Regional School Development Fund
- · Supporting the education of children from multicultural families
- · Sponsoring child welfare centers
- · Running the Youth Dream Support Project
- Operating the Onsan Junior Engineering Lab

## Community **Donation Service**

We are committed to supporting underprivileged neighbors in our local communities. At the end of each year, we contribute KRW 3 billion through the Community Chest of Korea to make a meaningful impact. Since 2007, our involvement in the "Hope Sharing Campaign" has enabled us to accumulate KRW 35.8 billion by 2023. These donations support underprivileged individuals through essential programs focused on basic livelihoods, education, and healthcare improvements. Our employees actively engage in volunteer activities, reinforcing our commitment to community service. Additionally, the Onsan Refinery has received the highest rating in the Community Contribution Recognition Program, a collaborative effort by the Ministry of Health and Welfare and the Korean Social Welfare Council. We also partner with NGOs to systematically enhance our community outreach efforts.

### Supporting the Arts

At Korea Zinc, we are passionate about enriching lives through cultural and artistic endeavors. Since 2013, our sponsorship of the Metalwork & Jewelry Award has celebrated and supported talented metal craftsmen, playing a vital role in revitalizing Korean craft culture and establishing a creative foundation. In 2023, we partnered with the Seoul Museum of Craft Art to jointly promote contemporary craft exhibitions and related programs. Our inaugural collaborative project featured a special exhibition titled "Long-Lasting Objects of Metalsmiths," showcasing the winners of the Metalwork & Jewelry Award. Beyond this, we continue to support a variety of cultural institutions, including the National Museum of Modern and Contemporary Art and others.

- Onsan Refinery
- Donating to the Community Chest of Korea
- · Hosting briquette and kimchi sharing events
- · Volunteering for Habitat for Humanity housing improvement projects
- · Sponsoring the Metalwork & Jewelry Award
- · Hosting a special exhibition on crafts
- Supporting the National Museum of Modern and Contemporary Art

· Sponsoring the Glory Opera Company and Orchestral Ensemble Seoul



Governance Governance Transparent and Responsible Growth **Enhancing Sustainable Corporate Value through Responsible Management** 

## **Sustainability Management Committee**

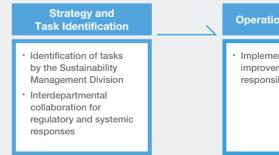
Korea Zinc is committed to integrating sustainability into its core operations while enhancing corporate value through robust management practices. Central to this effort is the Sustainability Management Committee, which oversees and evaluates our sustainability initiatives. This committee ensures that our approach to sustainability is comprehensive and effective, focusing on strategies for achieving carbon neutrality and implementing eco-friendly projects.

Regular meetings of the Sustainability Management Committee

· Operating an independent, diverse, and expert Board of Directors

#### Sustainability Management System

Our sustainability management system follows a three-step process: strategy and task identification, operational execution, and performance assessment.



## **Ethical Management and Fair Trade**

At Korea Zinc, we have established a robust ethical management framework to guide our corporate culture. We have meticulously crafted a Code of Ethics that serves as our moral compass, directing every decision and action across our organization. To promote fair business practices, we have implemented Fair Trade Principles, safeguarding the rights of customers and suppliers while maintaining fair competition.

- Compliance monitoring
- · Establishment of Code of Ethics and Code of Conduct
- · Development of Fair Trade Principles

#### **Operational Execution**

Implementation of improvement tasks by responsible departments

## Performance Assessment

Database creation of departmental performance and performance review by the Sustainability Management Committee

Published by	Korea Zinc Co., Ltd. www.koreazinc.co.kr
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Scan the QR code to discover how Korea Zinc is shaping the future with its new mission and core values.









## **KOREA ZINC**

