posco
FUTURE M

POSCO FUTURE M

INDEX

Overview

Heading Towards the Future of Materials

Move on,
Change the Future

Korea's ONLY maker of cathode·anode materials for batteries

superior supply chain capabilities

industry first to establish joint venture with automaker, GM

mass production capability (North America) for direct supply

Premium needle coke

- used for making anodes & electrodes
- high value-added tech only by **4 nations (KOR·CHN·US·JPN)**

Secured Steelmaking Electrode Manufacturing Technology

Procured UHP (Ultra High Power) electrode manufacturing technology (previously imported)

ESG Grade A+

Korea Institute of Corporate Governance & Sustainability (KCGS)

a/o 2024

Revenue

₩3.7 trillion
(~$2.7 billion)

Assets

₩7.93 trillion
(~$5.78 billion)

a/o Dec. '24

# of Employees

3,047

History

To leap forward as a formidable producer of future materials

BEGINNING

founded as solid partner within the steel industry

- **1963 · Samhwa Hwasung Established**
  Refractory manufacturing
- **1971 · Founded as Pohang Industrial Furnace**
  Korea's leading refractory provider
- **1983 · first R&D center established**
- **1994 · R&D center established**

GROWTH

portfolio expansion via new high value-added operations

- **2010 · renamed to POSCO Chemtech**
  entry into carbon materials market made from steelmaking by-products
- **2011 · Korea's 1st natural graphite anode**
  first step into battery materials
- **2012 · POSCO MC Materials established**
  entry into needle coke market, for anodes and electrode bars
- **2019 · Renamed to POSCO Chemical**
  merged with POSCO ESM(cathode) for more synergistic battery business

LOOKING FORWARD

accelerated battery materials operations via investments home & abroad

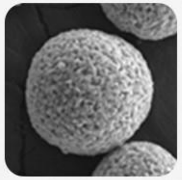
- **2021 · Agreement with GM(General Motors) for joint venture in cathodes**
  industry first partnership with global automaker
- **2022 · Completion of Gwangyang Cathode Plant**
  mother factory for global production network
- **2023 · Cathode supply agreement with Sansung SDI and LG Energy Solution**
  first NCA supply to extend its portfolio(to Samsung SDI)
- **2023 · Renamed to POSCO FUTURE M**
  expanded business portfolio and global presence
- **2025 · Completion of Pohang Cathode Plant**
  expanding premium cathode material production base

Business | Introduction

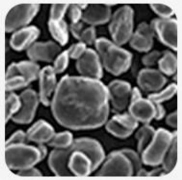
POSCO FUTURE M, Preparing for the Future of Materials

Battery materials

- **Goal to become global top tier supplier of core materials for batteries**
  - Korea's only simultaneous cathode·anode production
  - domestication of artificial graphite anodes
  - material value chain via global investment
  - next-gen materials R&D & expanding product portfolio (Ultra Hi-Ni / LMR / high voltage mid-Ni cathode / ASSB, silicon anode materials)
  - internalized precursor production for self-sufficiency



cathode



anode

precursor

Advanced Chemical Materials

- **Production of carbon-based advanced materials**
  - utilize COG(Coke Oven Gas) by-product from steelmaking to produce chemical materials including coal tar & light oil
- **High value-added advanced materials**
  - artificial graphite anode, needle coke for electrode manufacture
  - semiconductor pitch coke
  - supercapacitor & environmental purification activated carbon

carbon materials

carbon products

Basic Industrial Materials

- **Total refractory solutions**
  - production & engineering of refractories that maintain properties in high temperature environments inside various plants
- **High grade quicklime for steelmaking**
  - to improve steelmaking quality and productivity by detaching impurities
- **Global top manufacturing technologies**
  - refractory expertise & automated smart facilities

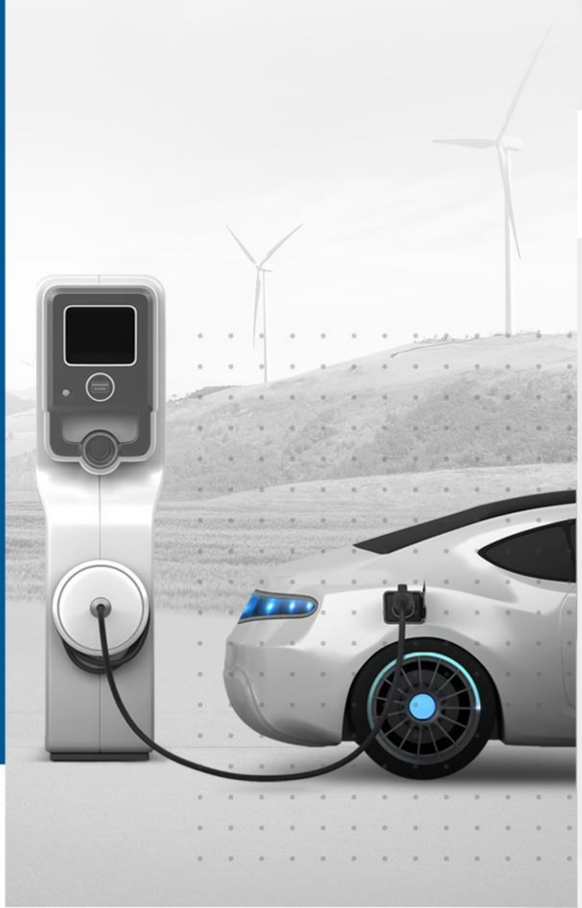
refractories

quicklime

furnaces

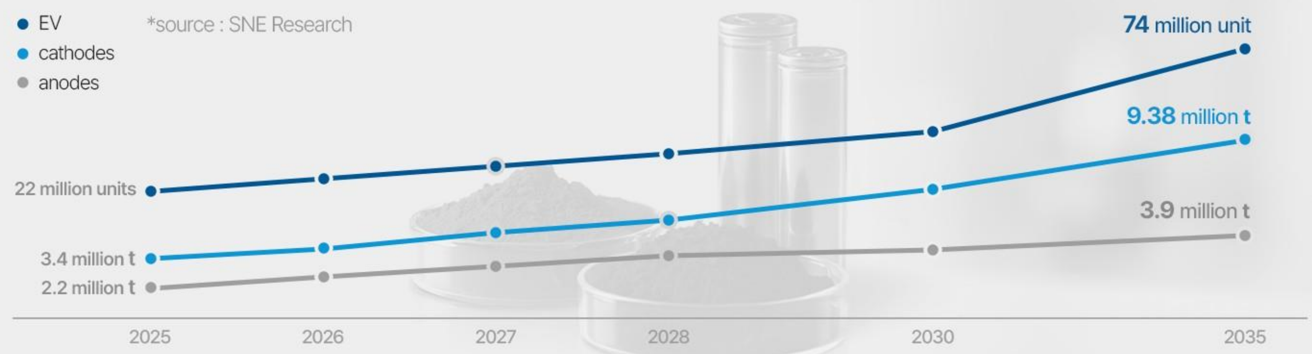
Business

Leading the era of Carbon Neutrality



Growth of Green Mobility: **Rapidly increasing Demands of battery materials**

EV & BATTERY MATERIAL MARKET (FORECAST)



Opening the Future as a Materials Company via Portfolio Expansion & Secured Supply Chain

(unit: kt)

Material	Area		Product	Capacity	Total
+ Cathode	Domestic (S.Korea)	Gwangyang	NCM/NCMA	90.0	305.0
			NCA	52.5	
		Pohang	NCMA	76.0	
			NCA	30.0	
	Overseas	China	NCM/NCMA	25.0	
		Canada	NCMA	33.0	
− Anode	Domestic (S.Korea)	Sejong	Natural Graphite	74.0	82.0
		Pohang	Artificial Graphite	8.0	

Long-term Strategy

- Cathode: review investments in new products (e.g. LMR & LFP)
- Anode: graphite spheroidization/acid treatment investment (approved Apr. '25), Si-C anode investmnet by stage

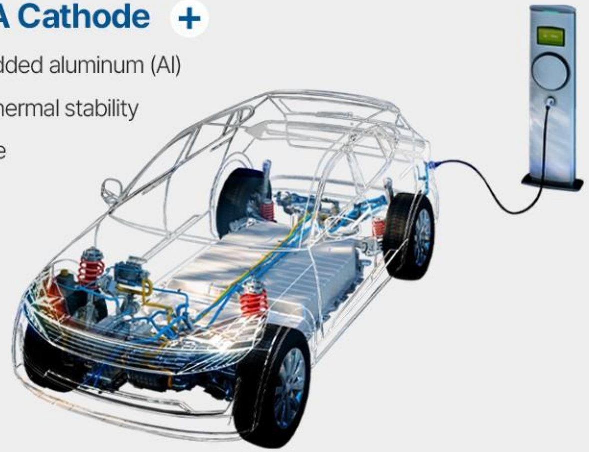
Business

Global Top Tier In the business

Pursuing technological edge in core battery materials

High Nickel NCMA Cathode +

- more nickel included w/ added aluminum (Al)
- High capacity, improved thermal stability
- up to 600Km driving range on single charge



− Low Expansion Anode

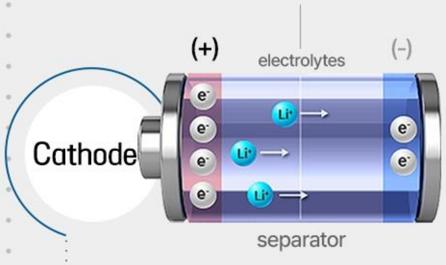
- improvement of charging speeds, safety, & battery life via combining the benefits of natural/artificial graphite anodes

− Artificial Graphite Anode

- made of needle coke
- rapid charging, prolonged battery life

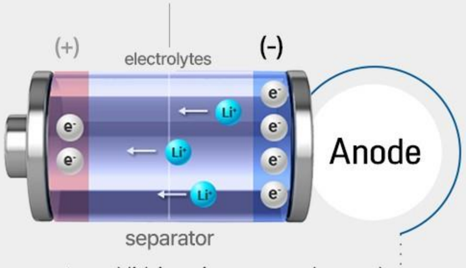
The Lithium Ion Battery

charge transfer of lithium ions(Li+) from positive (+) to negative (-)



- energy source that acts upon a lithium source
- determines avg. output and capacity of battery

discharge transfer of lithium ions(Li+) from negative (-) to positive (+)



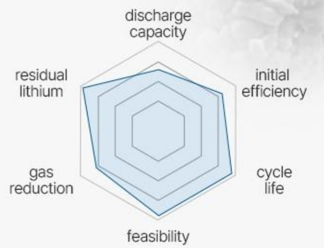
- stored lithium ions are released via external circuit to create an electric current
- determines charging speed & battery life

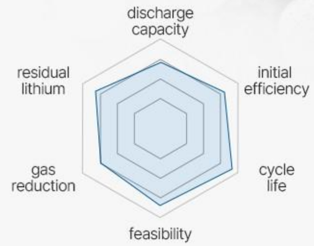
Portfolio Expansion (Entry to Premium)

Cathode To expand product portfolio from standard to premium

Now

STANDARD	PREMIUM HIGH-END
Mid-Ni Polychrystalline (NCM6X) • distance: 400km	**Hi-Ni Bi-modal, Poly crystalline Large Particle / Single Crystalline Small Particle** • NCMA8x, NCA9x • distance: 500km

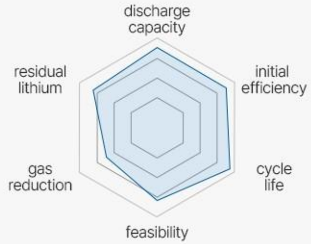




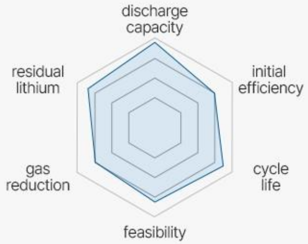
Future

ENTRY	STANDARD	PREMIUM HIGH-END
LFP : ESS & EV Entry-level **LMR : high capacity, eco-friendly** • 30%+ capacity compared to LFP • Recyclable, low-cost	**High-Voltage Mid-Ni Single Crystalline** • Hi-Ni capability secured via high-voltage • superior thermal stability	**Ultra Hi-Ni(9x)** **: Long Distance Driving, cylindrical** **Hi-Ni Unimodal, Semi-Crystalline Medium particle** **: Long-Range Driving, Stable** • 600~700km driving distance • usable in all pouch/crystal form factors

LMR



High-Voltage Mid-Ni Crrystal



Ultra Hi-Ni(9X)

Business

Expansion of Portfolio for Consumer Needs

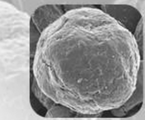
Anode To develop advanced technologies including Si Anode Materials

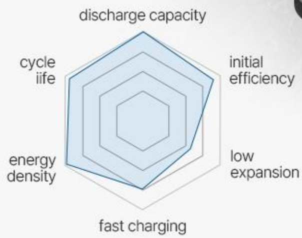
Now

NATURAL GRAPHITE

Low-Expansion Natural Graphite Anode Material

- high stability, long cycle life

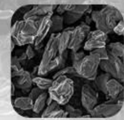


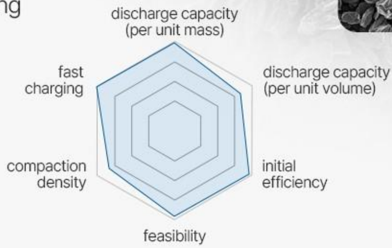


ARTIFICIAL GRAPHITE

Secondary Particle Coating

- excellent power, fast charging



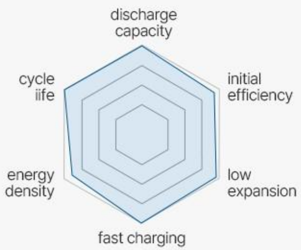


Future

NATURAL GRAPHITE

Fast Charging, Low Expansion

- high power/low expansion artificial graphite level
- suppresses expansion during charge/discharge, enhances life

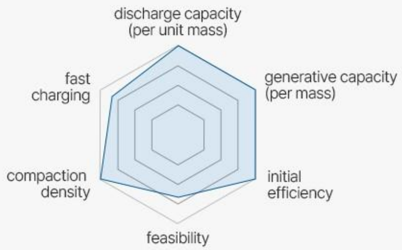


Fast Charging, Low Expansion Natural Graphite

ARTIFICIAL GRAPHITE

high volumetric capacity Secondary Particle Artificial Graphite

- high-density EV anode material



high volumetric capacity Secondary Particle Artificial Graphite

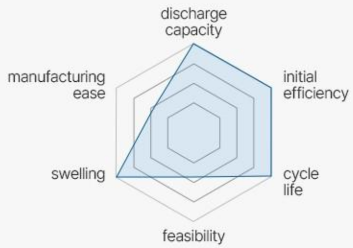
SILICON

Pulverized Si-C

- maximized fast charging performance using carbon nanotubes

Deposited Si-C

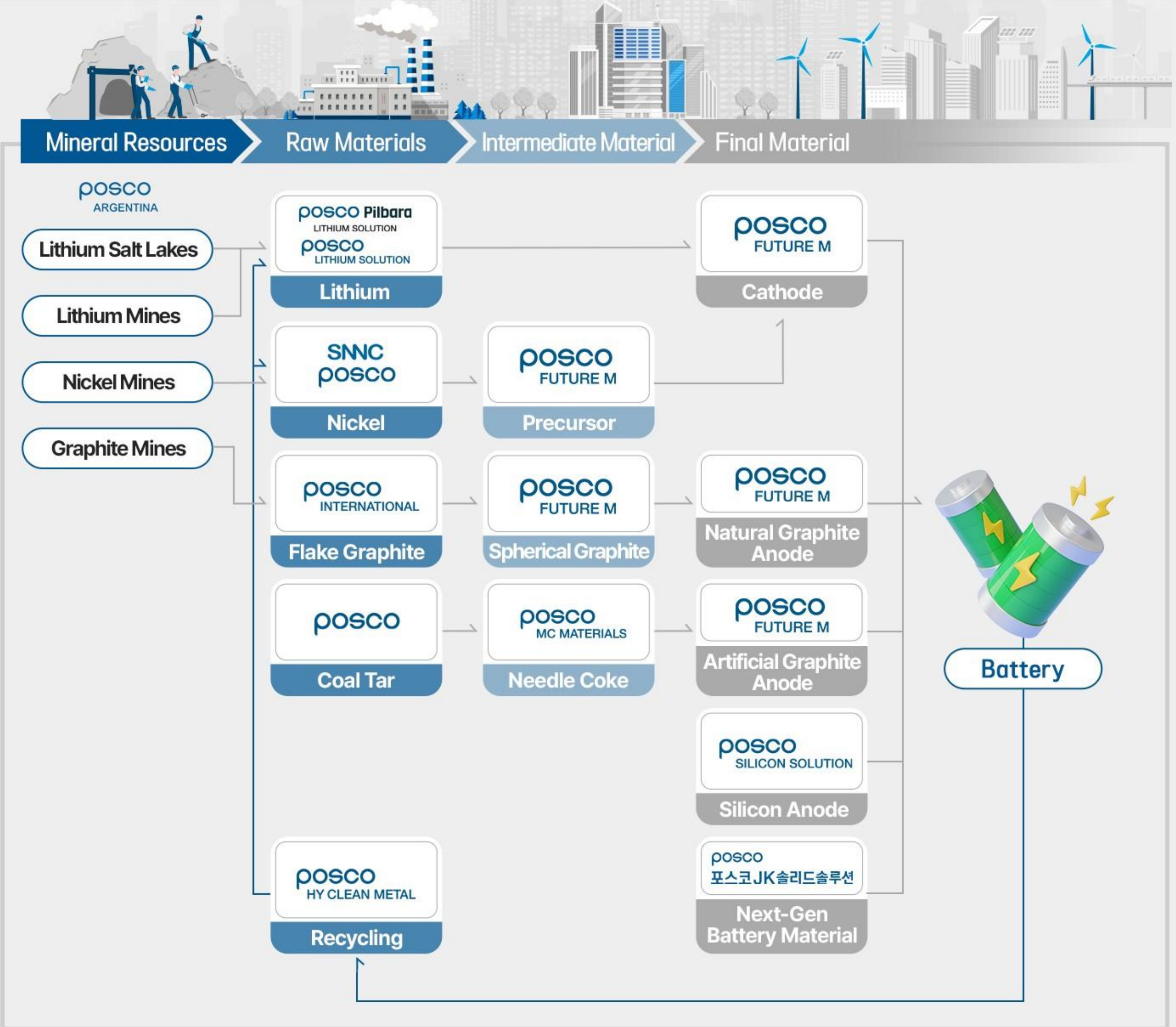
- high-quality nanosilicon deposited on carbon, maximizes high capcity/long life



Deposited Si-C

Total Value Chain of Enegery Materials

POSCO Group's **Battery Materials Value Chain**



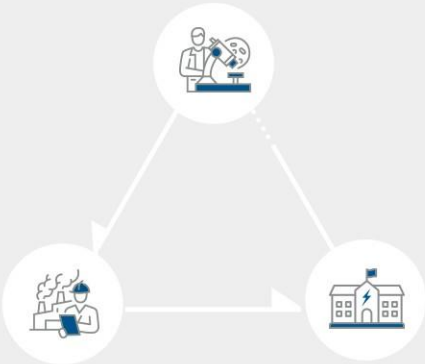
Global Leadership in Technologies

Key competence in next-gen tech leadership : Integrated R&D capabilities within POSCO Group

FUTURE TECHNOLOGY RESEARCH INSTITUTE*/RIST

PILOT STUDY AND RESEARCH

*Groupe's Control tower of newly growing businesses, established in 2022



POSCO FUTURE M Tech Center

commercialization

partner-focused researching capability

POSTECH

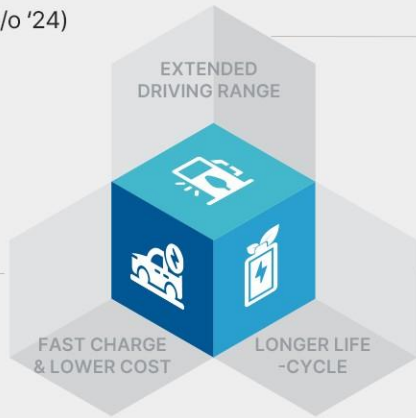
industry-academia synergy

fostering researching talent

EV BATTERY MEGA TRENDS

1,088 secondary battery material patents (a/o '24)
Accumulated EV battery market IPs

continued tech development
leading mega-trends



Higher Capacities for Extended Distances

- all-solid-state battery materials (lithium metal anode materials)
- silicon(Si) anodes

Faster Charging & Lowered Costs

- LFP cathodes
- cobalt-free (Co-free) cathodes
- low expansion natural graphite anodes

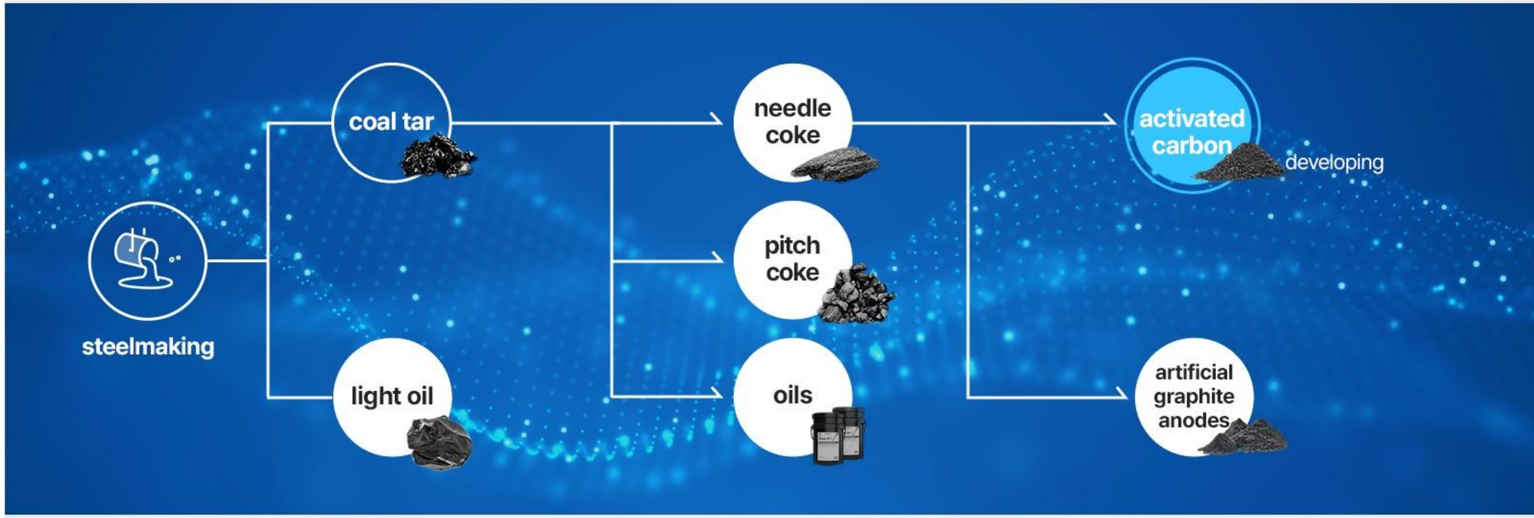
Prolonged Battery Life

- high nickel NCMA cathodes (Single crystal)
- long-life artificial graphite anodes

Business

Extending the Chemical Value Chain

Chemical Value Chain Expansion



High Value-Added Carbon Materials & Raw Materials

Premium Needle Coke

- technology used in artificial graphite anodes & Electrode available only in **4 countries (KOR·CHN·US·JPN)**
- successful domestication via POSCO MC Materials subsidiary,improving Korea's carbon materials industry

Coal Tar raw material for advanced materials including needle cokes & pitch for anodes

Light Oil benzene-based industrial material

Activated Carbon

- Carbon material that maximizes its porous surface area for optimal absorption of harmful substances
- Development of activated carbon for use in desulfurization/air purification /water treatment from heavy tar & artificial graphite anode by-products
- Planning for mass production

Business

01 Battery Materials

02 Advanced Chemical Materials

03 Basic Industrial Materials

To become an Industry Essence with the World's Best Partner

Total Refractory solution provider as a partner **of the world-best steelmaker, POSCO**

Refractories

Refractory Production

- high quality refractory products based on its own technologies
- total customer services based on extensive refractory portfolio with customers domestic & abroad for customized Trouble Zero solutions

Seawater Magnesium Hydroxide
Desulfurizer & wastewater neutralizer via seawater/lime reaction

Shaped Refractories
brick shaped and used in building industrial furnaces & plants

Unshaped Refractories
powdered and castable for various construction applications

Functional Refractories
improves steel strength during milling process

Refractory Engineering

- total solutions for industrial plant refractories
- current projects in Vietnam, Taiwan, Mexico, Ghana, Iran, Brazil, UAE, Bahrain, Saudi Arabia and Nigeria, etc.

steel plant

nonferrous metals· cement plant

energy plant

petrochemical plant

Quicklime

- used in steelmaking, core material that determines productivity & quality of steel products
- quicklime for various applications, supplied to Pohang and Gwangyang Steelworks

limestone (or dolomite) baked at temperatures above **900°C**

Korea's largest annual production of **2400Kt**

steel making

chemicals

ESG

Pursuing Sustainability for the World and Future Generations

Rating

2024 KCGS
Rated overall 'A+' grade

Member of Dow Jones Sustainability Indices Powered by the S&P Global CSA

2023~2024
Included in the 'DJSI Asia Pacific' Index

Environment

Transition to renewable energy based on enhancing climate change response governance and transparent information disclosure

Strengthening low-carbon management system on the foundation of the declaration of carbon neutrality by 2050 and its roadmap

- Carbon reduction strategy and execution reviewed by CEO-led internal council

Disclosure of carbon emissions information from a product lifecycle perspective including proactive response to Scope 3 regulations

Diversification of procurement portfolios for renewable energy transition

- Soloar power self-generation utilizing factory space, purchasing Renewable Energy Certificates(RECs), and participating in large-scale offshore wind-power projects

Transforming Industrial Byproducts into High Value-Added Materials, Establishing Cyclical Economies via Recycling

Resource Circulation Certifications Plant

- Magnesia plant's fine limestone, Sejong Anode Material Plants 1 and 2, Pohang Anode Material Plant merited for graphite by-product resource recycling

CFP(Carbon Footprint) certifications for low carbon product(to be acquired)

EPD KOREA www.epd.or.kr

Acquired EPD (Environmental Product Declaration) both on Cathode and Anode Materials

ESG

Pursuing Sustainability for the World and Future Generations

Social

Published Responsible Minerals **Report for the first time in 2021**

Responsible mineral sourcing for designated 27 countries & 218 high risk areas

expand battery resources (lithium, nickel, manganese, graphite,...) away from conflict materials

ESG SUPPORT TO SME PARTNERS

ESG standards assessment, management consulting, and other systematic support

"Sustainable Management Program" to encourage ESG to partner companies

BENEFIT SHARING

government designated for drilling machine developed together with partners

Shared Growth with Suppliers in Safety-Health Management

60 Suppliers

- ··· Evaluation
- ··· Impovement
- ··· Monitoring
- ··· After-evalution

Minister of Employment & Labor Award for accident prevention efforts

Governance

- establishment of BOD affiliated committees for **transparent & effective decision-making**
- increased the ratio of outside directors within BOD to strengthen expertise & diversity

BOD

- outside directors candidate committee
- audit committee

Network

POSCO FUTURE M's growth vision extends all the way to the global market

South Korea

- HQ in Pohang
- Gwangyang Cathode Plant
- Sejong Anode Plant 1
- Gwangyang Office
- Pohang Cathode Plant
- Sejong Anode Plant 2
- Seoul Office
- Pohang Anode Plant
- Sejong Campus

North America

- **POSCO FUTURE M CANADA**
- **Ultium CAM**

China

- **ZPR Headquarters**
  Zhangjiagang Pohang Stainless Steel Co., Ltd
  (张家港浦项耐火材料有限公司)
- **QZNT**
  Qingdao Zhongshuo New Energy Technology Co., Ltd.
  (青岛众硕新能源科技有限公司)
- **ZPHE** Cathode JV
  Zhejiang POSCO-HUAYOU New Energy Co., Ltd.
  (浙江浦项华友新能源材料有限公司)
- **ZHPE** Precursor JV
  Zhejiang HUAYOU-POSCO New Energy Co., Ltd.
  (浙江华友浦项新能源材料有限公司)

Indonesia

- **PT.KPFM**
  KRAKATAU POSCO FUTURE M CALCINATION
- **PT.KPDC**
  KRAKATAU POS-CHEM DONG-SUH CHEMICAL
- **PT.IPCR**
  INDONESIA POS-CHEMTECH CHOSUN RE

Domestic Affiliates

- **POSCO MC Materials**
- **C&P Advanced Material Technology**
- **CRInnotech**
- **Future Graph**