



The Beginning and End of Waste Battery Recycling

IS Dongseo's Growth Strategy for Waste Battery Recycling

- IS TMC Acquired -

INVESTOR RELATIONS 2023





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INVESTOR RELATIONS 2023



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CHAPTER 01

Drivers of Waste Battery Recycling Industry growth

1. Explosive growth of the waste battery recycling market
2. Other drivers of waste battery recycling industry growth



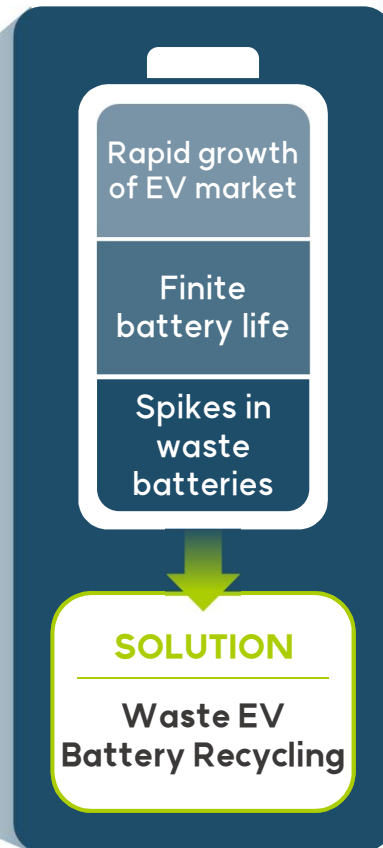
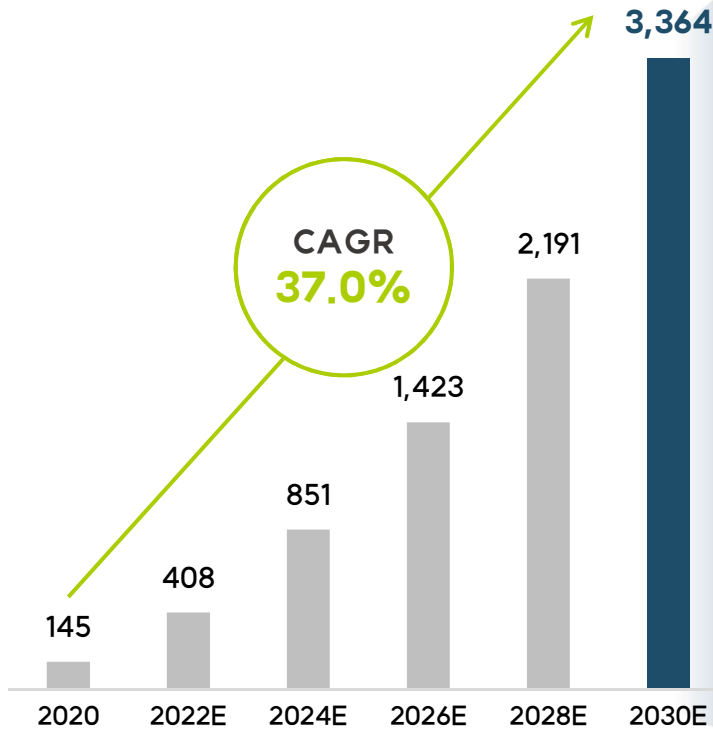
01 Explosive growth of the waste battery recycling market

With the rapid growth of electric vehicle (EV) battery market, waste battery recycling market is growing fast

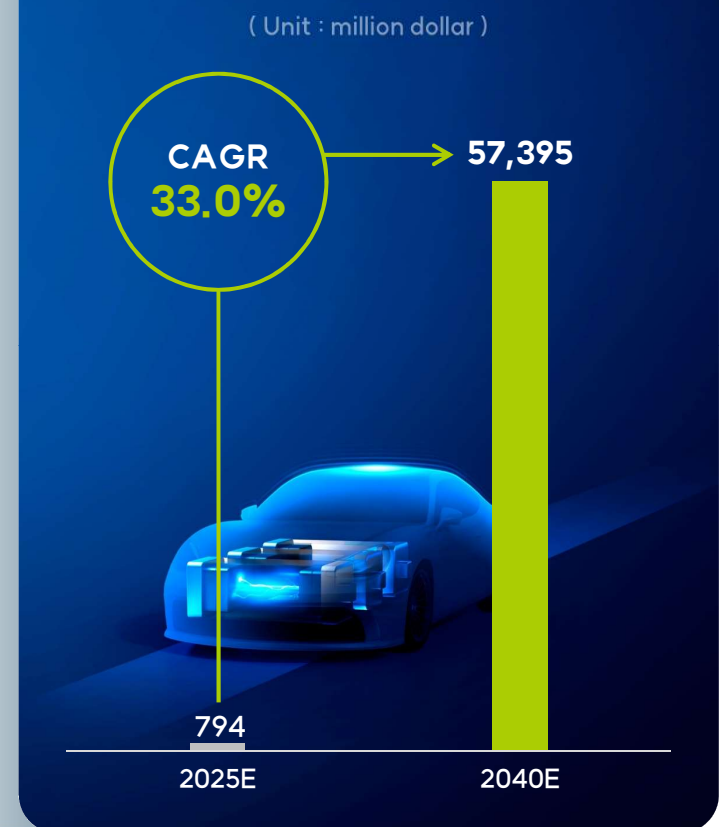
► Waste battery recycling market prospect

The recycling market is expected to grow along with the increasing supply of EVs as EV batteries reach the end of lifecycle within 5–10 years.

Global electric vehicle battery market size (Unit : GWh)



Global waste EV battery recycling market size (Unit : million dollar)



* SNE Research, Eugene Investment & Securities

* SNE Research, Eugene Investment & Securities

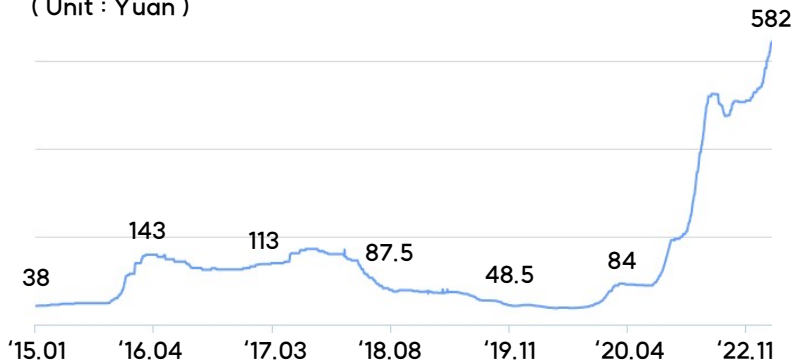
02 Other drivers of waste battery recycling industry growth

Factors leading to the inevitable recycling of waste batteries

► Increasing price of battery raw materials

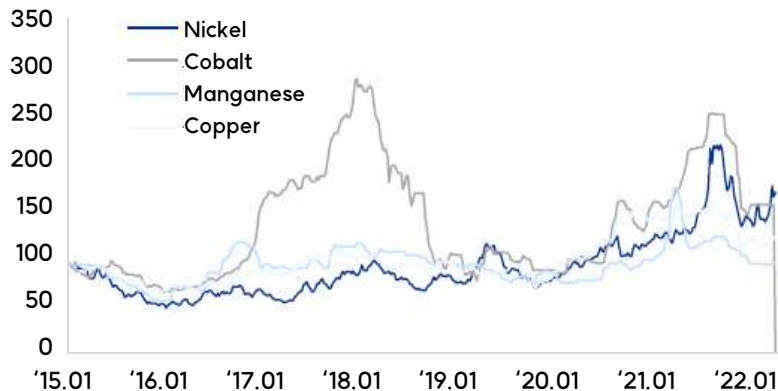
· Lithium price trends

(Unit : Yuan)



* Korea Resources Corporation, Eugene Investment & Securities

· Nickel, cobalt, manganese, and copper price trends

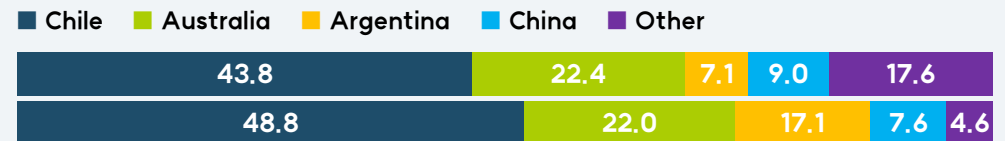


* Korea Resources Corporation, Eugene Investment & Securities

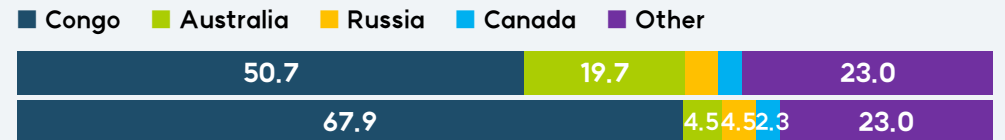
► Concentrated production of major raw materials in specific countries – increasing supply risk

Reserves and production of major raw materials, such as lithium, cobalt, and nickel, are concentrated in few countries, resulting in significant impact on raw material procurement and price fluctuations in the event of production disruptions due to political/economic issues in those regions

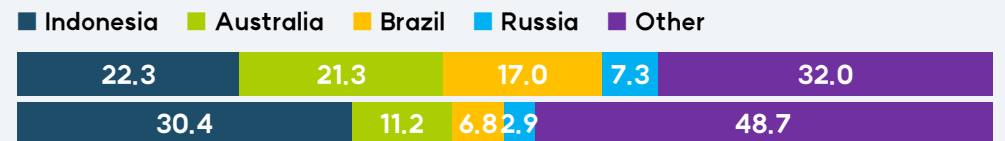
· Global lithium reserves(top) and production(bottom) in 2020 (Unit : %)



· Global Cobalt Reserves(top) and Production(bottom) in 2020 (Unit : %)



· Global nickel reserves(top) and production(bottom) in 2020 (Unit : %)



* United States Geological Survey (USGS), Australian Department of Industry, Argentine Chamber of Mining Companies, Eugene Investment & Securities

02 Other drivers of waste battery recycling industry growth

Factors leading to the inevitable recycling of waste batteries






► Environmental hazards of waste batteries

* Future Waste Recycling and Proper Treatment, Ministry of Environment, Korea Environmental Industry & Technology Institute, Eugene Investment & Securities

Substance	Property	Health hazard	Environmental impact
Nickel	Toxicity	<ul style="list-style-type: none"> Nickel carbonyl is a cause of lung and nasal cancer Skin disease such as itching, burning, drying and scaly skin Nickel-contaminated water causes kidney damage like proteinuria Immunologic issues: decreased resistance to viruses and infectious agents 	<ul style="list-style-type: none"> Green pigment deficiency in plants Adverse effects of colloidal nickel to animals
Lithium	Non-toxic	<ul style="list-style-type: none"> Causes severe disruption of water balance in the body and blocks the synthesis of thyroid hormones Causes drowsiness, speech impairment, tremors, muscle cramps, tonus of muscle, sweating, and fever Increases the risk of acute/chronic kidney failure Causes weight gain, vomiting, headache, nausea, and tremors to children exposed to lithium Might cause shallow respiration, hypotonia, and lethargy to lithium-exposed infants 	<ul style="list-style-type: none"> Interferes with the carbohydrate metabolism and affects the growth of and pituitary hormones in rodents Causes physiological and immunological irregularities that lead to infectious diseases Causes congenital disorders, such as cleft palate, skeletal deformities, and ectopic brain Impairs brain growth in test animals
Manganese	Non-toxic	<ul style="list-style-type: none"> Causes coughing, abdominal pain, and nausea when exposed Causes neuropsychiatric disorders such as "manganese madness" or "Parkinson's disease" 	<ul style="list-style-type: none"> Its finely dispersed flammable particles form explosive mixtures in air Influences the immune system of marine invertebrates Induces iron deficiency in some algae and inhibits chlorophyll synthesis Induces disorder to some crops

► Promoting waste battery recycling policies in major countries

* Korea International Trade Association, Eugene Investment & Securities

	<ul style="list-style-type: none"> Approaches for supply chain due to low domestic production Invests in waste battery recycling infrastructure and supports R&D Fosters relevant companies and industries 		<ul style="list-style-type: none"> Approaches with environmental policies and shows an interest in global standards Enforces the mandatory use of recycled battery materials (12% cobalt, 4% lithium, 4% nickel (by 2030)) Mandates the percentage of recycled materials (45% (current) > 70% (by 2030))
	<ul style="list-style-type: none"> Goes for public-private R&D Certification standards and legal foundation are still lacking 		<ul style="list-style-type: none"> The private sector begins to capture the business opportunity The government also introduced investment and incubation programs
	<ul style="list-style-type: none"> Continues to expand the market size (28 billion yuan in 2022) Set nickel/cobalt/manganese recovery rate at 98%, lithium at 85%, and other rare metals at 97% Specified the recycling responsibilities of producers 		<ul style="list-style-type: none"> 40,000 recycling companies have registered and patents are increasing Establishment of 6 major challenges (history management, packaging, standardization, development of representative company, technology improvement, standardization) Established national standards for recycling (dimensions, registration, recovery, packaging, transportation, dismantling, etc.)



CHAPTER 02

About IS TMC

1. Company overview
2. Company milestones
3. Projects
4. Process and products
5. Exceptional technologies
6. Plant status
7. Business performance
8. Future Development and Vision
9. Comparison with competitors



01 Company overview

IS TMC, The Green-Frontier in resource circulation



cares about the environment with an infinite cycle of resources and contributes to the country and human society.

The metal is not a substance not only to be consumed but also to repeat the recycling process



► Company overview

Company name	IS TMC Co., Ltd.
CEO	Kwon Sang-Goo
Foundation	Oct. 13, 1998
Capital	KRW 1,750,000,000
Location	216, 1 Gongdan-ro, Gumi-si, Gyeongsangbuk-do
	132-22 3gongdan 3-ro, Gumi-si, Gyeongsangbuk-do
	98 Gyeonghocheonseo-gil, Buksam-eup, Chilgok-gun, Gyeongsangbuk-do
Contact	FAX 054-462-6122
	TEL 054-462-6117
Website	istmc.co.kr/
Business area	Manufacturing of lithium cobalt oxide and production of recycled metal-processed material
Major products	Complex sulfate, lithium carbonate, cobalt oxide, etc.

► Shareholder Composition



02 Company milestones

IS TMC, a company that creates a clean and prosperous world through resource recycling

Early days 1998 ~ 2007

Established the company and built the foundation

- 1998 Established the company
- 2003 Began to operate the Ansan Plant
- 2004 Produced cobalt hydroxide
Certified with ISO 14001
Received a 5 Million Dollar Export Tower award
- 2005 Tower award
- 2006 Received a 10 Million Dollar Export Tower award
- 2007 Relocated the headquarters to the Gumi Plant
Registered patent regarding the recovery of cobalt compounds
Patented a method for making nickel compounds
Received a 20 Million Dollar Export Tower award

Growth 2008 ~ 2018

Expansion of the business

- 2010 Acquired the 2nd plant in Gumi
- 2011 Certified as a Technology Innovation-Oriented SME (INNO-BIZ)
- 2012 Patented a lithium compound recovery method
- 2013
- 2014 Selected as a New Growth Engine Company in Korea
- 2017 Established the Town Mining Resources Co., Ltd.
Achieved the first shipment of NCM solution (TMR)
Changed the majority shareholders of Huayou Cobalt
- 2018 Acquired the 3rd plant (Buksam)
Started production of lithium carbonate

Growth spurt 2019 to present

Became a leader in resource recycling

- 2021 Became a limited partnership with Asteran Milestone Private Equity Fund
- 2022 Changed the majority shareholders
- 2023 Completed the 3rd plant in Buksam
Changed the majority shareholders of IS Dongseo



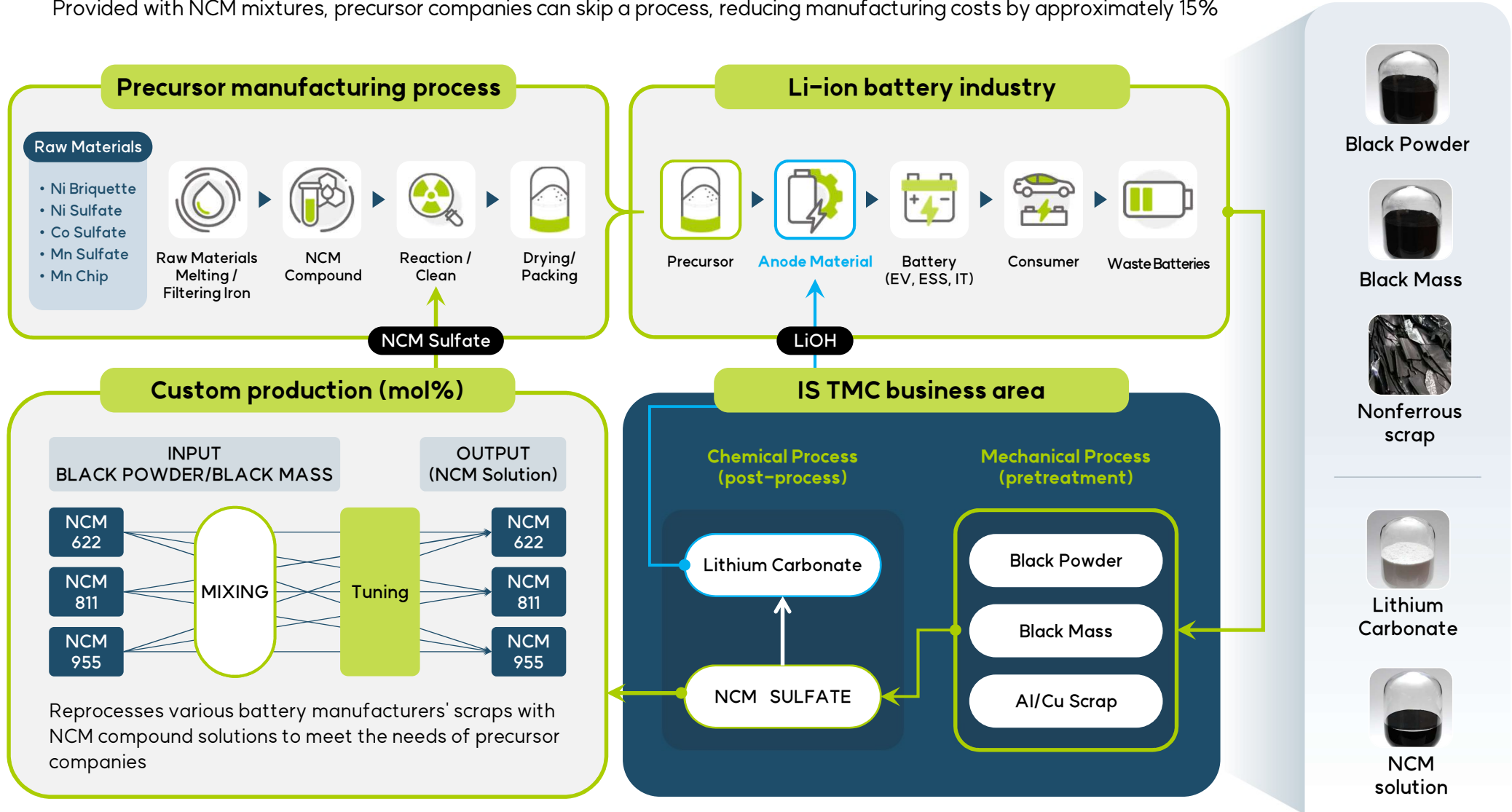
03 Projects

BUSINESS AREA

► Established the industry's first virtuous ecological cycle for waste batteries

Provided with NCM mixtures, precursor companies can skip a process, reducing manufacturing costs by approximately 15%

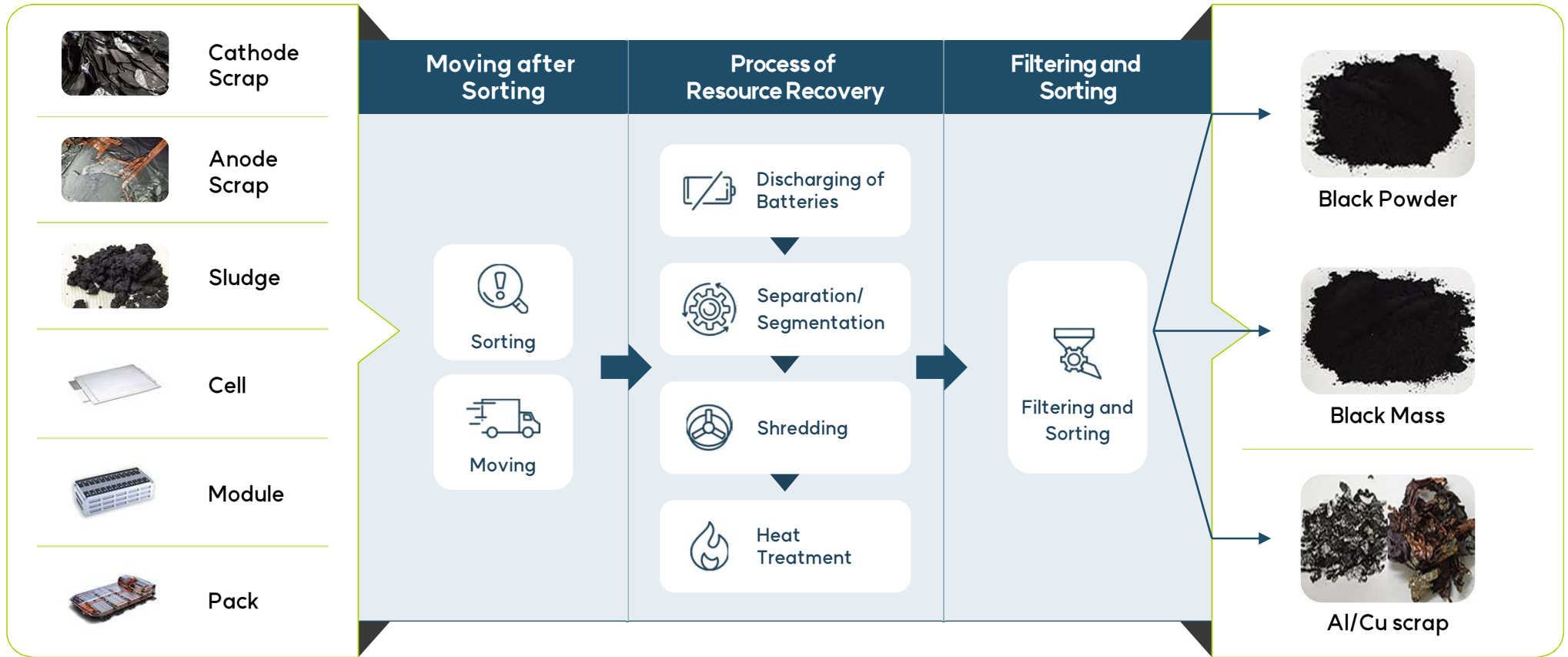
► Products



04 Process and products

▶ Pretreatment

Mechanical Process



· Analysis Report

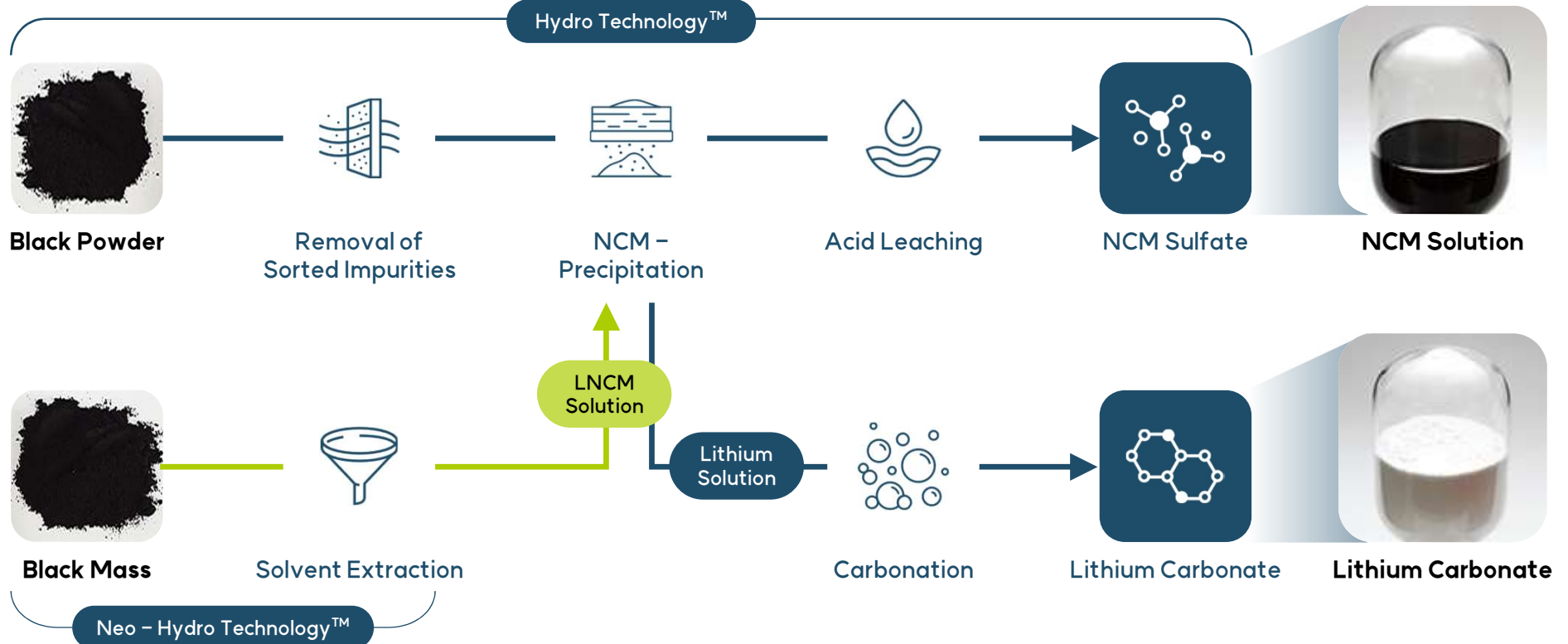
(Unit: %, ppm)

Test Item	NCM Content	Al	Fe	Ca	Mg	Cu	Zn	Cr
Black Powder	45.90%	4,900	300	1,000	700	100	100	-
Black Mass	28.00%	30,100	1,300	500	200	15,200	-	-

04 Process and products

► Post-process

Chemical Process



· Analysis Report

(Unit: %, ppm)

Test Item	Content	Al	Fe	Ca	Mg	Cu	Zn	Cr
NCM SO4	10~11%	≤2	≤2	≤30	≤20	≤2	≤2	-
Li2Co3	99%	54	16	731	111	12	10	-

05 Exceptional technologies

Leading the development of next-gen recycling technology with a number of its pioneering technologies and patents in Korea

▶ Patent list



Patent name	Application / registration no.
Preparation of nickel compounds from waste nickel compounds	No. 10-0329483
Lithium compound recovery from waste Li-ion battery anode materials	No. 10-1049937
Cobalt compound recovery from waste Li-ion battery anode materials	No. 10-0560005
Organometallic recovery from waste Li-ion battery anode materials	No. 10-1497041
Recovery of tin and nickel from ferrous (Fe) scrap containing tin compounds and nickel compounds	No. 10-1314746
Recovery of high-purity potassium iodide and boron compounds from wastewater produced during the manufacture of polarizing films	No. 10-1055395
Recovery of tin and nickel from scrap steel balls for barrel plating	No. 10-1291681
Recovery of high-purity potassium iodide and boron compounds from wastewater produced during the manufacture of polarizing films	No. 10-1407616

▶ R&D status



Major research accomplishments

- Recovered cobalt, manganese, and nickel from waste lithium batteries to develop semi-finished products for secondary battery precursors
- Recovered lithium from Li-ion batteries using a physical method to produce lithium carbonate
- Separated aluminum and cobalt from anode materials using a physical method
- Removed impurities from anode materials separated from Li-ion batteries for production and crystallization of cobalt sulfate

06 Plant status

State-of-the-art infrastructure that forms the foundation of circular economy

▶ IS TMC production infrastructure



The 1st Plant

Location	216, 1 Gongdan-ro, Gumi-si, Gyeongsangbuk-do	
Production line	Part 1	Module dismantling, discharging, units 1-3
	Part 2	Lithium Carbonate
Products	  	<p>Black Powder Black Mass Lithium Carbonate</p>
Remark	<ul style="list-style-type: none"> Completed in Jan 2006 Battery discharging/shredding Lithium carbonate production Lithium phosphate production 	




The 2nd Plant

Location	132-22 3gongdan 3-ro, Gumi-si, Gyeongsangbuk-do	
Production line	Part 3	Shredder, gas furnace, electric furnace
Products	 	<p>Black Powder Black Mass</p>
Remark	<ul style="list-style-type: none"> Completed in May 2010 Battery discharging/shredding Firing shredded products 	



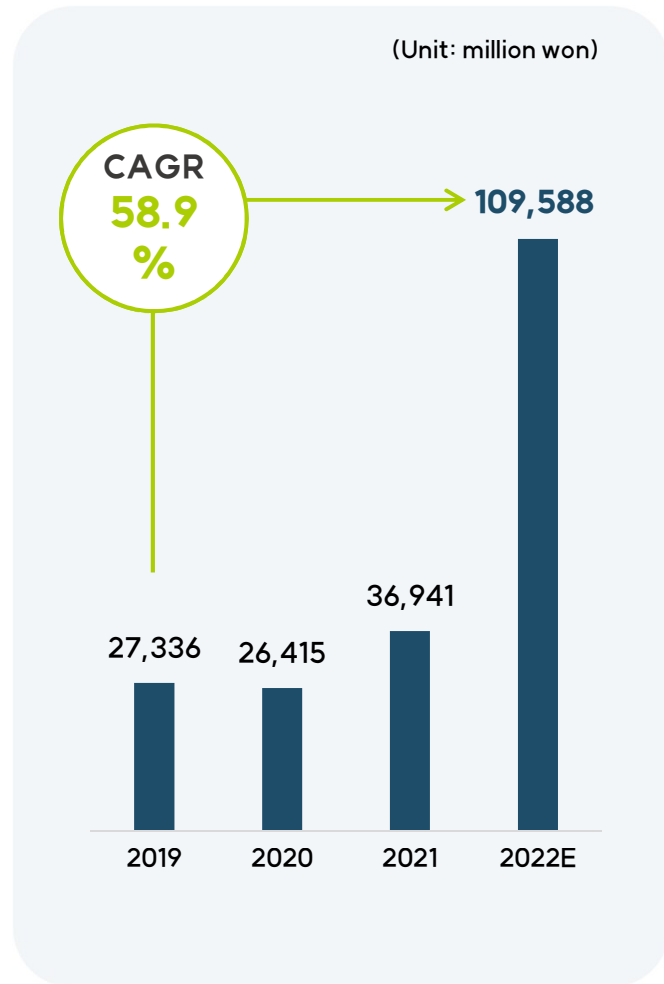
The 3rd Plant

Location	98 Gyeonghocheonseong-gil, Buksam-eup, Chilgok-gun, Gyeongsangbuk-do	
Production line	Part 4	NCMS-S
Products		<p>NCM Solution</p>
Remark	<ul style="list-style-type: none"> Completed in Apr 2022 Extracted NCM SoL 	

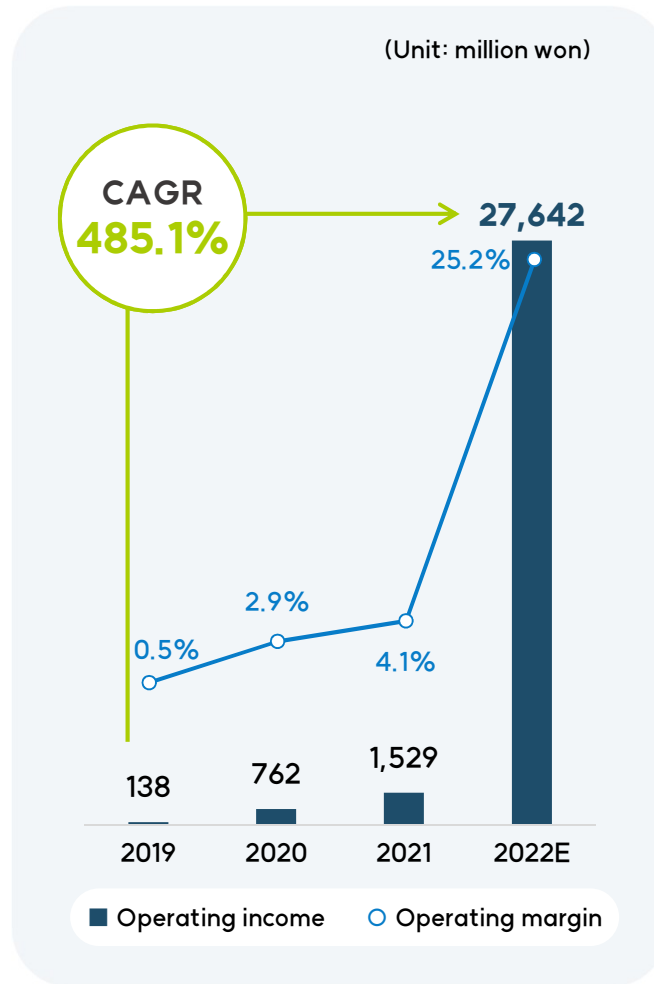
07 Business performance

Achieved annual growth of 58.9% in revenue, 485.1% in operating income, and 503.3% in net income over past 4 years

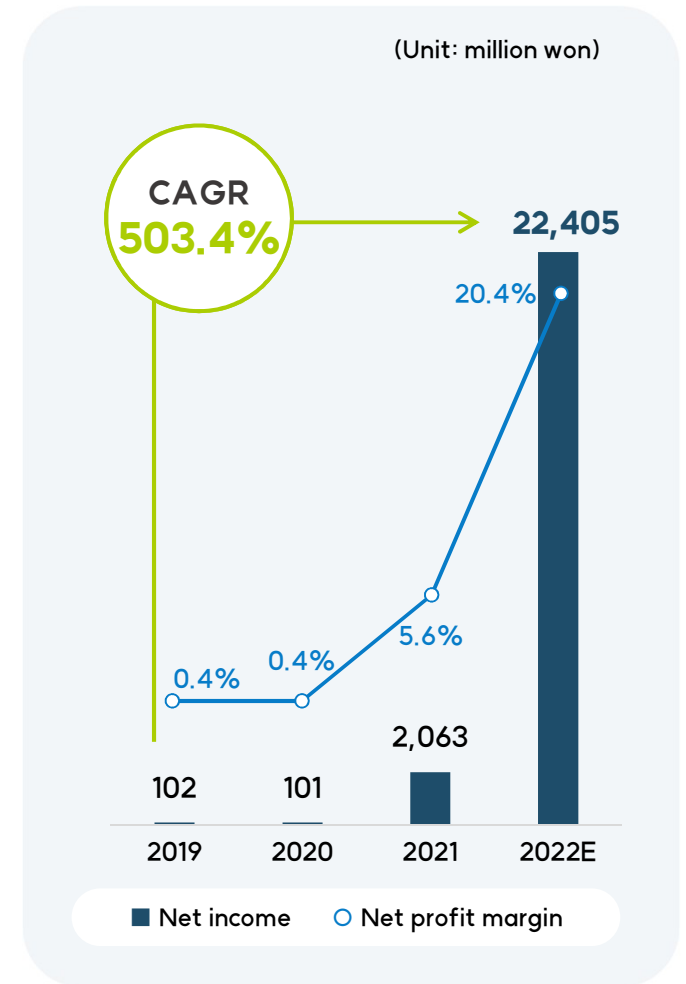
Sales



Operating profit (%)



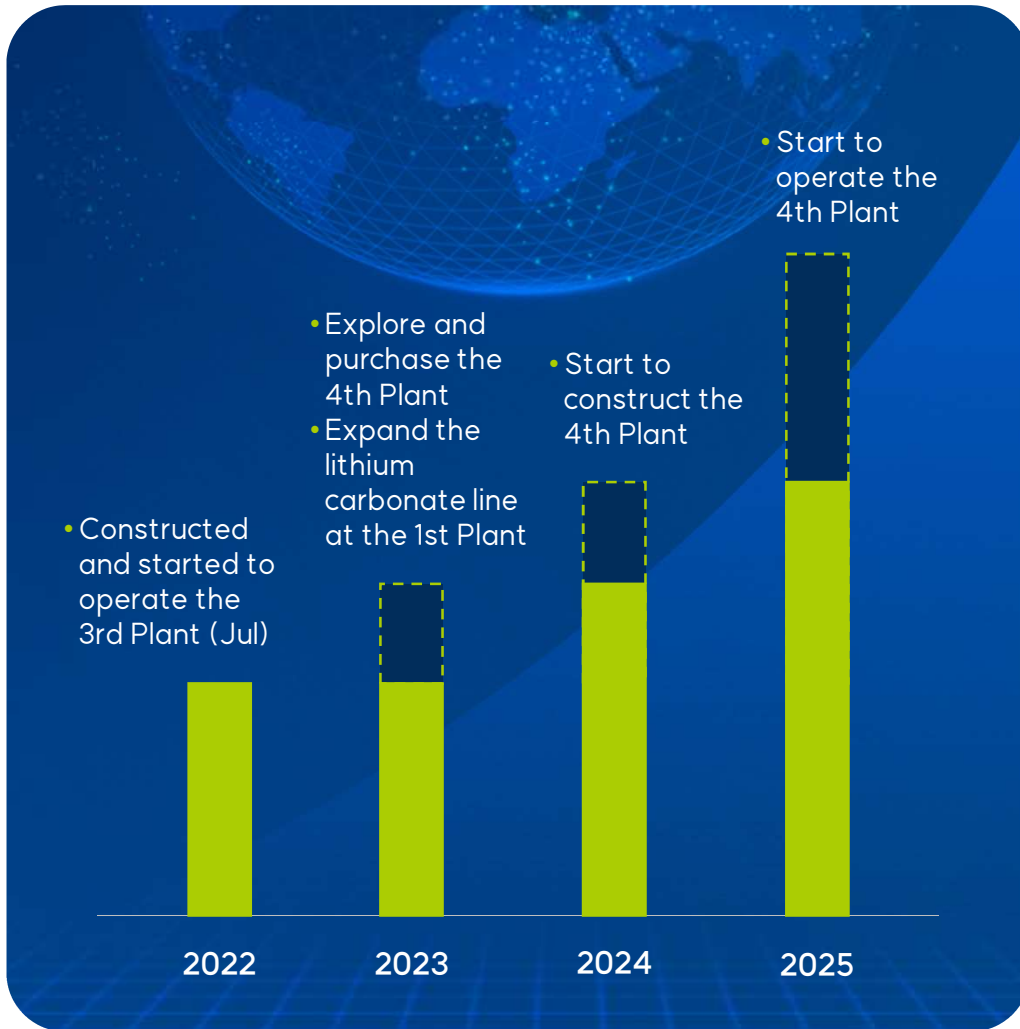
Net income (%)



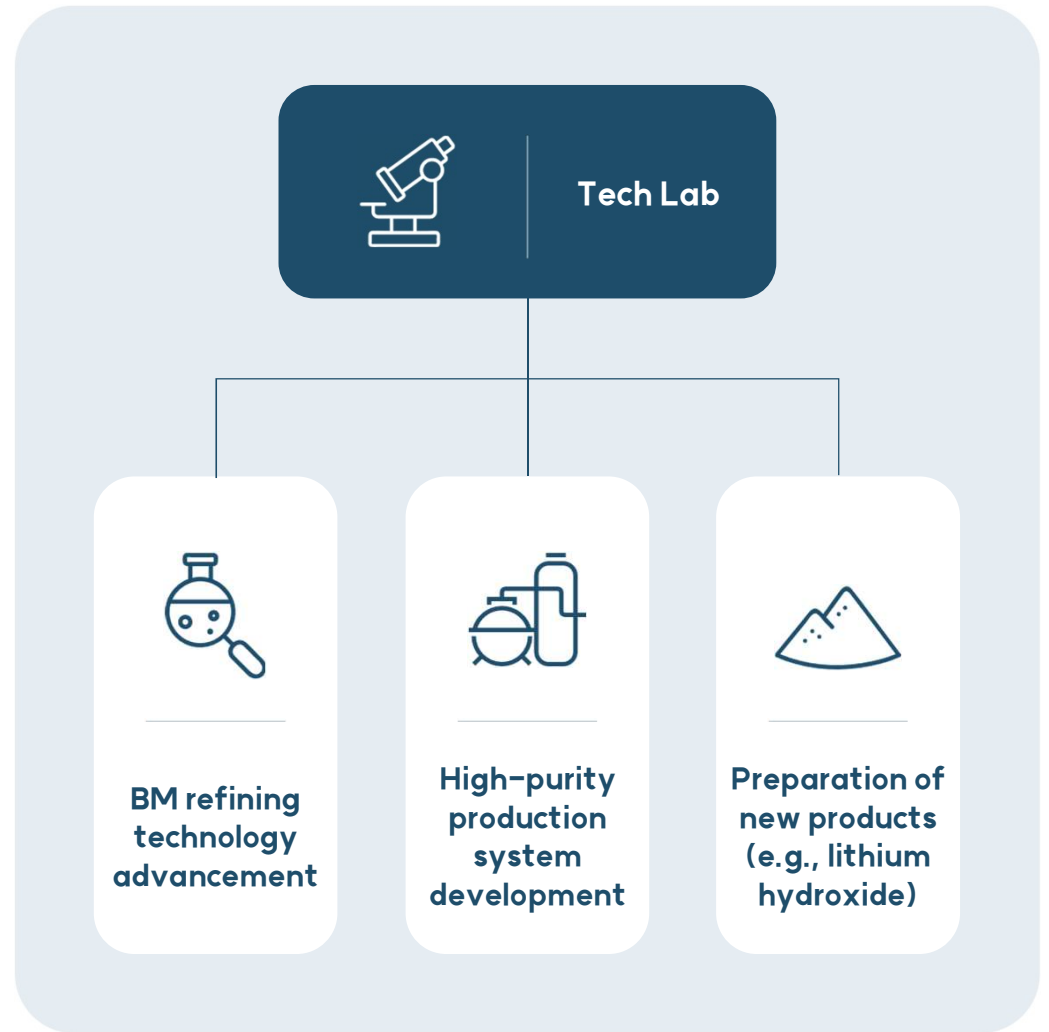
08 Future Development and Vision

Continue to invest in CAPEX and R&D to maximize production capacity and broaden the product portfolio

▶ CAPEX plan



▶ R&D plan



09 Comparison with competitors

TMC's enterprise value calculated by comparing with competitors

▶ Comparison against competitor financials (2022)

(Unit: 100 million won)

 성일하이텍(주)

 IS ISTMC

 Sebitchem (주)세빛캠

Category	SungEel HiTech	ISTMC	Sebitchem
Sales	2,699	1,096	481
Operating profit	483	276	102
Operating margin	17.9%	25.2%	21.2%
Net worth	2,912	534	631
EBITDA	573	294	113
EV/EBITDA	27.3	27.3~39.7	39.7
PER	39.2	35.6~51.8	53.8
PBR	5.3	14.9~21.8	6.6
Market capitalization*	15,354	7,976~11,616	4,147

* Aug. 30, 2023. Based on stock price



CHAPTER 03

IS Dongseo's Growth Strategy

1. IS Group strategy (2023)
2. Clients status
3. IS Group's mid- to long-term strategy



01 IS Group strategy (2023)

First in Korea to complete the waste battery recycling value chain from dismantling to productization of recovered materials



Business planning and general management

Recycle Value Chain

Secure raw materials

Pretreatment

Post-process

- Has the largest **scrap car network** in Korea – 40% M/S nationwide / 70% M/S in capital area
- Is the **only company in Korea** to own the **technology and facilities** for waste battery transportation, discharge, and dismantling
- **Dismantles 300–400 tons** of waste batteries every month
- **Built a partnership with full-production automakers**

- Built plants that **operate based on cutting-edge technology**
 - State-of-the-art facilities, highly efficient processes
- **Size of 8,077 m²** in Hwaseong, Gyeonggi-do
- **Construction starts in 2023**
 - Completion and test-operation scheduled
- Unit 1 has a processing **capacity of 7,000 tons** per year

- Batch pretreatment and posttreatment
- Production of **NCM solutions and lithium carbonate**
- **Korea's first** waste battery recycling company
- **Built a partnership with secondary battery companies**
 - Has a solid buying and selling **sales network**

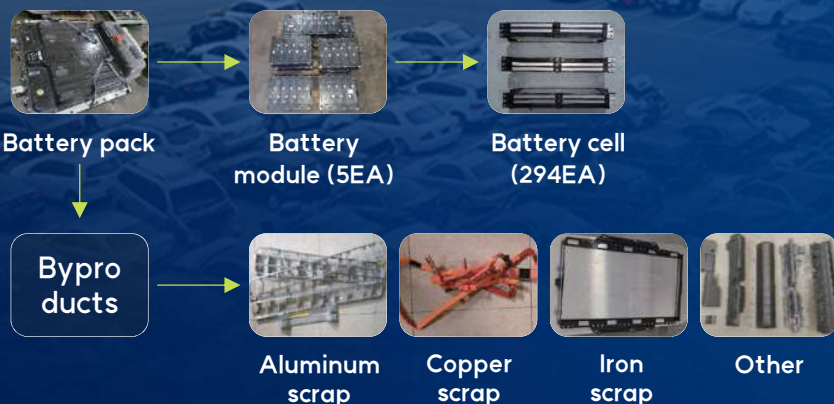
01 IS Group strategy (2023)

Insun Motors, Korea's the largest automotive resource recycling center

With the best vehicle dismantling & shredding technology and expertise in Korea, it emerged as a leader in the vehicle recycling industry by enhancing the value of junk and used cars



▶ KONA (EV) battery pack configuration



▶ Core competencies



The largest in Korea

- The largest dismantling and shredding facility in Korea
- Dismantles all type of cars amounting to 30,000 vehicles per year
- Shreds 450,000 (45%) out of 970,000 scrapped cars annually



Technical excellence

- Has the best technology in Korea for automobile dismantling and shredding with multiple patents
 - Achieved 98% recycling rate for scrap cars



Exceptional expertise

- Owns the only electric and hydrogen vehicle-dismantling technology in Korea
- Discharges/dismantles over 4,000 tons of waste batteries per year
- Supports government-commissioned EV battery retrieval project
- Establishes a safe transportation system for waste batteries



Robust network

- Built the largest network in Korea
- Established a national sales network for salvage recyclers
- Exports used cars and used parts to over 30 countries

01 IS Group strategy (2023)

The largest waste battery pretreatment production base in the metropolitan area

IS IS BM SOLUTION

Overview

- Location : Hwaseong-si, Gyeonggi-do
- Land area : 8,077m²

Capacity (by input)

- Unit 1: 1 ton/hr (7,000 tons/year)
- Unit 2: 1.1 tons/hr (7,500 tons/year)

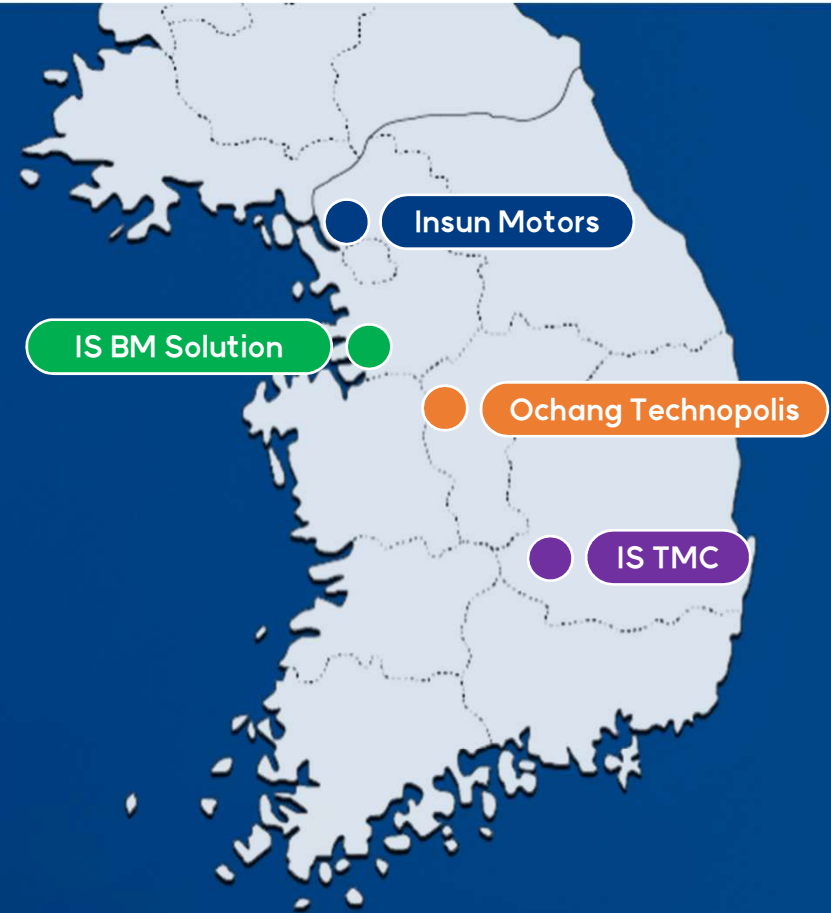
key points of Secondary battery business

- Waste recycler license (business place : general/designated)
- Target items : EV waste battery, waste secondary battery

Feedstock

- Unit 1: Battery cell
- Unit 2: Battery module

Blackmass Recovery : 95% or higher



► Waste battery recycling process



01 IS Group strategy (2023)

Lithion, a Tech Leader in New Green Technology for Waste Battery Recycling Market

Our differentiated battery recycling technology is revolutionizing the battery market with superior quality and resource recovery through differentiated battery recycling technology



Collaboration partners

- Partnered with GM raising an equity investment fund
- Partnered with Call2Recycle (the largest battery collection company in North America)

Technology

- Developed and patented eco-friendly wet recycling technology
- Preparing to launch a commercial plant near Montreal based on the current pilot plant

Exclusive license

- Secured exclusive domestic business rights for superior Lithion facilities and technology (2022)

► Process and features



Lithion Major benefits of pretreatment facilities

- Minimizes the risk of environmental pollution (e.g., wastewater and air pollutant emissions)
- Directly pretreat without discharge (explosion/fire risk ▼)
- Recovers at least 98% of Black Mass
- Handles any battery types and compositions



Lithion Major benefits of post-processing facilities

- Minimizes the risk of environmental pollution (e.g., wastewater and air pollutant emissions)
- Secures high recovery rates for valuable metals, such as lithium and nickel
- Recovers at least 95% of valuable metals
- Access to battery-grade raw materials

02 Clients status

Securing reliable and sustainable supply chain with trust-based partnerships



03 IS Group's mid- to long-term strategy

Become global top-tier company in the waste battery recycling industry

2023~

Strategically collaborated with domestic and foreign manufacturers to expand overseas locations
Built a global collaboration network centered on Lithion (technology) + IS Dongseo (operations)



• Target country



2023

Built a waste battery recycling value chain

• Secure raw materials



• Pretreatment



• Post-process



2025~

Establish a base for IS Dongseo's domestic and overseas waste battery recycling business



Large
99,000 m²
land area

Lithion
Technology

250 billion
funding

Building massive cutting-edge recycling infrastructure

INVESTOR RELATIONS 2023



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