China Hongqiao Group Limited
中國宏橋集團有限公司

China Hongqiao Group Limited

Carbon Reduction Action Report

May 2025

About This Report

This report is the first Carbon Reduction Action Report ("the Report") of China Hongqiao Group Limited (collectively referred to as "China Hongqiao", the "Group", or "we"). Following a "Governance - Strategy - Risk Management - Metrics and Targets" four-pillar framework, the Report discloses carbon reduction information covering the Group's carbon governance system, strategic transformation plan, climate-related risks and opportunities assessment, GHG emissions from operations (2020-2024), as well as energy-saving practices and progress.

Organisational Boundary for the GHG Inventory

The greenhouse gas (GHG) inventory in this Report adopts the operational control approach. It covers GHG emission data of China Hongqiao Group Limited (1378.HK) and subsidiaries over which it exercises operational control.

GHG Inventory Period

2020, 2021, 2022, 2023, 2024

Reporting Period

Some data in this Report may extend beyond the GHG inventory timeframe , including limited retrospective and forward-looking information where appropriate.

Reporting Scope

The management and operational information presented in this Report derives from China Hongqiao's publicly disclosed reports, official documents, consolidated operational records from the Group's subsidiaries over which it has operational control, as well as supplementary materials provided by stakeholders. Unless otherwise specified, currency units in this Report are denominated in Renminbi (RMB).This Peport is prepared in both Chinese and English. In case of any discrepancies between the Chinese and English texts, the Chinese text shall prevail.

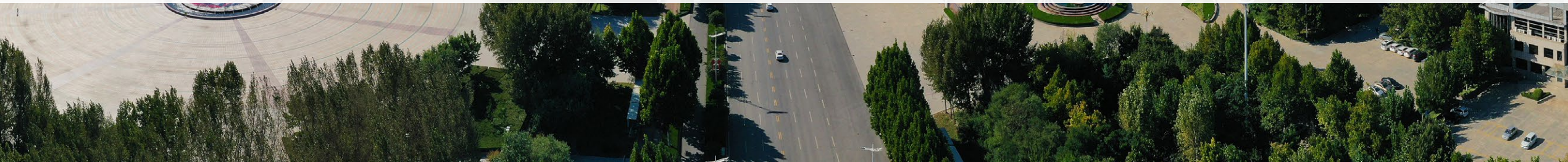
Reference

International Sustainability Standards Board (ISSB) - IFRS S2 Climate-related Disclosures;
Hong Kong Exchanges and Clearing Limited (HKEX) - Implementation Guidance for Climate Disclosures under HKEX ESG Reporting Framework;
GHG Protocol: Corporate Accounting and Reporting Standard.

Forward-Looking Statements

In addition to historical facts, this Report contains forward-looking statements regarding potential future events and descriptions, including but not limited to assumptions, preconditions, GHG emission targets, and carbon reduction action plans. Actual future outcomes or trends may differ from projections in this Report due to external variable factors. These forward-looking statements were made as at 14 May 2025, and China Hongqiao assumes no obligation to update any of the forward-looking statements contained herein.

Contents



Message from the Chairman

Mr. Zhang Bo, Chairman of the Board

The significance of advancing the "dual carbon" strategy goes far beyond achieving green and low-carbon development within a single company. More importantly, it lies in leveraging the Group's influence across the industry chain to build climate leadership and engage all partners in deep and collaborative carbon reduction efforts. By continuously promoting green and sustainable development, we aim to contribute actively to addressing global challenges such as climate change.

China Hongqiao always keeps pace with the times as a world-leading aluminum product manufacturer. Resonating dynamically with national strategies and powered by innovation, we firmly practice sustainable development. As a navigator in electrolytic aluminum production, China Hongqiao embraces its role as a pathfinder in reshaping the industry and addressing the defining challenge of climate governance. Centered on the strategy of "empowering green revolution with technology," we are accelerating the transition to clean energy (hydropower, wind power, and solar power), digitising operations through intelligent factories and full-process digital management, and developing a new energy-based lightweight industry alongside circular economy practices. These combined efforts are driving the aluminum industry toward high-end, sustainable solutions and have elevated China Hongqiao into a highly competitive, world-class enterprise.

Strategic leadership: a "three-step" approach for deep decarbonisation. Along our journey towards the "dual carbon" goals, we firmly implement the "three-step" strategy comprising initial decarbonisation, continuous decarbonisation, and deep decarbonisation–collectively referred to as the "2555 dual carbon goals", and steadily advance our dual carbon goals of peaking carbon emissions by 2025 and achieving net zero within our own operational scope by 2055. We anticipate that energy transition, green energy investments, and energy structure optimisation will enable around 60%-65% carbon reduction. By integrating climate risks into strategic decision-making, we identify risks and opportunities, and transform the pressure from developing low-carbon alternatives into drivers for technological innovation. The refined "decision-making-management-execution" three-tier sustainability governance framework clarifies the division of responsibilities, and contributes to a comprehensive sustainability management system. Simultaneously, we incorporate energy efficiency and environmental protection indicators into performance evaluations of executive members, which means that the compensation of senior management is directly linked to the outcomes of energy-saving projects, thus creating synergies for green and sustainable development.

Green transformation: optimising the energy structure while developing the circular economy. Driven by energy structure optimisation, we make unwavering efforts to create a green energy chain and develop a circular economy. We have been expanding downstream aluminum deep processing to promote operational efficiency across the board, and have achieved remarkable results in energy conservation and carbon reduction. In 2024, China Hongqiao utilised 17.932 TWh of renewable electricity, avoiding approximately 14.9283 million tonnes of CO_2e emissions. Through innovation-driven initiatives, we have advanced technological R&D and application, established low-carbon production and operational models across production systems, and created sustainable workplaces for employees and partners. Meanwhile, we have pioneered the practical application of low carbon technologies. In 2024, we achieved a breakthrough in bauxite residue (red mud) utilisation - increasing the comprehensive utilisation rate of bauxite residue to over 24% through advanced iron enrichment processes, with annual recycling exceeding 3.8 million tonnes. These green development initiatives have laid a solid foundation for achieving our net-zero emissions target.

Synergies in the ecosystem: whole-industry-chain collaboration for green development. We prioritise training environmental protection professionals, as they drive innovation and help the Group develop more eco-friendly as well as sustainable products and services. To fulfill our carbon reduction commitments, we leverage green finance as a powerful engine to seize sustainable development opportunities. As the industry leader, we are committed to driving progress across the entire supply chain, deepening domestic and international collaboration to advance low-carbon transformation and ecological conservation. Through relentless efforts, we aim to contribute to environmental protection, foster harmonious coexistence between the economy and ecology, and make green development a core driver of societal progress.

Openness and shared success: transparent disclosure and achievement sharing. Embracing openness and transparency, we have significantly enhanced external disclosures. We have proactively the Aluminum Stewardship Initiative (ASI) to advance green and sustainable development across the global aluminum value chain. To date, 11 subsidiaries including Zouping Hongfa and Binzhou Hongzhan have successfully obtained this internationally recognised accreditation for their environmental, social, and governance (ESG) practices. Our green development achievements have been widely recognised. China Hongqiao has been named "Energy Efficiency Leader" in the electrolytic aluminum sector, honored as a 2023 Forbes China ESG Innovation Enterprise and Excellent Case of New Quality Productivity, awarded Bloomberg's ESG Leading Enterprise - Outstanding Environmental Project Award and The SDG IMPACT's Excellence Award for Corporate.These accolades not only affirm our progress in sustainable development, but also motivate us to keep moving forward.

From foundational steps to transformative leadership. As a leader in the aluminum industry, China Hongqiao fully recognises that large scale brings greater responsibility. We consistently uphold scientific management and precision operations to ensure comprehensive and accurate collection and analysis of carbon emissions data. Moving forward, China Hongqiao will continue to leverage its role as an industry pioneer. Guided by our mission to maintain professional excellence, drive continuous innovation, prioritise people-oriented development, and advance green growth, we will deeply implement the practical requirements for developing new quality productive forces, and deliver tangible results to contribute our insight and strength to industry progress.

Report Highlights

Our Path to Carbon Reduction

2025

Peak the emissions within our own operational scope

2030

Continuously reduce the carbon intensity of primary aluminum

2040

The carbon intensity of primary aluminum is projected to decrease by **40%**, and the proportion of green electricity will increase from **0.45%** in 2020 to **70%**

2055

Achieving net zero within our own operational scope

The carbon intensity of primary aluminum is projected to approach **0**

Strategic Deployment

The initial decarbonisation period (2020-2030)

- Promote the relocation of production capacity to hydropower aluminum bases in Yunnan, accelerate investment in wind power and photovoltaic, optimising the energy structure;
- Improve the intelligent control level of aluminum electrolytic cell and apply advanced aluminum production technology;
- Focus on the development of recycled aluminum to improve resource utilisation efficiency.

The continuous decarbonisation period (2030-2040)

- Expand investment in green energy and increase the use of clean energy;
- Promote the low-carbon transformation of products and expand downstream aluminum processing;
- Apply advanced technologies to reduce carbon emissions and carry out trials of negative carbon technologies.

The deep decarbonisation period (2040-2055)

- Continue to optimise the energy structure transition and invest in off-site green power, and apply negative carbon technologies such as CCUS;
- Actively participate in carbon credit trading within the carbon market, using carbon removal and offset mechanisms to address residual emissions.

Four Major Transformation Paths

Business transformation

- Optimising energy structure
- Developing circular economy
- Expanding downstream processing

Operational transformation

- Improving operational efficiency
- Promoting technological innovation
- Implementing green office
- Applying carbon-negative technology

Organisational and cultural transformation

- Cultivating green talents
- Building green brands
- Fulfilling carbon emission commitments
- Developing green finance

Value chain transformation

- Boosting the development of the industry
- Leading the decarbonisation of the industrial chain
- Deepening multi-party cooperation
- Building a green ecosystem

01

Steadily Optimising Sustainability Governance

Governance Structure

Under the continuously refined "decision-making-management-execution" three-tier climate governance framework, China Hongqiao clarifies responsibilities at each level and has established a comprehensive sustainability governance system.

Decision-making level

The Board serves as the highest decision-making body for the Group's sustainable development and climate action initiatives, bearing primary responsibility for formulating sustainability strategies.

Members of the Board have professional backgrounds in risk management and financial management, and provide decision-making support in conducting climate risk assessment and carbon reduction management within the Group.

We established the Sustainability Committee (the "Committee") in March 2025 under the Board. The responsibilities of the Committee include guiding and formulating the Group's sustainability vision, goals, and strategies, overseeing policies and management in areas such as climate change, corporate social responsibility, and supply chain management, assisting the Board in assessing and optimising sustainability and ESG-related matters, regularly communicating with relevant committees, reviewing significant non-financial risks, discussing the effectiveness of risk management measures with the management team, and promoting exchanges with stakeholders. In addition, the Committee monitors ESG target implementation, reviews related reports, provides recommendations for improvement to ensure legal and regulatory compliance, and conducts research and tracking of other sustainability-related matters.

Management level

The Group's management is responsible for organising the assessment and management of climate issues and reporting climate-related information to the Board from time to time. The Group has been gradually carrying out research on the current situation, strategy formulation, risk management, identification and management of indicators and targets for the risks and opportunities that it may face as a result of climate change.

Execution level

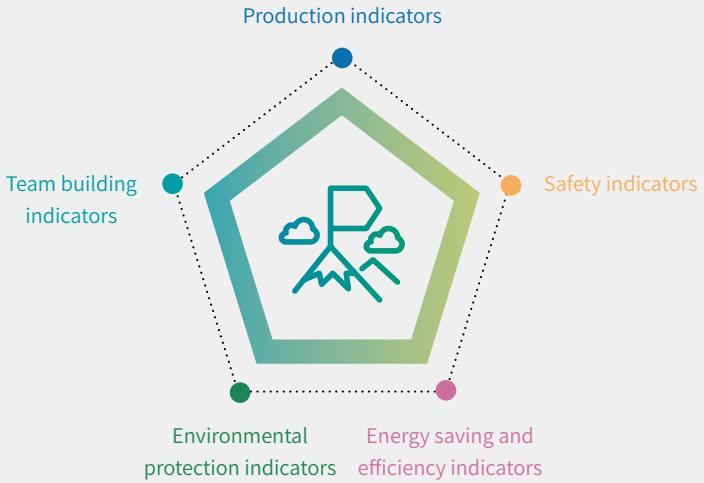
Functional departments and subsidiaries within the Group serve as the execution level responsible for implementing the carbon reduction initiatives assigned by the management.

Carbon reduction requires significant effort and investment but also presents opportunities for technological innovation and business transformation, laying a foundation for the future sustainable development. Therefore, the Board and the Committee are committed to integrating climate action into the Group's strategic planning and business operations, achieving sustainability through further improvement and innovation.

Performance-Linked System

Energy efficiency, environmental protection, and other climate-related indicators are incorporated into the performance evaluation system for management at all levels, and the senior executives' compensation is linked to the implementation and effectiveness of energy-saving and emission-reduction projects. Furthermore, the energy saving and emission reduction targets are decomposed and reflected in the performance salary assessment of employees, and guidance and assistance are given to employees who perform poorly in the assessment to ensure that employees from management to grassroots level fully realise the importance of the dual-carbon (carbon peak and carbon neutrality) initiatives, fostering smooth progress in achieving our climate objectives.

Types of Performance Assessment Indicators for Senior Executives



02

Carbon Reduction Strategy

The international community has worked collaboratively to address the urgent issue of global climate change, and has built a solid cooperation framework comprising the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and multiple other international agreements. In 2015, the Paris Agreement became a significant milestone in global climate governance. It set the goal of keeping the global temperature rise well below 2° C above pre-industrial levels and pursuing efforts to limit the temperature increase even further to 1.5° C. Countries were also committed to putting forward nationally determined contributions based on their national situations and jointly reducing GHG emissions. In the future, continued cooperation and innovation in technology and policy will be key to achieving global climate goals.

China has demonstrated its firm determination and sense of responsibility as a great power in addressing global climate change. On September 22, 2020, President Xi Jinping announced at the General Debate of the 75th Session of the United Nations General Assembly the aim to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060, known as the "3060" goals. The goals have been incorporated into the 14th Five-Year Plan and the Long-Range Objectives Through the Year 2035, which means that China has made carbon peak and neutrality a national strategy. To achieve the ambitious goals, China has launched the "1+N" policy system. "1" represents the Working Guidance for Carbon Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy, which, as the top-level design and overall framework of policies, clarifies the connotation, basic path, and key tasks of the "dual carbon" goals. "N" refers to a series of specific policies and plans formulated by various departments and local governments according to the requirements of the above document, covering key areas such as energy and industry, as well as support systems such as technology and finance. The policy system not only demonstrates China's leadership in global climate action but also indicates China's firm determination to promote green and low-carbon transition and build a clean energy system.

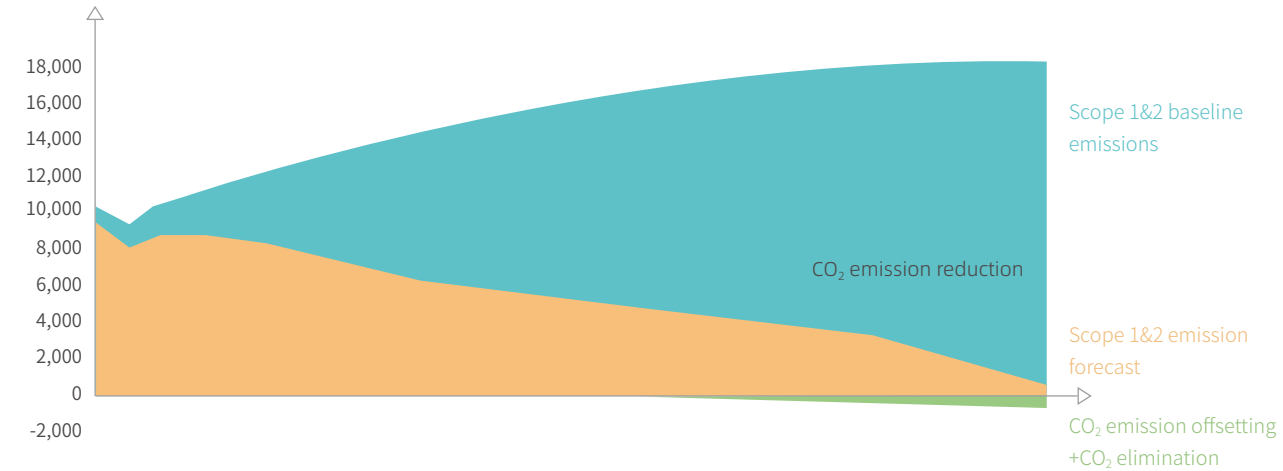
As a leading enterprise in the aluminum industry, China Hongqiao actively responds to national policies and goals and the trend of the times. Deeply practicing the sustainable development concept that "lucid waters and lush mountains are invaluable assets", China Hongqiao actively deals with climate change while planning and promoting its green and low-carbon transition with high standards. Carbon reduction actions have been launched throughout the entire process of investment, construction, production, and operation.

Strategic Goals

We announced the Group's dual carbon goals to the whole society, under the current business framework, peak the carbon emissions by 2025 and achieving net zero within our own operational scope by 2055. In addition, we hope to work together with all partners along the upstream and downstream of the value chain to create a net-zero alliance.

Taking into account trends in policy changes, feedback from carbon markets, the current state of technology, and breakthrough innovations, and based on the results of the carbon inventory and the Group's development plans, we have conducted exploratory forecasting analysis of the carbon emissions generated within our operational scope. In the future, we will continue to refine our forecasting methods in accordance with regulatory requirements and gradually conduct climate scenario analysis.

Carbon Neutrality Roadmap



Transformation Paths

Based on the characteristics of its greenhouse gas emissions and the specifics of the industry, China Hongqiao has formulated multiple key initiatives for carbon reduction, with business transformation as the strategic direction, operational transformation as the critical focus, organisational and cultural transformation as the capability support, and value chain transformation as the expansion path, so as to achieve China Hongqiao's "dual-carbon" goals.

Business transformation

We focus on optimising the energy structure, developing the circular economy, and expanding downstream processing to systematically advance business.

Operational transformation

We aim to achieve comprehensive carbon reduction and transformation by improving operational efficiency, promoting technological innovation, implementing green office, and applying carbon-negative technologies, etc.

Organisational and culture transformation

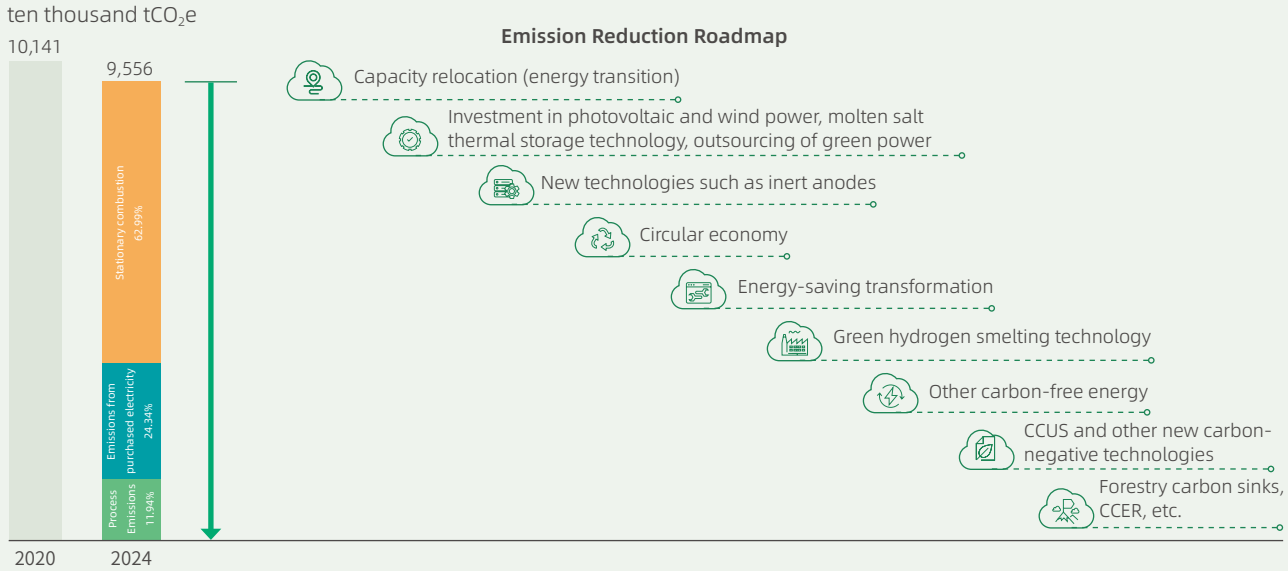
We strive to enhance the ability to seize sustainable development opportunities by cultivating green talents, building green brands, fulfilling CO_2 emission commitments, and developing green finance.

Value chain transformation

We work to leverage our influence as a leading enterprise to drive the low-carbon transformation of the entire value chain by boosting the development of the industry, leading the decarbonisation of the industrial chain, deepening multi-party cooperation, and building a green ecosystem.

Strategic Deployment

China Hongqiao will adhere to the principle of "taking direct carbon reduction as the priority and carbon removal and carbon offsets as the auxiliary measures". Since carbon emissions are mainly derived fossil fuel combustion, the first step is energy structure optimisation, that is, significantly increasing the proportion of green electricity while reducing the use of fossil energy such as coal; secondly, focusing on product optimisation, so as to promote products with relatively lower carbon intensity, primarily for circular economy and downstream processing; in addition, improving operational efficiency and applying leading technologies to realise carbon reduction and reduce energy consumption; eventually, carbon removal methods may be deployed as a supplementary means to achieve carbon neutrality.



Under the goal of achieving carbon neutrality within the Group's operations by 2055

Carbon reduction by energy structure optimisation (through capcacity relocation, investment in green energy, and optimisation of energy structure) accounts for around **60%-65%**;

Development of circular economy and the expansion of downstream processing contribute around **10%-25%**;

Improvement of operational efficiency and the promotion of technological innovation account for around **15%-20%**;

And the application of negative carbon technologies and carbon credit offsets contribute around **5%-10%**.

China Hongqiao will follow the "three-step" strategy to steadily advance the "25/55" dual-carbon goals.

01 The initial decarbonisation period (2020-2030)

The carbon emissions from the Group's operation peak by 2025 and the carbon intensity of primary aluminum will continue to decline.

Key strategies: We have completed a comprehensive carbon emission inventory and formulated a strategic plan for carbon neutrality. In view of the high proportion of fossil fuels, a priority will be given to energy structure transformation in the initial stage. On the one hand, efforts will be made to promote the relocation of production capacity to hydropower aluminum bases in Yunnan . On the other hand, we will increase investment in wind power and photovoltaic power, so as to gradually replace fossil fuels with clean energy and optimise the energy structure of China Hongqiao's production bases in Shandong, Yunnan, and overseas. Meanwhile, China Hongqiao will focus on improving operational efficiency, upgrading intelligent control of aluminum electrolytic cells, and applying advanced technologies for aluminum production. In addition, China Hongqiao will prioritise recycled aluminum to develop a circular economy. Through a series of efforts, China Hongqiao aims to peak its carbon emissions from its operations (Scope 1 and Scope 2) by 2025 and continuously reduce the carbon intensity of primary aluminum by 2030 under the current business model .

02 The continuous decarbonisation period (2030-2040)

The carbon intensity of primary aluminum is projected to decrease by **40%,** and the proportion of green electricity increase from **0.45%** in 2020 to **70%**.

Key strategies: Clean energy technologies such as green hydrogen and production technologies like inert anodes are expected to be mature at this period. Therefore, based on the solid foundation formed in the initial decarbonisation period, China Hongqiao will take three major measures to continue its carbon reduction efforts. First, China Hongqiao will further increase investment in green energy sources, such as wind and solar power,while applying mature clean energy technologies like green hydrogen; Second, China Hongqiao plans to drive product transformation, promoting products with lower emission intensity such as recycled aluminum, while developing downstream aluminum product processing; Third, China Hongqiao will focus on the application of advanced technologies like inert anodes and pilot the use of negative carbon technologies such as CCUS, laying the foundation for subsequent carbon neutrality.

03 Deep decarbonisation period (2040-2055)

By 2055, the carbon intensity of primary aluminum is projected to approach **zero**, and the Group's operations will achieve carbon neutrality.

Key strategies: In the first two periods of decarbonisation, China Hongqiao aims to apply mature new technologies to maximise the use of clean energy. In this period, the Group will focus on tackling hard-to-abate residual emissions to achieve deep decarbonisation. As such, China Hongqiao will continue to optimise its energy structure transition and invest in off-site green power. With the support of negative emission technologies such as CCUS, we will actively participate in carbon credit trading within the carbon market, using carbon removal and offset mechanisms to address residual emissions and achieve carbon neutrality in our operations.

03

Enhancing Climate Risk Management for Sustainable Development

In the face of increasingly stringent global sustainability policies targeting the industry, China Hongqiao addresses climate change-related opportunities and challenges with strategic foresight. We have integrated carbon reduction into strategic decision-making, and initially established a sustainability risk and opportunity management system, which has been incorporated into the Group's risk management framework. By identifying, assessing, and responding to climate-related risks and opportunities, we transform the pressure arising from low-carbon transformation into driving forces for technological innovation. While strengthening operational resilience, we endeavor to seize the high ground in green aluminum production, and convert risk management capabilities into competitive edges in the market.

The Sustainability Risk Management Process

Risk Identification	Analysing physical risks (e.g., extreme weather) and transition risks (e.g., policy constraints) that each business segment may face in the short, medium, and long term based on actual climate data and future projections, while simultaneously identifying potential opportunities in the low-carbon transformation.
Risk Assessment	Organising climate risk analysis sessions to integrate climate risk assessment into the sustainability risk assessment framework, and assessing the severity and possibility of risks and opportunities across different time horizons.
Risk Response	Formulating climate response measures based on the assessment results, clarifying carbon reduction action plans, and implementing concrete initiatives to enhance climate resilience.
Risk Monitoring	Establishing a climate indicator monitoring and early-warning mechanism (e.g., carbon emissions, losses caused by disasters) to track progress and report any anomalies, ensuring that risks remain under control.

Under the guidance of *the United Nations Framework Convention on Climate Change (UNFCCC), the Implementation Guidance on Climate Disclosures under HKEX ESG Reporting Framework*, and other climate-related guidelines, the Group is progressively enhancing its risk management processes. We prioritise the identification of climate-related risks, and the assessment of their potential impact on the Group's long-term sustainability, based on which we formulate appropriate response strategies to integrate risk management closely with corporate governance. With reference to the Shared Socioeconomic Pathways (SSPs) scenario analysis framework released by the Intergovernmental Panel on Climate Change (IPCC), the Group has selected two climate scenarios - SSP1-2.6 (low emissions scenario) and SSP5-8.5 (high emissions scenario) - to preliminarily identify two physical risks, four transitional risks, and three potential market opportunities. In the future, the Group will continue to deepen its climate scenario analysis and conduct financial impact assessment of climate-related risks and opportunities. By leveraging risk management, we aim to drive green transformation and comprehensively enhance our climate resilience.

2
physical risks

4
transition risks

3
potential opportunities

04

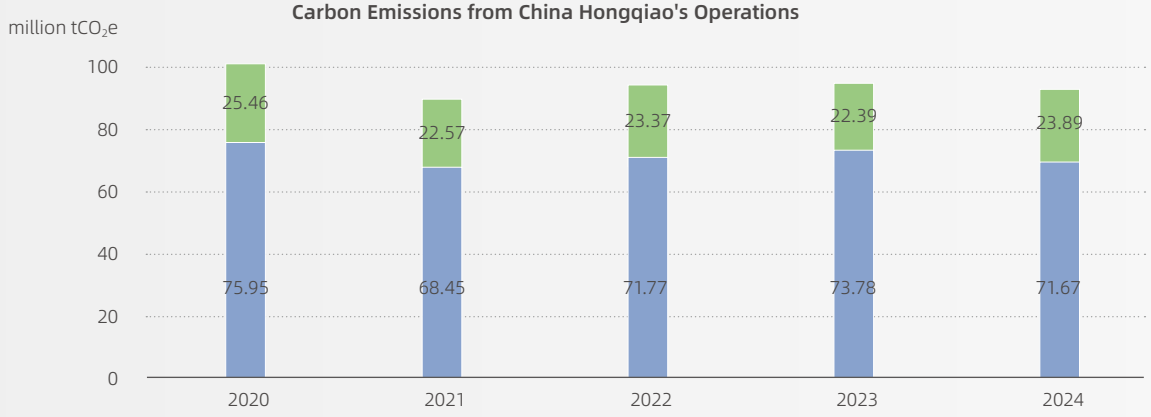
Progress of Carbon Reduction Action

GHG emissions from China Hongqiao's operations belong to Scope 1 direct emissions and Scope 2 indirect emissions. To be specific, our emissions are from the combustion of fossil fuels in stationary and mobile sources, production processes and fugitive emissions in Scope 1, as well as emissions of purchased heat and electricity in Scope 2. We have conducted a thorough inventory of GHG emissions from our operations for the period 2020-2024. The inventory adopts the operational control approach[1], and the organisational boundary is China Hongqiao Group Limited and its subsidiaries over which it has operational control. There are seven types of greenhouse gases included: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF_3), and sulfur hexafluoride (SF_6). To meet the requirements of ISO 14064-1:2018, we ensure the accuracy, relevance, completeness, consistency, and transparency of quantification[2]. Considering the actual availability of data and the cost, we utilise the emission factor approach to quantify GHG emissions.

Carbon emissions = Activity × Emission factor

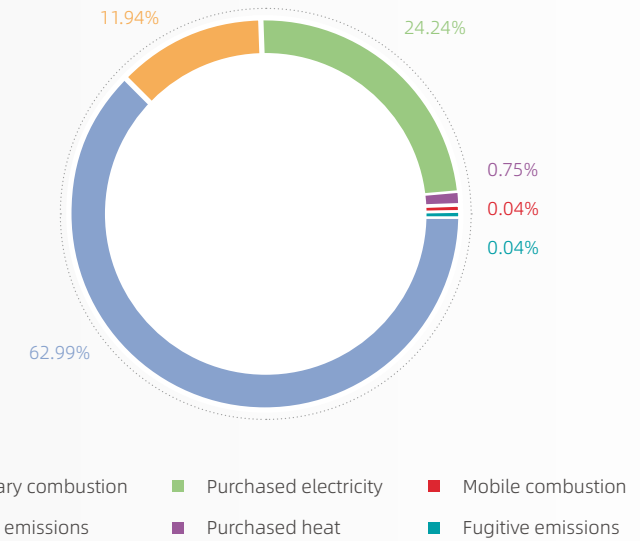
In 2020, the total GHG emissions from our operations were 101.41 million tCO_2e. There was a significant decline in 2021 due to factors such as capacity relocation. In 2022 and 2023, emissions rebounded to 95.14 million tCO_2e and 96.17 million tCO_2e due to increased production in electrolytic aluminum, alumina, and aluminum deep processing, coupled with the launch of lightweight and recycled aluminum businesses. In 2024, emissions slightly decreased to 95.56 million tCO_2e, which was mainly attributed to changes in Scope 1 emissions. The Group's operational CO_2 emissions from stationary combustion, purchased electricity and process emissions accounted for more than 99% of the total.

Carbon Emissions from China Hongqiao's Operations



	2020	2021	2022	2023	2024
Scope 2 Emissions (million tCO_2e)	25.46	22.57	23.37	22.39	23.89
Scope 1 Emissions (million tCO_2e)	75 .95	68.45	71.77	73.78	71.67
Total Emissions of Scope 1 & 2 (million tCO_2e)	101.41	91.02	95.14	96.17	95.56

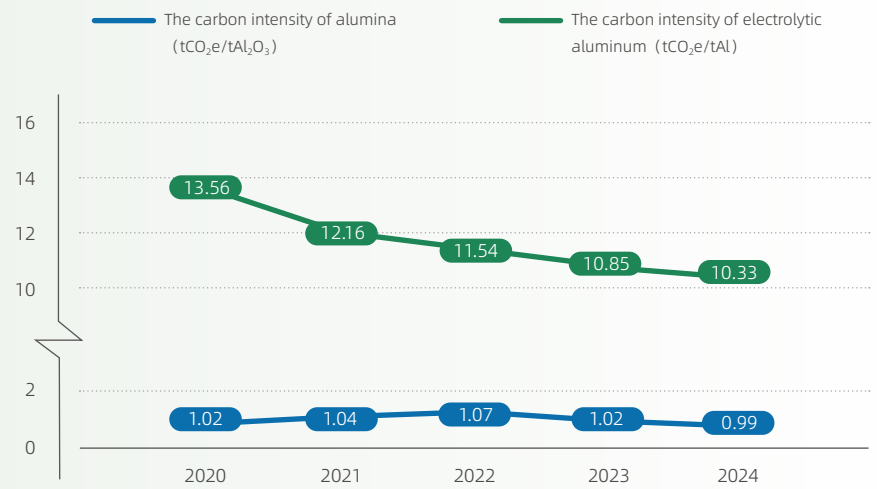
The Proportion of Various Types of Carbon Emissions within Operational Scope in 2024



[1]Operational control approach: A company has operational control over an operation if the former or one of its subsidiaries has the full authority to introduce and implement its operating policies at the operation. (https://www.openriskmanual.org/wiki/GHG_Accounting_Operational_Control_Approach)

[2] The carbon inventory was performed in accordance with applicable standards. After accounting and calibration procedures, the final data demonstrated a margin of ≤ 5%, ensuring the reliability and reference value of the results.

From 2020 to 2024, among China Hongqiao's major products, the emission intensity of alumina fell from **1.02** tCO_2e/ tAl_2O_3 to **0.99** tCO_2e/ tAl_2O_3. Due to the implementation of energy-saving and carbon-reduction measures such as capacity relocation, technological innovation, and energy-efficiency renovation, the emission intensity of electrolytic aluminum showed a year-on-year downward trend, dropping to **10.33** tCO_2e/ tAl in 2024, a significant **23.82%** decrease compared to the data of 2020.

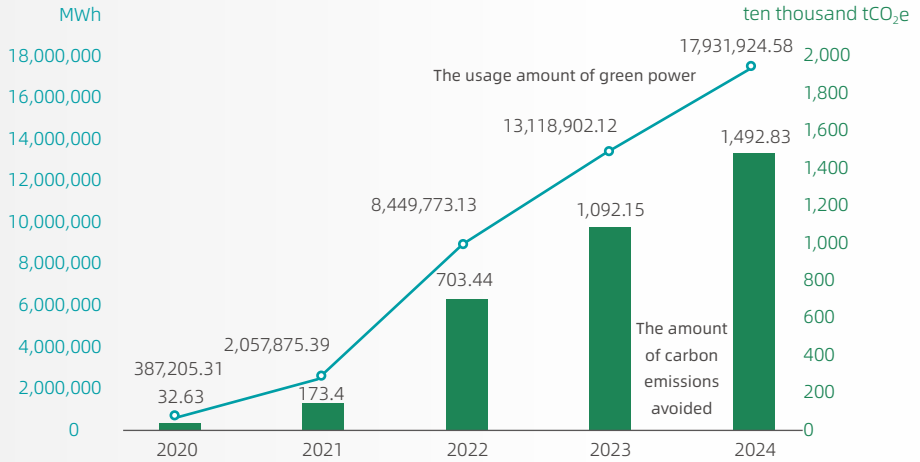


The subsidiaries of China Hongqiao that have been included in the list of national carbon emission enterprise list have gone through two complete carbon trading compliance cycles. They have produced GHG emission reports as required by the competent authorities and strictly implemented compliance requirements. Beihai New Material was rated as a progressive enterprise in the national carbon market in 2023.

Energy Structure Optimisation

China Hongqiao is committed to building a green energy chain. Through capacity relocation, investment in clean energy, and expansion of green electricity procurement, we reduce the proportion of fossil energy while increasing that of clean energy such as hydropower, solar power, and wind power, so as to gradually optimise the energy structure. From 2020 to 2024, the consumption of green power has been climbing steadily, contributing to a new mixed energy structure. **In 2024, the Group's green power consumption reached a new high of 17.932 TWh, 4.8 TWh higher compared to that of 2023. About 14.92 million tCO_2e of carbon emissions were avoided by the use of green power.**

The Usage Amount of Green Power and the Amount of Carbon Emissions Avoided



Case study Capacity relocation for green electrolytic aluminum

Yunnan Province is rich in green energy such as hydropower, wind power, and solar power. In response to the national "dual carbon" goals, China Hongqiao has been planning to relocate parts of the electrolytic aluminum capacity from Shandong Province to Yunnan Province since 2019. We have planned the green electrolytic aluminum project with a capacity of 3.96 million tonnes, accounting for more than 60% of the total electrolytic aluminum capacity. In 2024, the Group produced around 1.49 million tonnes of electrolytic aluminum at the Green Aluminum Industrial Park located in Wenshan, Yunnan and the proportion of green electricity consumption water over 80% of the total. In the future, we will gradually increase electrolytic aluminum production at the Yunnan Wenshan Industrial Park.The 1.93 million tonnes electrolytic aluminum project of the Green and Low-Carbon Industrial Demonstration Park in Honghe, Yunnan has been under construction since 2022 as scheduled. Through the coordinated layout of "wind, solar, hydropower, storage and forests" and carbon reduction projects in industrial parks. These efforts aim to open up new avenues for green aluminum innovation and further enhance the clean production standards of China's aluminum industry.

Yunnan Green Aluminum Innovation Industrial Park

Case study Developing new energy power generation for green transition

The wind-solar-storage integrated new energy project in Yunnan: China Hongqiao is developing a wind-solar-storage integrated new energy project with a total installed capacity of 4 GW in Honghe Prefecture and Wenshan Prefecture, Yunnan Province. The first batch of 19 solar projects have all commenced construction while the second batch of 18 projects have started preliminary procedures and EPC construction bidding. By 31 December, 2024, some solar power stations of the project have been connected to the grid for power generation. The solar project (I) covers an area of 283.13 acres, with an installed capacity of 0.192 GW. It is expected to generate 290 GWh of electricity annually, saving about 90,000 tonnes of standard coal and reducing carbon emissions by about 234,000 tonnes each year.

China Hongqiao's new energy solar project in Yunnan (1)

China Hongqiao's new energy solar project in Yunnan (2)

China Hongqiao's new energy solar project in Yunnan (3)

Yunnan Hongtai's distributed solar project: Yunnan Hongtai and its partners installed a distributed solar power generation project with a total capacity of 60.49 MW on the rooftop space of the plant area. This project utilises the roofs of over 40 workshops and buildings to install photovoltaic modules. The photovoltaic project in this area effectively utilises the idle space on the roofs and fully consumes its power generation. The project was constructed in four phases, with the first and second phases fully connected to the grid in 2022, and the third and fourth phases fully connected to the grid in 2023, achieving direct supply of photovoltaic power to electrolytic aluminum smelting technology applications.

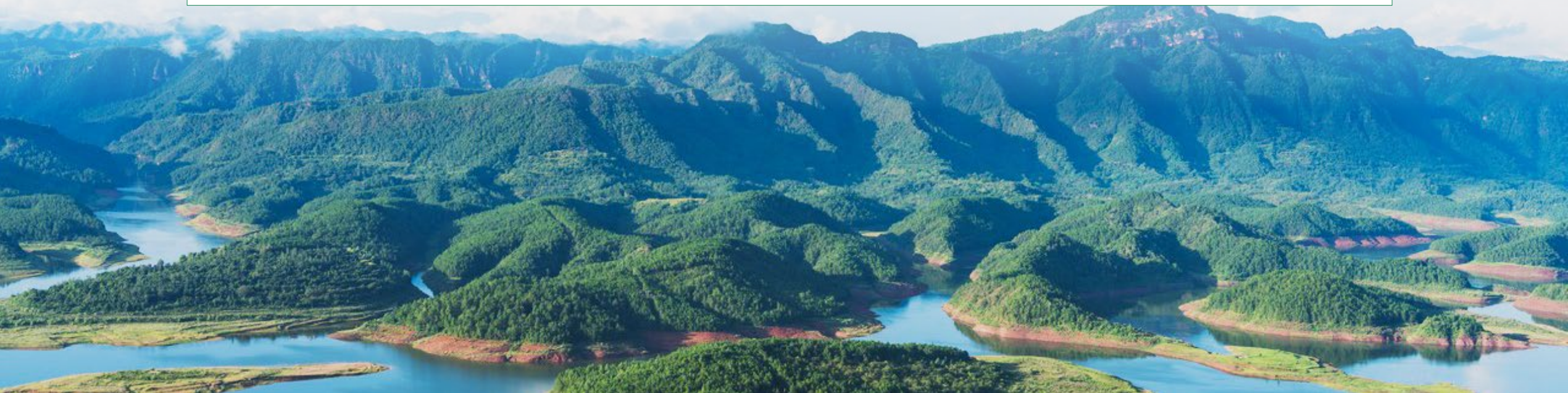
Rooftop solar panels installed at Yunnan Hongtai

In addition, our electrolytic aluminum and aluminum deep processing plants in Shandong have also been installed with rooftop solar panels. The distributed solar power generation system utilises rooftop space to gradually increase the proportion of green power consumption in production. We will continue to explore the possibility of promoting distributed photovoltaic projects with our partners to accelerate the transition to clean energy.

Rooftop solar power generation at Shandong Hontron

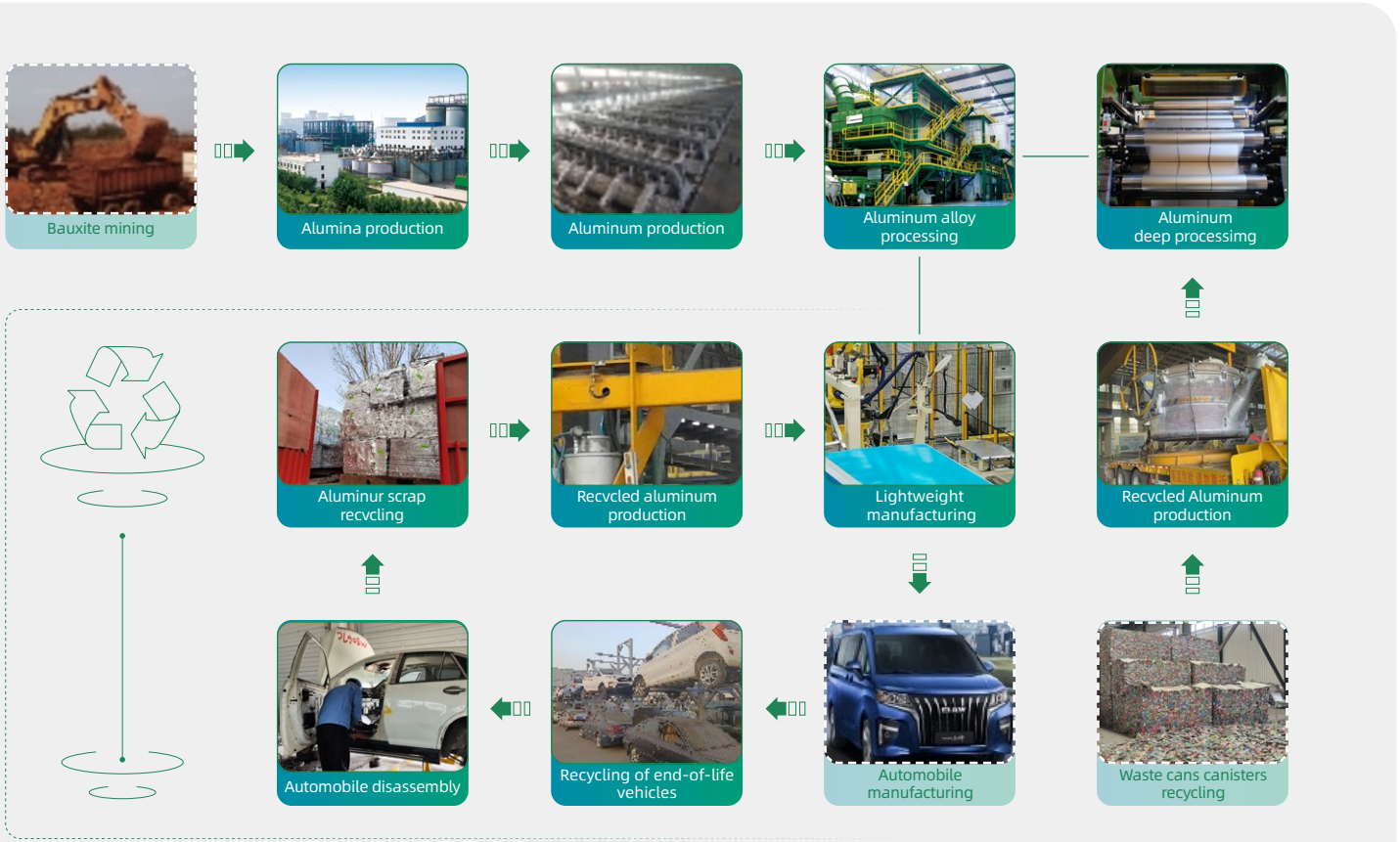
Case study The molten salt energy storage and steam supply pilot project facilitates new energy consumption, energy saving and emission reduction

For the industry's struggle of fluctuating loads of new energy power generation and increasing consumption pressure for the grid, China Hongqiao plans to launch a molten salt energy storage and steam supply pilot project in Zhanhua District, Binzhou City. Leveraging the advantages of high-temperature molten salt energy storage, such as its large heat storage temperature difference, high heat storage density, good heat transfer performance, stable working status, and low cost, the project aims to create a collaborative peak-shaving mode combining molten salt energy storage and solar power generation, which upgrades the traditional "electricity peak-shaving" to "electricity-thermal energy peak shaving". The project's 500MW capacity electric heater guarantees continuous operation for more than 6 hours and 24-hour high-pressure steam supply, with a maximum of 300 tonnes/h and an annual supply of about 950,000 tonnes. It effectively resolves the conflict between continuous high-pressure steam production and fluctuating new energy power supply. The project has started the bidding and design processes. Upon operation, the Group will establish a unique new energy consumption model combining solar, grid peak shaving, electrode boilers for low-pressure steam and molten salt energy storage for high-pressure steam. It is expected to absorb approximately 0.81 TWh of solar power annually, saving a total of around 100,000 tonnes of standard coal and reducing carbon emissions about 260,000 tonnes. The project provides a both technically and economically optimal path for high-energy-consuming industries to deeply replace energy with green one.



Circular Economy Development

The recycling of green and low-carbon aluminum has become a key way for the global aluminum industry to achieve sustainability. China Hongqiao is actively advancing circular economy practices. A complete closed-loop industrial chain has been established, which covers bauxite mining, alumina production, electrolytic aluminum production, aluminum alloy processing, lightweight manufacturing, vehicle dismantling and recycled aluminum processing. We also maximise resource utilisation and minimise waste emissions through the recycling of resources and effective waste treatment. These measures not only reduce production costs and ease environmental pressure, but also lay a solid foundation for sustainable development.



The green and recycling industrial chain

*The dotted box represents the related businesses operated by entities not under the operational control of China Hongqiao

Case study Recycling aluminum

Recycled aluminum boosts low-carbon transformation: China Hongqiao and Germany's Schlolz jointly established the Sino-German Hongshun Recycling Technology Park. The project adopts the "3+N model" and covers multiple industry chains, including the recycling of scrapped vehicles, and the reuse of recycled aluminum. It is planned that the annual production capacity of recycled aluminum is 500,000 tonnes, and the annual scale of recycling and dismantling scrapped motor vehicles is 100,000. The first phase of the project plans to produce 200,000 tonnes of recycled aluminum and dismantle 40,000 scrapped vehicles each year. It has been put into production step by step since May 2022. The products mainly include recycled cast aluminum alloy ingots and recycled aluminum alloy melt, which meet various customer needs for recycled aluminum products. Each tonne of recycled aluminum saves 95% of energy and reduces carbon emissions by more than 85%. The first phase of the project, upon its completion and reaching its full production capacity, can reduce carbon emissions by approximately 800,000 tonnes annually. The second phase of the project plans to dismantle another 60,000 scrapped vehicles and add another 300,000 tonnes of recycled aluminum capacity, which will further reduce carbon emissions by nearly 1.1 million tonnes annually on average.

Recycling of rare metals: A large amount of scale is generated in the purification system pipelines of alumina plants, containing rare metal resources such as vanadium, gallium, and scandium. We extract alkaline scale deposits (vanadium compounds) from the pipelines, which not only reduces pipeline resistance but also improves the efficiency of subsequent electrolytic aluminum production and significantly lowers carbon emissions. Additionally, these alkali slags can be further processed into high-value-added products, bringing considerable economic benefits to the Group. Furthermore, the Group has already started on the R&D of new recycling processes and technologies such as gallium metal extraction.

Alumina dust and overhaul slag recycling: During the production of electrolytic aluminum, electrolytic cells generate a large amount of exhaust gas containing alumina dust, which can be effectively recycled through equipment such as bag filters and reused as electrolytic raw materials, so that environmental pollution from dust is avoided and raw material consumption is reduced. Electrolytic cells require overhaul after a certain period of use, and a large amount of overhaul slag is generated during the overhaul process. We extract valuable metal elements and other useful components from electrolytic cell overhaul waste through process steps such as physical separation and chemical leaching, achieving resource utilisation and harmless disposal of electrolytic cell overhaul waste.

Recycling of scraps: Zouping Hongfa's two dual-chamber melting furnaces are mainly used for melting scraps from can factories and foil factories, recycled materials, wastes collected from the market and clean materials to produce high-quality recycled aluminum melt. The Group thereby increases the use of recycled aluminum while achieving the purposes of recycling aluminum scraps and reducing industrial waste, so as to produce more responsible and sustainable canned products. The Group has been certified as a National Green Factory and obtained the ASI Performance Standard Certification and the ASI Chain of Custody Certification. It is also the first in China's aluminum deep processing industry to be granted the certificate for resource recycling certification from CQC (China Quality Certification Center).

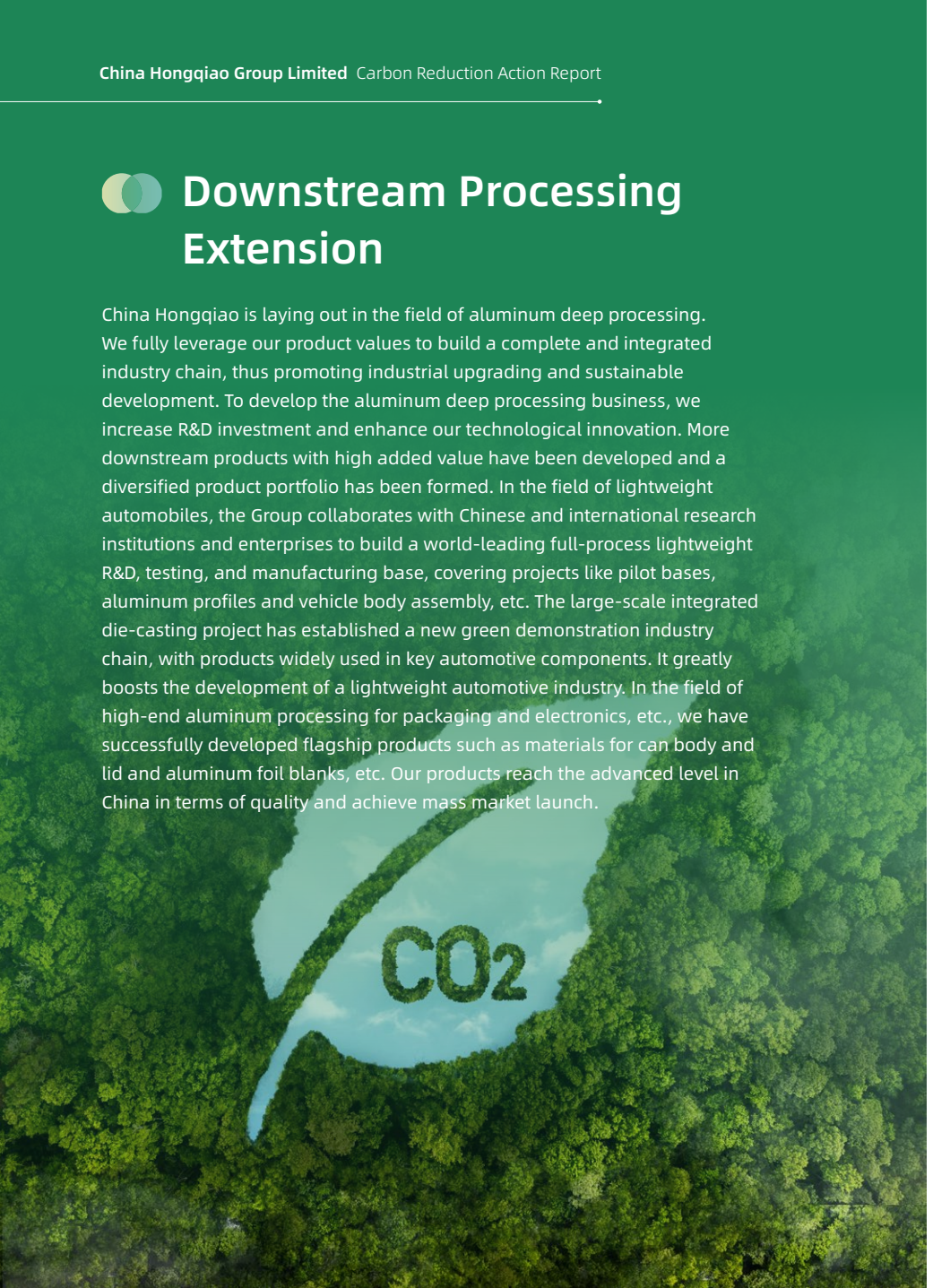
Production line for recycled cast aluminum alloy ingots

Zouping Hongfa's dual-chamber furnaces

Zouping Hongfa's certificate for resource recycling certification

Downstream Processing Extension

China Hongqiao is laying out in the field of aluminum deep processing. We fully leverage our product values to build a complete and integrated industry chain, thus promoting industrial upgrading and sustainable development. To develop the aluminum deep processing business, we increase R&D investment and enhance our technological innovation. More downstream products with high added value have been developed and a diversified product portfolio has been formed. In the field of lightweight automobiles, the Group collaborates with Chinese and international research institutions and enterprises to build a world-leading full-process lightweight R&D, testing, and manufacturing base, covering projects like pilot bases, aluminum profiles and vehicle body assembly, etc. The large-scale integrated die-casting project has established a new green demonstration industry chain, with products widely used in key automotive components. It greatly boosts the development of a lightweight automotive industry. In the field of high-end aluminum processing for packaging and electronics, etc., we have successfully developed flagship products such as materials for can body and lid and aluminum foil blanks, etc. Our products reach the advanced level in China in terms of quality and achieve mass market launch.



Lightweight components help reducing carbon emissions from vehicles

The use of lightweight materials can significantly reduce carbon emissions from vehicle use. For every 100 kg reduction in vehicle weight, fuel consumption per 100 kilometres can be reduced by 0.3 to 0.6 liters, and CO_2 emissions per kilometres can be reduced by 8-11 grams. China Hongqiao targets the development of lightweight solutions, establishing high-standard lightweight bases and a manufacturing industry cluster for core components such as recyclable aluminum vehicle bodies, batteries, and electrical motor controllers. The 8 types of self-developed high-strength and high-toughness aluminum alloy materials have their comprehensive performance improved by more than 20% compared to that of traditional alloys. The vehicle body platforms, chassis platforms, and chassis transmission components are reduced in weight by more than 40%, 30%, and 50% respectively compared to traditional products. They have been accepted into the supply chains of over 20 well-known auto companies.

China Hongqiao's lightweight factory

Operational Efficiency Improvement

China Hongqiao continuously improves operational efficiency through measures such as implementing the responsibility system for environmental goals, building the intelligent management platform, and upgrading production process. We have achieved significant results in energy saving and carbon reduction. Our subsidiaries have been included several times into the annual list of leading energy efficient enterprises in key industries released by three ministries including the Ministry of Industry and Information Technology.

Intelligent and digital transformation

Equipment automation

All links have achieved high automation, ranging from automatic raw material feeding, automatic electrolytic cell monitoring, automatic assembly lines and automatic product packaging, which have significantly reduced manual operation costs and human errors, with higher production efficiency yet lower energy consumption.

Intelligent control system

The introduction of the advanced intelligent control system enables us to conduct real-time monitoring and precise adjustment of various process parameters of electrolytic cells. The system can automatically collect and analyse production data to optimise the operating parameters of electrolytic cells and improve both production efficiency and product quality.

Big data and artificial intelligence

We cooperate with well-known technology companies to establish a big data platform and an artificial intelligence model. We utilise big data to discover the potential value of production data, predict production trends and optimise production plans with artificial intelligence, and achieve intelligent decision-making and automated adjustments in production.

Case study Building an intelligent aluminum electrolysis factory

China Hongqiao's Shandong Hongtuo Industrial Co., Ltd., deeply integrates advanced management models, mature production processes, and new-generation intelligent technologies. The Group has successfully built an intelligent aluminum electrolysis future factory, AI&L, to keep leading the development of the industry. Transforming expert experience into data models, the factory has constructed a "smart brain" and utilised the smart process system and the digital twin technology to optimise the operation management of inefficient and energy-consuming electrolytic cells, thus achieving better process, unified indicators, and higher energy efficiency. The system replaces manual judgment with big data analysis, accurately setting key parameters such as planned aluminum output, fluoride feeding amount, set voltage, and feeding interval for electrolytic cells. It significantly enhances production efficiency and environmental protection.

In terms of technical architecture, the intelligent aluminum electrolysis future factory adopts a three-layer architecture consisting of two clouds and one terminal. It achieves data interconnectivity among the terminal, the edge cloud and the central cloud through a "fully connected industrial internet network". The system can predict and simulate the entire process of aluminum electrolysis production. It monitors and simulates real-time process parameters and dynamically optimises the production process to further enhance production efficiency.

The control room of the intelligent aluminum electrolysis factory

Case study Building an intelligent alumina future factory

To accelerate the digital transformation across the whole Group, China Hongqiao explored and constructed the intelligent alumina future factory in collaboration with external R&D teams. We improved management and decision-making efficiency through the self-developed intelligent management system and promoted intelligent industrial production through technological transformation or the introduction of various intelligent equipment to conduct AI-based monitoring on personnel, behaviors, and equipment status.

The intelligent alumina future factory

In the future factory, new energy heavy trucks are used to transfer goods and raw materials. After entering the factory area, raw materials and goods go through closed belt conveyors, undergo homogenisation through automatic equipment before moving to the intelligent production line. The factory area has established a complete automated production chain. The panoramic monitoring screen in the central control room tracks real-time production line data and equipment status. It can accurately predict production changes, supporting our refined management and energy efficiency optimisation.

The central control room of the intelligent alumina factory

All construction projects of the intelligent alumina factory phase I have passed the final acceptance and put into operation. Phase II projects are progressing as scheduled. In the future, the project team will continue to apply intelligent and IT means to optimise the intelligent management system, accelerating the development of the alumina "industrial super brain" to empower the industry's intelligent and digital transition.

Upgrading production processes

• Bituminous coal for lean coal boilers

Bituminous coal has been used for lean coal boilers at one of our thermal power plants. The application has improved the combustion stability of the boilers and increased boiler efficiency. The amount of general solid waste such as ash and slag, as well as the standard coal consumption for power generation have both been reduced, which saves approximately 7,300 tonnes of standard coal annually and cuts CO_2 emissions by about 18,800 tonnes.

• Efficiency improvement of cooling towers

Two cooling towers at one of our thermal power plants have been upgraded to achieve higher efficiency. The vacuum pressure has increased by 3 kPa, which saves around a total of 24,000 tonnes of standard coal annually and reduces CO_2 emissions by around 62,000 tonnes.

• Low-pressure cylinder zero output

The low-pressure cylinder zero output heat supply technology has been applied to units of our two thermal power plants. It has not only significantly improved the heat supply capacity of the units, but also achieved a substantial reduction in coal consumption, which saves approximately 216,000 tonnes of standard coal annually and reduces CO_2 emissions by about 561,600 tonnes.

Technological Innovation and Application

China Hongqiao actively supports China's carbon peaking and carbon neutrality goals, and regards green technology and carbon neutrality as core drivers of corporate development. The Group has demonstrated forward-thinking vision and firm commitment in these fields by continuously advancing technological innovation and application. We have established an efficient, eco-friendly production system, and are dedicated to building green factories and green supply chains. By promoting low-carbon transformation and sustainable development across the industry, we contribute to achieving carbon neutrality.

Case study China Hongqiao leads global aluminum electrolysis innovation – the continuous evolution and application of 600kA electrolytic cells

Since initiating an industry-academia-research partnership with Northeastern University in 2014, China Hongqiao has pioneered a new era of clean aluminum production by successfully developing the world's first 600kA extra-large prebaked anode electrolytic cell. This breakthrough reduces comprehensive energy consumption per tonne of aluminum by 15% compared to the industry average while maintaining particulate emissions below 10mg/m^3–just one-third of the strictest international environmental limits. Awarded the First Prize of the China Nonferrous Metals Industry Scientific Technology Award in 2016, this innovation represents a milestone in the global aluminum industry's green and low-carbon transformation. Over the past decade, the full-scale 600kA electrolytic cells have sustained world-leading performance, and earned recognition as a "National Energy Conservation Standardisation Demonstration Project." During the construction of the green aluminum innovation industrial park in Wenshan Zhuang and Miao Autonomous Prefecture, Yunnan, we have further optimised the 600kA technology through sustained R&D investment to reinforce our industry leadership.

China Hongqiao's 600kA electrolytic cells

Case study Reducing carbon emissions with the Aluminum Electrolysis Integrated Copper-Carbon Composite Cathode (RuC) Technology

Developed through a seven-year collaboration between Shandong Hongtuo Industrial Co., Ltd., a subsidiary of China Hongqiao, Northeastern University and other institutions, the world's first integrated copper-carbon composite cathode (RuC) technology for aluminum electrolysis has overcome persistent industry challenges. Utilising a precision cold-assembly process for all-copper conductor rods, this innovation resolves traditional cathode issues including carbon penetration and corrosion susceptibility, enabling stable 600kA electrolytic cell operation at reduced voltage. The RuC technology combines intelligent current distribution with thermal balance optimisation to deliver exceptional benefits, including reducing DC power consumption by 600kWh per tonne of aluminum, saving over 100 million kWh annually, decreasing solid waste by 1,300 tonnes and carbon emissions by 100,000 tonnes, generating annual economic benefits exceeding RMB 100 million, and significantly extending electrolytic cell service life. Validated by the China Nonferrous Metals Industry Association, the project has demonstrated outstanding advantages in pollution reduction and decarbonisation.

Case study Leveraging innovative magnetic levitation blower technology to enhance energy efficiency and environmental performance

China Hongqiao has upgraded the core equipment of desulphurization oxidation systems by replacing traditional roots blowers with advanced magnetic levitation blowers, which utilise a contactless drive system. The new blowers deliver three key benefits: First, system power consumption has been reduced 30%, yielding substantial annual electricity savings. Second, by eliminating mechanical wear, the blowers have dramatically decreased equipment failure rates and reduced maintenance costs. Third, the technology has lowered operational noise levels, significantly improving onsite working conditions. The new blowers have demonstrated reliable, continuous operation over an extended period, with their energy efficiency and operational reliability fully validated in actual production.

Case study Achieving energy conservation with variable-speed crushers

During the technological upgrade of the recycled aluminum production lines, China Hongqiao has innovatively adopted an intelligent crushing system. The system features variable speed drive (VSD) technology to enable real-time rotational speed adjustments based on material characteristics. Compared to traditional fixed-speed crushing equipment, it achieves 15-20% energy savings. In addition, the system integrates an intelligent power management module to dynamically balance electrical load. This not only reduces peak power demand but also eliminates the need for conventional power factor correction devices due to the equipment's built-in high power factor design (>0.95). Finally, VSD control effectively suppresses aluminum dust emissions during crushing, increasing metal recovery rates by 3-5 percentage points. Production data show that this integrated solution reduces energy costs per tonne of output while boosting both production efficiency and environmental performance.

Case study Innovative bauxite residue utilisation

Bauxite Residue (red mud), a highly alkaline solid waste generated during alumina production, contains high iron levels and complex composition. Traditional stockpiling methods pose significant environmental risks, including soil alkalisation, water contamination, and ecological damage.
To address this challenge, China Hongqiao has pioneered a groundbreaking "multi-stage cyclone-magnetic separation-coupled iron extraction technology system." In 2024, the Group achieved a breakthrough in bauxite residue resource utilisation efficiency. Through high-efficiency iron enrichment, the comprehensive utilisation rate of bauxite residue exceeded 24%, with annual processing surpassing 3.8 million tonnes. The extracted iron concentrate was converted into metallurgical raw materials through an integrated "waste treatment-resource regeneration-economic value creation" chain. This innovative model has not only reduced environmental pressure but also opened a new pathway for large-scale, high-value bauxite residue utilisation. It has demonstrated how ecological governance and industrial profitability can reinforce each other.

Case study Building National Green Factories

As pioneers in the green transformation of the aluminum smelting industry, Shandong Hongqiao New Material Co., Ltd. and Zouping Hongfa Aluminum Technology Co., Ltd., both subsidiaries of China Hongqiao, have established comprehensive green systems covering production processes, office operations, and employee lifestyles, and achieved a holistic upgrade from equipment efficiency to energy-saving awareness. They have created a replicable model for green transformation in traditional manufacturing and earned recognition as National Green Factories. Furthermore, they have contributed to drafting the local standard Assessment Specifications for Green Factories in the Aluminum Smelting Industry.

Green Office Practices

In full alignment with national environmental policies, we spare no effort to create sustainable office spaces guided by low-carbon and eco-friendly principles. Specifically, we encourage employees to conserve water and electricity, reduce office supply consumption, and choose eco-friendly commuting options including walking and public transport. By implementing these measures, we collectively advance green office practices toward a low-carbon future.

Case study Leading the shift to green travel by strengthening energy conservation and emissions reduction

Amid the rapid development of the new energy vehicle (NEV) industry, China Hongqiao has kept pace with the times and actively responded to the national call for energy conservation and emissions reduction. In 2024, we installed Titans charging piles at the side of our headquarters office building in Shandong and simultaneously introduced a subsidy policy for employees purchasing NEVs, encouraging staff to adopt new energy vehicles and fostering a green travel ecosystem. By optimising our energy structure, we have not only created a more low-carbon and eco-friendly work environment for our employees but also provided convenient and safe electric vehicle charging services for both staff and visiting clients. This has effectively enhanced EV charging accessibility.

Lighting

Office fluorescent lights have been replaced with low-wattage LED tubes to reduce energy consumption.

Water supply

By switching to gravity-fed water distribution via rooftop storage tanks, we have eliminated round-the-clock pump operation, reducing energy use by approximately 350,000 kWh per year.

Air conditioning

By adopting energy-efficient lithium bromide absorption chillers, that utilise waste heat steam from our power plant, significantly reduce electricity consumption compared to traditional electric central air conditioning.

Heating

During winter, the heating system operates in split-zone mode, with separate circuits for high and low floors. Variable frequency drives (VFDs) automatically adjust pump speeds based on outlet pressure to optimise energy efficiency and reduce power consumption.

Green Products

In the era of sustainable development, China Hongqiao embraces green innovation as a driving force, and has ushered in a new chapter of transformation and upgrading for the aluminum industry. As an industry leader, the Group fully recognises the critical role of green products in shaping the industry's future. Therefore, we are actively engaged in the in-depth development of sustainable products and the circular utilisation of recycled aluminum. Through the comprehensive advancement of green and low-carbon product certification, we strive to build an eco-friendly supply chain from raw materials to finished products, and set a new benchmark for sustainable practices in the aluminum industry.

Case study China Hongqiao showcases HQALight and HQALoop at COP28

At the 28th Conference of the Parties (COP28) of the UN Framework Convention on Climate Change （UNFCCC）, China Hongqiao launched its green aluminum brands HQALight and HQALoop. HQALight refers to low-carbon primary aluminum products produced with hydropower or other renewable energy sources, which adopts the world's leading 600kA electrolytic cell and RuC technology. It has already been applied in the Group's Yunnan project, with carbon intensity of less than 1.83 tonnes of CO_2e per tonne of aluminum products. HQALoop refers to products made from recycled aluminum, with 100% of the raw materials being waste aluminum, resulting in significantly lower carbon emissions compared to traditional primary aluminum. The two brands showcase the Group's innovation and dedication to sustainable aluminum.

HQALight and HQALoop products

Case study Shandong Hongshun advances carbon footprint certification

Shandong Hongshun Recycling Technology Co., Ltd. ("Shandong Hongshun") has made significant strides in carbon footprint certification. Its flagship product, the A356.2 alloy, incorporates nearly 75% recycled aluminum content and delivers carbon emissions far below industry averages—at just 4.72tCO_2e per tonne of aluminum. This accomplishment not only highlights the Group's exemplary practices in energy conservation, emission reduction, and green production, but also sets a new benchmark for low-carbon and eco-friendly practices in the aluminum industry.

The carbon footprint certificate for A356.2

While advancing its carbon footprint certification efforts, Shandong Hongshun has been preparing for SCS Global Services' Recycled Content Certification - the global benchmark for recycled material verification. This certification's rigorous, scientific, and standardised assessment process enables precise identification and quantification of recycled content in products. For the aluminum industry, it serves not only as authoritative validation of environmental claims, but also serves as an international credential symbolising a company's green transformation and commitment to sustainable development.

SCS Global Services

Case study Zouping Hongfa Aluminum achieves breakthrough in high-ratio recycled aluminum application

Zouping Hongfa Aluminum Technology Co., Ltd. ("Zouping Hongfa") has successfully implemented large-scale production of can body stock using 100% green aluminum (produced from recycled materials and hydropower) for a domestic brand client. The production batch, while maintaining stringent quality standards, incorporated a material mix of 50% used beverage cans (UBC), 35% HQALight aluminum ingots produced with hydropower, and 15% manufacturing scrap from can production facilities. After rigorous client testing of the product, all performance indicators met excellent standards. This achievement has not only realised closed-loop recycling of aluminum packaging materials while maintaining their original material grade, but has also significantly reduced energy consumption and carbon emissions across the entire industry chain. It has established a replicable model for the aluminum processing industry's green transformation.

Can body stock produced from 100% green aluminum

A Driver for Industry Development

Committed to promoting the green development of the industry, China Hongqiao actively participates in the compilation of important standards concerning energy consumption and carbon emissions, and closely cooperates with industry associations to jointly advance environmental protection. The Group not only works with industry partners to facilitate the construction of green projects and takes actions to lead the industry towards low-carbon and environmentally friendly development, but also contributes to the building of a green industrial ecosystem. In addition, the Group's Chairman participated in high-end platforms such as the China Carbon Neutrality Forum to engage in in-depth exchanges with experts, scholars, and entrepreneurs, share the Group's latest achievements and valuable experiences in the field of green development, and further enhance the green development of the industry.

Case study China Hongqiao leads industry standards to promote green and low-carbon development

China Hongqiao plays an active role in the formulation of national, industry and group standards regarding carbon emissions. Since 2021, the Group has actively participated in the green product evaluation work of the Green Product Evaluation Center of China Nonferrous Metals Industry Association. China Hongqiao has been engaged in the formulation of over 100 standards, including carbon-related national standard GB/T 44905-2024 *Greenhouse Gas - Quantification Requirement and Method of Product Carbon Footprint - Electrolytic Aluminum* and the group standard T/CNIA 0245-2024 *Assessment Guidelines and Traceability Guidance for Green & Low-Carbon Aluminum*.The formulation of these standards not only displays China Hongqiao's contribution to the standardisation of the industry, but also demonstrates the Group's proactive efforts in promoting green and low-carbon development.

Standards contributed by China Hongqiao (excerpts)

Case study China Hongqiao joins hands with ASI to forge a new chapter in sustainable aluminum industry development

The Aluminum Stewardship Initiative (ASI) is a global non-profit organisation dedicated to establishing standards and certifications for the aluminum value chain. It brings together producers, users, and stakeholders to promote responsible production, sourcing and corporate governance, and maximise the aluminum sector's contribution to a sustainable society. To date, over 300 leading enterprises in the global aluminum industry have joined ASI. In 2021, China Hongqiao officially became an ASI member, and has since actively supported 11 subsidiaries, including Hongfa Aluminum (including Zouping Dingrui), Binzhou Hongzhan, Shandong Hontron (including Binzhou Hongbo, Zouping Hongcheng, and Zouping Hongzhuo), Yunnan Hongtai, Shandong Hongshun, Weihai Haixin, and Weihai Chenxin, in achieving the ASI Performance Standard certification or the ASI Chain of Custody (CoC) Standard. This underscores the Group's strong commitment and robust efforts toward sustainable development in the aluminum industry. Looking ahead, we will intensify our initiatives in carbon reduction, sustainable practices, and responsible production to further propel the global aluminum industry towards a sustainable future.

Case study Shandong Hongqiao joins the Shandong High-end Aluminum Manufacturing and Application Innovation and Entrepreneurship Community

China Hongqiao's Shandong Hongqiao New Materials Co., Ltd. and Weihai Chenxin New Material Co., Ltd. are key members of the Shandong High-end Aluminum Manufacturing and Application Innovation and Entrepreneurship Community. The community is dedicated to establishing an innovative collaboration model that integrates seven key elements, including government, industry, academia, research, finance, services, and application. By consolidating resources across the entire value chain, it aims to enhance the high-end aluminum industry ecosystem. Therefore, the community is a key platform for the Group to tackle core technologies and cultivate innovative enterprises. To date, it has brought together over 50 organisations, all actively involved in joint R&D and technological innovation initiatives that support Shandong Province's transition towards innovation-driven, green, and low-carbon development.

The Aluminum Industry Science and Technology Development Forum organised by the community

Leading the Industry Chain in Carbon Reduction

China Hongqiao shoulders social responsibility and proactively responds to global climate challenges by fully leveraging its active role and influence in leading the industry chain in carbon reduction. China Hongqiao promotes green transportation, constructs a green supply chain, advances the "molten aluminum metal direct supply" technology and reduces packaging, which has not only effectively reduced the carbon footprint of the industry chain but also set a benchmark for the sustainable development of the industry.

Case study Railway built to reduce carbon emissions

China Hongqiao and its partners have established the SMB joint venture in Guinea to manage bauxite mining and transportation operations in the country. To enhance transport efficiency and reduce carbon emissions, SMB has implemented several major initiatives, including investing in March 2019 to build Guinea's first modern railway in nearly half a century - the Dapilon-Santou Railway. From the railway's inauguration to September 2024, SMB's rail operations achieved an energy consumption reduction exceeding 260,000 tonnes compared to road transport, equivalent to eliminating 850,000 tCO_2e. These results have firmly established the consortium as an industry leader in sustainable mineral transportation.

Dapilon-Santou Railway

Case study Large environmentally friendly ore carriers reduce energy consumption

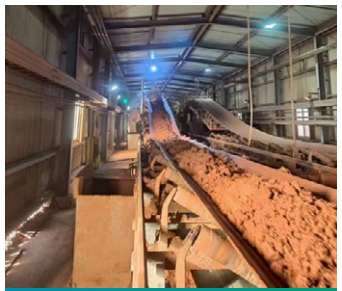
China Hongqiao's joint venture SMB ships its bauxite via sea freight to Chinese ports. With the development of Guinea's port loading technology, the Group has worked closely with partners to optimise shipping methods, and progressively deployed bulk carriers exceeding 200,000 DWT. These Very Large Ore Carriers (VLOCs) incorporate continuous design advancements, significantly improving energy efficiency and environmental performance. By adopting these optimised shipping solutions and advanced vessel technologies, we have reduced transportation-related carbon emissions, and further advanced our sustainability objectives.

Large environmentally friendly ore carriers

Case study A green logistics system built to promote the sustainable development of China's transport industry

China Hongqiao is committed to driving the green transition of China's transport industry. A series of innovative measures have been taken to reduce carbon emissions, improve transport efficiency, and optimise resource allocation. In land transport, low-emission new energy heavy trucks have been introduced to replace diesel trucks for short-distance transport of finished alumina to downstream enterprises. With less reliance on traditional diesel fuel, these new energy trucks have significantly lowered carbon emissions during transport. In ore transport, as our plant is close to the port, a closed tubular belt conveyor system has been constructed to replace truck transport and reduce carbon emissions. In sea transport, the Group is planning and implementing hybrid or fully electric ships. Especially for short-distance shuttle ships from Yantai to Beihai, the Group is developing and putting into use hybrid or pure electric new energy ships to reduce carbon emissions during operations at the port, moving towards the goal of achieving zero emissions in port areas.

New energy vehicle transport



Closed tubular belt conveyor system

Case study Direct supply of molten aluminum metal to promote green production

China Hongqiao's "molten aluminum metal direct supply " model directly transports the aluminum metal from the electrolytic smelting stage to downstream processing enterprises for the production of high-precision products such as car wheels, aluminum foil, and aluminum plates. The model not only reduces the loss of molten aluminum metal during transport and cooling but also eliminates the need for remelting, significantly lowering energy consumption and carbon emissions. It enhances overall production efficiency and environmental protection, providing a strong demonstration for the green development of the aluminum industry.

On-site photo of the "molten aluminum metal direct supply " model

Case study Multiple measures taken to realise green packaging

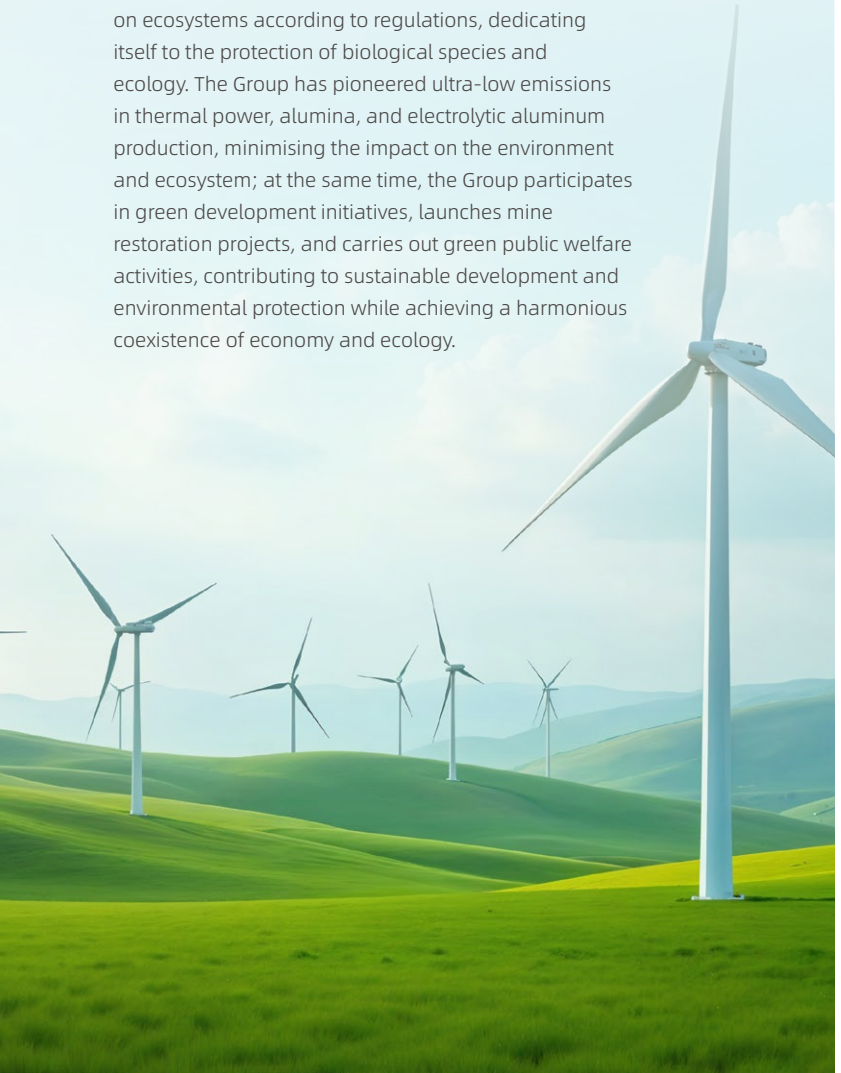
Committed to advancing green packaging development, China Hongqiao has implemented a series of innovative measures. The Group has collaborated with multiple industry chain partners to promote recyclable packaging bags with detachable openings for repeated use to significantly reduce packaging waste and pollution; adopt bulk transportation using high-sided trucks lined with waterproof tarps (inside and out) to cut packaging bag consumption; implement bulk containerised sea shipments with inner liner bags to optimise loading space and improve handling efficiency; and expand dry bulk container shipments, utilising top-fill and bottom-discharge designs to reduce the use of packaging bags.

Recycling aluminum wire for reuse

In 2024, Shandong Hontron Aluminum Industry Holdings Co., Ltd., a subsidiary of China Hongqiao, partnered with the downstream clients to develop 100% recycled aluminum green packaging materials. Fully produced from reclaimed aluminum, this innovation reduces source-level carbon emissions and is now being rolled out to the market.

Ecological Conservation

China Hongqiao identifies biodiversity risks in production areas and manages the impacts of production activities on ecosystems according to regulations, dedicating itself to the protection of biological species and ecology. The Group has pioneered ultra-low emissions in thermal power, alumina, and electrolytic aluminum production, minimising the impact on the environment and ecosystem; at the same time, the Group participates in green development initiatives, launches mine restoration projects, and carries out green public welfare activities, contributing to sustainable development and environmental protection while achieving a harmonious coexistence of economy and ecology.



Case study Mine restoration to protect the ecology

SMB is engaged in open-pit bauxite mining in Guinea's Boké region. The project has always made environmental protection a top priority and has implemented large-scale land reclamation and rural road construction to restore mined-out areas and mitigate environmental impacts. As of September 2024, the total reclaimed area has reached 1,237.6 hectares, accounting for over 35% of the mined area. Meanwhile, the joint venture of China Hongqiao has developed an agricultural corridor along the railway to support local diversified agriculture. The initiative protects the environment and assists Guinea in achieving economic diversification and food self-sufficiency.

Reclamation in mining areas

Case study Building eco-friendly factories

Upholding the principle that "lucid waters and lush mountains are invaluable assets," China Hongqiao organises annual tree-planting activities for employees across all subsidiaries to enhance greenery within factory premises and beautify the community environment. During the planning phase of the green aluminum innovation industrial park in Wenshan, Yunnan, we conducted in-depth research and comprehensive preparations. The industrial park was designed and built using an integrated ecological model that combines production, agriculture, and forestry. Nearly 440 acres of land surrounding the industrial park have been used for afforestation and forest conservation. This initiative not only aids carbon reduction through forest carbon sinks but also boosts forestry income and supports poverty alleviation efforts.

Employees participate in a tree-planting activity

Outlook

China Hongqiao will uphold the principles of green, low-carbon, and sustainable development, and remain steadfast in advancing towards the carbon neutrality goal. Through scientific planning and coordinated efforts, we will further optimise our energy structure, industrial layout, technological equipment, and environmental management to build a green energy chain, industry chain, manufacturing chain, and ecological chain.

We will significantly expand investments in clean energy, energy efficiency, carbon reduction, and circular economy initiatives to accelerate the industry's green transformation. By fully utilising renewable energy adoption and optimising our energy structure, we will substantially reduce carbon emissions. Through continuous technological innovation and industrial upgrading, we will improve resource utilisation efficiency while decreasing both energy consumption and emissions.

We recognise climate change as a global challenge requiring collective action from businesses, governments, and society. As a leader in the aluminum industry, we will actively fulfill our social responsibilities and contribute our part to tackling climate challenges.

We will actively engage in global carbon neutrality efforts, and strengthening collaboration with international organisations and enterprises to advance sustainable development across the aluminum industry. By sharing our experience and achievements in advancing carbon neutrality, we aim to contribute to the realisation of global carbon neutrality goals.

Looking ahead, China Hongqiao will pursue carbon neutrality with strengthened resolve and tangible action, while striving to set a benchmark for sustainable development in the global aluminum industry. We are confident that through society's collective efforts, we can effectively address climate change challenges and build a more sustainable and prosperous future for all.

Abbreviations of company names in this report

Full name	Abbreviation
China Hongqiao Group Limited	China Hongqiao, the Group, we
Zouping Hongfa Aluminum Technology Co., Ltd.	Zouping Hongfa
Binzhou Hongzhan Aluminum Technology Co., Ltd.	Binzhou Hongzhan
Shandong Hontron Aluminum Industry Holding Company	Shandong Hontron
Yunnan Hongtai New Materials Co., Ltd.	Yunnan Hongtai
Shandong Hongshun Recycling Technology Co., Ltd.	Shandong Hongshun
Weihai Haixin New Materials Co., Ltd.	Weihai Haixin
Weihai Chenxin New Materials Co., Ltd.	Weihai Chenxin
Binzhou Beihai Xinhe New Material Co., Ltd.	Beihai Xinhe
Shandong Hongtuo Industrial Co., Ltd.	Shandong Hongtuo