BAOWU 宝武

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中国宝武钢铁集团有限公司
China Baowu Steel Group Corporation Limited

绿色低碳发展报告
Green and Low-Carbon Development Report

绿动未来

Green the Future

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卷首语 Preface

全球钢铁业的格局正经历着新一轮深刻调整，面临着新的挑战和机遇。钢铁行业对于全球经济可持续发展依然发挥着举足轻重的作用。面对钢铁业长周期减量调结构，中国宝武坚持高端化、智能化、绿色化、高效化，走科技创新、智能制造、绿色低碳、高效集约之路，携手生态圈伙伴推动绿色低碳技术的研究和应用，为钢铁行业的技术进步和可持续发展作出积极贡献，共同保护人类家园，推进人类文明进步。

The global steel industry is experiencing a significant shift, presenting both new challenges and opportunities, and the steel industry is playing a pivotal role in driving sustainable global economic growth. In response to the ongoing structural adjustments within the industry, Baowu has adhered to high-end, intelligent, green, and high-efficiency development, and adopt a strategy focused on technological innovation, intelligent manufacturing, green and low-carbon development, and efficient and intensive growth. Together with its ecosystem partners, Baowu promotes the R&D and application of green and low-carbon technology, contributing to the technological advancement and sustainable growth of the steel industry. This collective effort supports the building of a community of all life on earth and advances human civilization.

共创未来钢铁科技创新之路，实现高端化。宝武集团已研究制订《2022——2027 年科技创新规划》，明确远景研发强度为 5%，研发创新主要聚焦于碳中和前瞻性技术创新、钢铁材料升级与先进材料创新、新能源技术创新、数智化技术创新等 4 大战略性任务，布局 40 项重大技术。在开发性能优越的高端钢铁产品方面，主要围绕“高强度、高耐蚀、高效能”，持续突破产品性能和使用功能。在开展碳中和前瞻性技术创新方面，430m^3 富氢碳循环氧气高炉（HyCROF）工业试验取得阶段性成果。在加强钢铁技术应用基础研究方面，拥有多个重点实验室、技术中心、研究中心。

Jointly building a path of innovation and high-end development. Baowu has developed *Baowu Science and Technology Innovation Plan 2022–2027*, which sets a clear target of maintaining a prospective R&D intensity of 5%. The plan focuses on four strategic areas: forward-thinking innovations for carbon neutrality, advancements in steel and innovative materials, technological innovations for new energy, and digital and intelligent technology innovations. In addition, Baowu Group has planned 40 major technological advancements. To develop high-end steel products with superior performance, the focus has been placed on achieving "high strength, high corrosion resistance, and high efficiency", seeking breakthroughs in product performance and functions. Phased results have also been made in terms of pioneering carbon-neutral technologies, particularly with the industrial testing of the 430 m^3 hydrogen-enriched carbonic oxide recycling oxygenate furnace (HyCROF), and the multiple key laboratories, technology centers, and research centers dedicated to basic research of the application of steel technology.

共创未来钢铁智能制造之路，实现智能化。宝武集团大力推进新一代信息技术和钢铁行业的深度融合，通过数字化重塑传统钢铁业，牵引下游产业加快实现数字化转型升级。针对钢铁制造特点，建设智慧工厂。针对集团产业结构和基地分布特点，大力推动基于工业互联网的跨产业、跨空间、跨界面“三跨”融合，借助数智化技术创新，打破物理界面、突破时空局限，实现极致的跨界协同效率。同时，宝武集团努力探索构建数据、算力、算法、工业知识及智慧应用于一体的钢铁工业大脑，升级智慧决策。

Jointly creating a path for intelligent steel manufacturing. Baowu has been promoting deeper integration of next-generation information technology with the steel industry, reshaping the traditional steel industry through digitalization, and leading downstream industries in accelerating their digital transformation and upgrades. It has also built smart factories tailored to the specific needs of steel manufacturing. Furthermore, in alignment with its industrial structure and base distribution, Baowu has promoted cross-industry, cross-space, and cross-interface integration through the industrial Internet. By leveraging innovations in digital and intelligent technologies, it has broke the physical interface and overcome time and space constraints, significantly enhancing cross-sector collaboration efficiency. Simultaneously, Baowu is committed to developing an "Industrial Intelligence" Initiative that integrates data, computing power, algorithms, and industrial expertise to enhance intelligent decision-making.

共创未来钢铁绿色低碳之路，实现绿色化。宝武集团致力于打造绿色产品，不断开辟新赛道，面向建筑、桥梁、交通运输、能源、船舶等行业，向用户提供寿命延长、能效提升的高性价比绿色用材解决方案。在打造绿色工艺方面，围绕传统高炉流程极致减碳、绿氢直接还原、二氧化碳捕集与资源化利用等与能源转型相对应的工艺技术创新，率先取得绿色低碳工艺颠覆性创新。在打造绿色能源方面，发挥用能量巨大、应用场景丰富等优势，加快源网荷储一体化及多能互补技术、规模化绿氢制备及储氢等技术开发，积极探索研究绿氢规模化、低成本供给难题的破解之路。在打造绿色产业方面，积极探索跨产业耦合发展新模式，持续提升资源循环利用水平。

Jointly creating a green, low-carbon future. Baowu is dedicated to pioneering new paths and producing green, cost-effective, and durable products for industries such as construction, bridge building, transportation, energy, and shipbuilding. In green manufacturing, the Group is the first to achieve breakthrough innovations in green, low-carbon processes by focusing on technological innovations in decarbonizing blast furnace operations, hydrogen-based direct reduction, carbon capture and resource utilization. In terms of green energy, it has leveraged its significant energy consumption and diverse application scenarios to accelerate the development of integrated source-grid-load-storage systems, multi-energy complementary technologies, large-scale green hydrogen production, and hydrogen storage, actively exploring solutions for large-scale, cost-effective green hydrogen supply. In terms of green industries, Baowu is pioneering new models of cross-industry synergy and continuously improving its resource recycling efforts.

共创未来钢铁高效集约之路，实现高效化。深入实施产业基础再造工程，加快关键工序、核心设备高效化技术创新和更新改造，极致提高资产效率、资金效率、人事效率、资源能源利用效率，为抵御风险、创造价值赋予新动能。今后一个时期，宝武集团的经营策略是：聚焦价值创造，追求管理极致高效。按照“有订单的生产、有边际的产量、有利润的收入、有现金的利润”的经营原则，构建钢铁产品竞争力模型，分类指引各生产基地优化经营策略，立足极致效率、极致成本，组织生产经营。以绿色为引领和核心价值，追求能源极致高效。在提高资源直接使用效率的同时，通过减量化、资源化、产品化等措施提高资源利用效率，追求资源极致高效。

Jointly creating a path for efficient and intensive steel production. The Group has rebuilt its industrial base, accelerated high-efficiency technological innovation, and upgraded key processes and core equipment. It has also improved the utilization efficiency of assets, capital, personnel, resources, and energy to inject new momentum for risk resistance and value creation. In the upcoming period, Baowu's business strategy will focus on generating greater value while achieving the highest level of management efficiency. Guided by the account-based management principle–emphasizing "order-driven production, margin-limited output, profit-driven revenue, and cash flow-generating profit"–we have developed a steel product competitiveness model to help each production base optimize its unique business strategy and organize cost-effective production and operations. With green development as our core value, we have pursued the highest levels of energy efficiency. We have improved the direct utilization efficiency of resources through various measures, such as reducing resource consumption, minimizing waste generation during production, recycling waste, and converting raw materials and semi-products into valuable products, to pursue the highest levels of resource efficiency.

钢铁行业的碳中和对全球应对气候变化行动具有重要作用，要实现钢铁的碳中和，绝对不是靠一两项技术就可以实现的。“条条大路通罗马”，任何降低钢铁碳排放的努力都应该得到承认和鼓励。宝武集团将坚决落实习近平主席重要批示指示精神，积极发挥科技创新引领作用，打造绿色低碳领域原创技术策源地，扎实推进双碳工作稳步前行，加快清洁能源和低碳原料布局，同时推动创新链产业链资金链人才链深度融合，与全社会一起努力，携手走向绿色的未来。

Achieving carbon neutrality in the steel industry is crucial for the global response to climate change. However, it cannot be achieved by relying on just one or two technologies. As the saying goes, "All roads lead to Rome", so every effort to reduce carbon emissions in the steel industry should be recognized and encouraged. Baowu is committed to implementing the important directives of President Xi Jinping, taking a leading role in scientific and technological innovation, and establishing itself as a source of original technologies in the green and low-carbon sectors. We will promote steady progress toward China's carbon peaking and carbon neutrality goals, accelerate the deployment of clean energy and low-carbon raw materials, and foster the deep integration of the innovation, industrial, capital, and talent chains. Together with society, we are committed to advancing toward a greener future.

关于我们 About Us

中国宝武钢铁集团有限公司（以下简称“中国宝武”“宝武集团”或“我们”）是国有重要骨干企业，总部位于上海。2022 年 6 月，正式转为国有资本投资公司。在 2023 年《财富》世界 500 强排行榜位列 44 位，位居全球钢铁企业首位。

Headquartered in Shanghai, China Baowu Steel Group Corporation Limited (hereinafter referred to as "China Baowu," "Baowu," "the Group" or "we") is a key state-owned enterprise. In June 2022, Baowu officially transitioned into a state-owned capital investment company. On 2023 *Fortune Global 500* list, Baowu ranked 44th, leading the global steel industry.

2023 年 In 2023

资产总额
13625.22 亿元
Total assets of RMB **1,362.522** billion

营业总收入
11129.72 亿元
Total operating revenue of RMB **1,112.972** billion

利润总额
316.20 亿元
Total profits of RMB **31.62** billion

钢产量
13077 万吨
Steel output of **130.77** million tonnes

员工总数
221494 人
221,494 employees in total

公司定位 Brand Positioning

提供钢铁及先进材料综合解决方案和产业生态圈服务的高科技企业

A high-tech enterprise to offer integrated solutions to steel and advanced materials and industrial ecosystem services

业务规划 Business Segments

“一基五元” 业务板块

"One Basis and Five Industries" business segments

逐绿篇
钢铁生产焕新蝶变
Green Governance
Refreshing Steel Production

绿色低碳治理架构
Green and Low-Carbon Governance

宝武集团建立碳中和工作推进体制，加强顶层设计和组织领导，将绿色低碳相关议题纳入董事会的工作范围中。董事会战略与投资委员会等专业委员会负责审议长期发展战略规划，就中国宝武的战略定位、产业布局等向董事会提出建议。2023 年，制定《碳达峰碳中和管理办法》，加强碳达峰碳中和工作，建立高效协同的碳达峰碳中和管理推进体系，促进集团全面绿色低碳转型发展。

Baowu has established a carbon-neutral advancement system to strengthen top-level design and organizational leadership, integrating green and low-carbon initiatives into the scope of the Board of Directors' responsibilities. Professional committees, such as the Strategic and Investment Committee of the Board, are tasked with reviewing long-term strategic development plans and advising the Board on the Group's strategic positioning and industrial layout. In 2023, the *Management Measures for Achieving Carbon Peaking and Carbon Neutrality* was formulated, leading to the creation of an efficient and collaborative management system for the Group's comprehensive green and low-carbon transformation and development.

治理架构 Governance Structure	负责机构 Responsible Institution	工作职责 Responsibilities
董事会 Board of Directors	董事会及各专门委员会 Board of Directors and all specialized committees	● 战略与投资委员会、审计与风险委员会等专业委员会负责对宝武集团中长期发展战略规划进行研究并提出建议；审查宝武集团年度经营计划、投资计划并提出建议；负责检查指导全面风险管理体系的有效运行；审查全面风险管理年度工作计划和年度报告、风险管理策略和重大风险管理解决方案、合规管理战略规划、基本制度和年度报告等；审查应由董事会决定的相关事项等。 ● Professional committees, such as the Strategy and Investment Committee and the Audit and Risk Committee, are tasked with researching and providing recommendations on Baowu's medium-term and long-term strategic development plans; reviewing the Group's annual business and investment plans and offering suggestions for improvement; overseeing and guiding the operation of the comprehensive risk management system; reviewing the annual work plan and report for comprehensive risk management, risk management strategies and major risk management solutions, compliance management strategic planning, foundational systems and annual reports, etc and reviewing relevant matters that require a decision by the Board of Directors, etc.
管理层 Management Team	碳中和推进委员会 Carbon Neutrality Promotion Committee	● 审议宝武集团绿色低碳发展总体目标和碳达峰碳中和行动方案，研究推进碳中和推进过程中重要事项和重大问题，统筹宝武集团内外部资源支持碳达峰碳中和目标实现。 ● The Carbon Neutrality Promotion Committee reviews Baowu's overall green and low-carbon development goals, along with its action plan for achieving carbon peaking and carbon neutrality, addresses critical issues and significant challenges in advancing carbon neutrality, and coordinates both internal and external resources to achieve carbon peaking and carbon neutrality goals.
	碳中和办公室 能源环保部 Carbon Neutrality Office Energy & Environmental Protection Department	● 负责碳中和管理体系建设；组织推进落实碳达峰碳中和行动方案；组织碳达峰碳中和相关政策研究与研修；推动重点排放单位参加碳排放权交易，完成碳排放配额履约。 ● The Office of Carbon Neutrality is responsible for building a robust carbon neutrality management system. They organize and promote the implementation of the carbon peaking and carbon neutrality action plan, conduct research and training on relevant policies, and encourage key emission units to participate in carbon trading and meet their carbon emission quotas. ● 能源环保部负责推进关键工序能效标杆创建，推广节能降碳最佳适用技术应用；跟踪研究国家能源相关政策；策划绿色低碳劳动竞赛，征集评选绿色低碳最佳实践案例。 ● The Energy and Environmental Protection Department is responsible for developing energy efficiency benchmarks for key processes and promoting the application of the best available technologies for energy conservation and carbon reduction. They also monitor national energy policies, organize green and low-carbon labor competitions, and identify and promote exemplary practice cases.
执行层 Execution	职能部门及子公司 Functional departments and subsidiaries	● 各职能部门根据职责推进相关工作。子公司建立和健全碳达峰碳中和管理体系，制定碳达峰碳中和行动方案，积极落实中国宝武碳达峰碳中和有关决策要求和工作部署。 ● Each functional department must advance relevant initiatives in line with their responsibilities. All subsidiaries should establish their own carbon peaking and carbon neutrality management systems, formulate action plans, and implement the requirements and tasks set forth to achieve the Group's carbon peaking and carbon neutrality goals.

绿色低碳行动战略

Green and Low-Carbon Action Strategies

宝武集团坚决贯彻落实习近平主席重要指示批示精神，积极承担推动钢铁业绿色低碳转型的重任，勇当新型低碳冶金现代产业链链长，多措并举应对气候变化带来的风险和机遇，积极开展基础性、前沿性低碳冶金技术研发，描绘绿色制造、绿色产品、绿色产业全景图，绿色低碳转型发展迈出了坚实的步伐，为实现“双碳”目标、应对气候变化奠定坚实基础，在世界钢铁行业树立了标杆形象。2023 年 9 月 23 日，宝武集团碳中和推进委员会提出绿色低碳四个工作原则。

Baowu has upheld the directives and guidance of President Xi Jinping, undertaking the mission of promoting green and low-carbon transformation of the steel industry. Acting as a leader in the modern low-carbon metallurgical industrial chain, Baowu has adopted a comprehensive approach to addressing the risks and opportunities presented by climate change. The Group has actively conducted R&D on foundational and cutting-edge low-carbon metallurgical technologies, striving to realize a vision of green manufacturing, green products, and green industries. Through these concrete actions, it has laid a solid foundation for achieving carbon peaking and carbon neutrality goals and addressing climate change, establishing a benchmark within the global steel industry. On September 23, 2023, the Carbon Neutrality Promotion Committee of Baowu proposed four working principles for driving green and low-carbon development.

四个原则

Four Principles

强化三种思维方式
Strengthen three ways of thinking

牢固树立市场化思维、国际化思维和法治化思维，始终把这三种思维方式作为解决问题的方向。

Maintain a market-oriented, international, and law-based perspective, consistently applying these three ways of thinking as the guiding principles for problem-solving.

坚持创新主体地位
Prioritize innovation

积极发挥科技创新引领作用，强化国际合作和基础研究，提升创新体系能力，搭建价值创新的开放平台。

Leverage the leading role of technological innovation, strengthen international cooperation and basic research, enhance the innovation system, and promote the construction of an open innovation platform.

坚持战略规划定力
Adhere to strategic planning

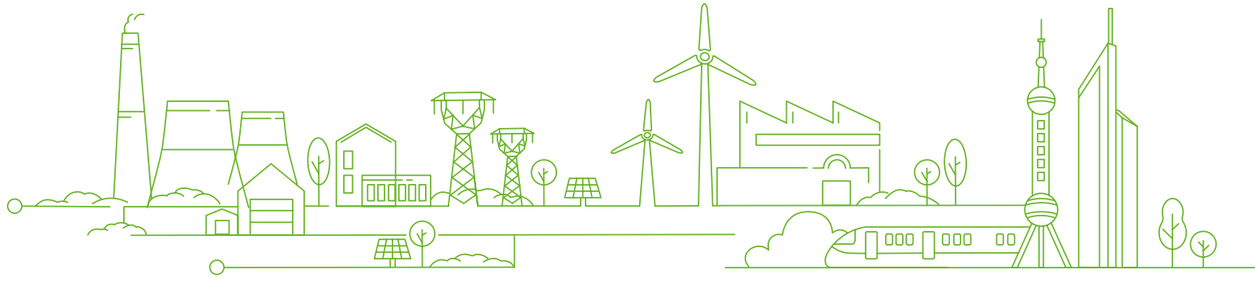
坚定不移地把碳中和六条技术路径推进下去，加快推进富氢碳循环氧气高炉（HyCROF）技术和氢还原电熔炼工艺（HyRESP）技术两条核心技术路径。

Continue to advance the "six technological paths" toward achieving carbon neutrality and accelerate the development of the two core technologies: HyCROF technology and HyRESP technology.

坚持统分结合工作基调
Balance top-level design with customized practice

既强调顶层设计更注重基层实践，各单位要根据各自的资源禀赋、产品特点、工艺条件度身定制“一企一方案”。

Emphasize top-level design with the development of a customized "one plan for one enterprise" strategy for each subsidiary based on their unique resource endowments, products, and processes.



六大技术路径

Six major technological evolution paths

极致能效
Extreme energy efficiency

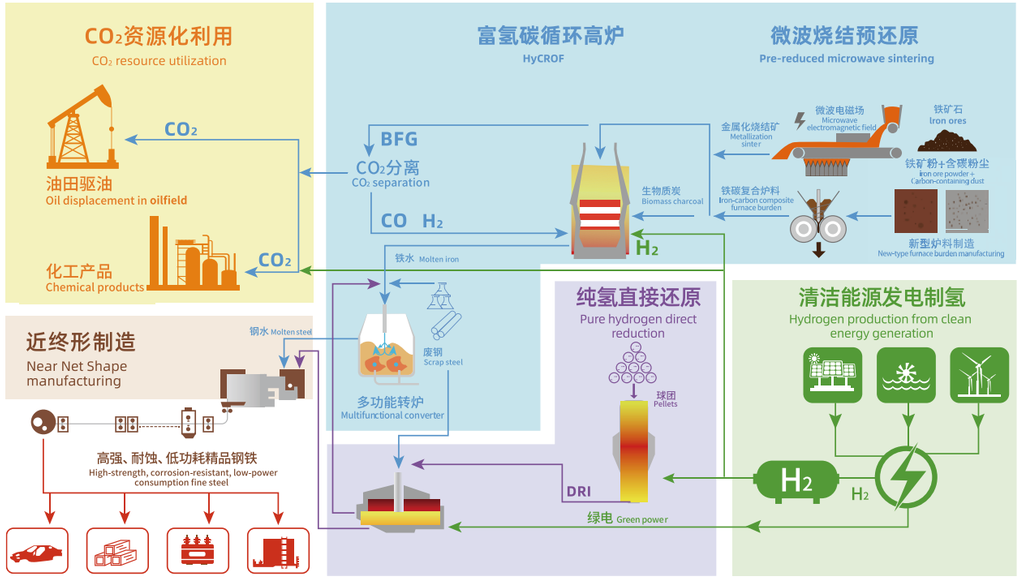
富氢碳循环氧气高炉（HyCROF）
HyCROF

氢基竖炉
Hydrogen-based shaft furnace

冶金资源循环利用
Cyclic utilization of metallurgical resources

近终形制造
Near Net Shape (NNS) manufacturaing

CO_2 回收及资源化利用
CO_2 recovery and utilization



中国宝武碳中和冶金技术路线图
Baowu Metallurgical Technology Roadmap Towards Carbon Neutrality

绿色低碳指标与目标

Green and Low-Carbon Indicators and Objectives

2021 年 1 月，中国宝武在钢铁行业率先发布碳达峰碳中和的路线图、时间表，力争 2050 年实现碳中和。

In January 2021, China Baowu became the first in the steel industry to announce a roadmap and timeline for carbon peaking and carbon neutrality, with a goal of achieving carbon neutrality by 2050.

中国宝武近中期碳减排目标
Baowu's near and medium term decarbonization objectives

2025 年具备减碳 30% 工艺技术能力，2035 年力争减碳 30%。

To develop process technologies necessary to achieve a 30% reduction in carbon emissions by 2025 and to accomplish a 30% reduction in carbon emissions by 2035.

碳减排主要措施 Main measures for reducing carbon emissions	阶段性成果 Progress and outcomes
富氢碳循环氧气高炉（HyCROF）技术 HyCROF technology	● 430m³ 富氢碳循环氧气高炉（HyCROF）工业试验取得阶段性成果，与基准期相比，固体燃料消耗下降了约 30%，单位铁水碳排放下降 21%。 ● Significant progress has been made in the industrial experiment of 430 m³ HyCROF. Compared to the reference period, solid fuel consumption has decreased by approximately 30%, while carbon emissions per unit of molten iron have been reduced by 21%. ● 2023 年 9 月 28 日，2500m³ 富氢碳循环氧气高炉（HyCROF）投入试运行，截至 12 月底，基本实现了单位铁水碳排放下降 15% 的阶段性目标。 ● On September 28, 2023, the 2,500 m³ HyCROF was put into trial operation. By the end of December, the phased target of reducing carbon emissions per unit of molten iron by 15% has been achieved.
氢还原电熔炼工艺（HyRESP）路径 HyRESP technology	● 2022 年 2 月 15 日，氢基竖炉项目在湛江钢铁基地开工建设。 ● On February 15, 2022, construction began on the hydrogen-based shaft furnace project at the Zhanjiang Iron & Steel Base. ● 2023 年 12 月 23 日，百万吨级氢基竖炉项目热负荷试车，成为世界首套集成氢气、天然气、焦炉煤气等多种还原气的工业化直接还原示范线。 ● On December 23, 2023, load commissioning was conducted for the million-tonnes hydrogen-based shaft furnace project, marking the world's first industrial-scale direct reduction demonstration production line integrating various reducing gases such as hydrogen, natural gas, and coke oven gas.
极致能效推荐技术推广应用 Promotion and application of recommended extreme energy efficiency technologies	● 制定《中国宝武能效标杆创建工作方案（2023——2025 年）》。 ● Developed *China Baowu Work Plan for Creating Energy Efficiency Benchmarks (2023-2025)*. ● 发布《中国宝武钢铁基地主要工序关键能效指标对标评价办法 V2.0》。 ● Released *China Baowu Benchmarking and Evaluation Measures for Key Energy Efficiency Indicators of Main Technological Processes in Iron and Steel Bases (V2.0)*. ● 将《中国宝武极致能效推荐技术目录（2022 版）》推荐极致能效技术应用情况纳入对标评价体系。截至 2023 年底，推荐技术应用比例较上年提升 15%。 ● Incorporated the application of the extreme energy efficiency technologies recommended by the *China Baowu Catalogue of Recommended Energy Efficiency Maximization Technologies (2022)* into the benchmarking and evaluation system. By the end of 2023, the proportion of recommended technologies applied has increased by 15% year-on-year.

造绿篇
三位一体极致降碳
Green Manufacturing
Three-in-One Strategy to Ultimate Decarbonization

宝武集团积极践行碳达峰碳中和重大战略决策，将绿色作为企业的生命底色和战略基色，大力推进“绿色制造、绿色产品、绿色产业”三位一体绿色发展模式，勇当新型低碳冶金现代产业链链长。

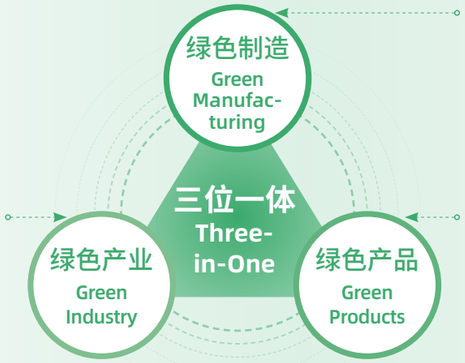
Baowu is committed to the strategic goal of achieving carbon peaking and carbon neutrality, embracing green as its core value and strategic direction to promote the three-in-one green development model that encompasses "green manufacturing, green products, and green industry," which has positioned the Group as a leader in the modern low-carbon metallurgical industrial chain.

构筑绿色制造、绿色产品、绿色产业三位一体的绿色发展模式。

Three-in-one green development model encompassing "green manufacturing, green products, and green industry".

发展绿色资源能源产业，探索产业绿色化和绿色产业化耦合发展新模式。

Develop green resource and energy industry and explore green transformation paths for the steel industry.



以绿色制造为目标，探索低碳冶金新工艺新技术，打造原创技术策源地。

Explore new low-carbon metallurgical processes and technologies and build itself into a pioneer in original green manufacturing technologies.

以产品卓越为目标，围绕“高强度、高耐蚀、高效能”打造中国宝武精品，打造绿色低碳产业链。

Focus on "high strength, high corrosion resistance, and high efficiency" to deliver premium positioning based products of Baowu and build a green and low-carbon industrial chain.

打造绿色制造新引擎

Creating a New Driving Force for Green Manufacturing

我们的挑战
Our challenges

在国家“双碳”政策背景下，如何主动适应绿色低碳发展新形势，发挥技术创新主体和原创技术策源地作用，部署和研发颠覆性、前瞻性低碳前沿技术，构建“绿色制造、制造绿色”循环低碳发展体系，引领供应链上下游共同实现绿色化低碳化改造，促进钢铁行业健康可持续发展，是我们肩负的时代任务。

To achieve carbon peaking and carbon neutrality, the challenges we face for promoting the healthy and sustainable development of the steel industry in this era include adapting to the new landscape of green and low-carbon development, harnessing the role as a driver of technological innovation and a source of original technologies, developing and deploying breakthroughs and forward-looking low-carbon technologies, establishing a green manufacturing system that supports circular and low-carbon development, and leading the transformation of the upstream and downstream segments of our supply chain.

我们的行动
Our actions

- 探索绿色低碳冶金新技术，强化基础研究，打造原创技术策源地。

  Explore new green and low-carbon metallurgical technologies, strengthen basic research, and establish ourselves into a source of original technology.

- 扎实开展重点工序能效标杆创建，加快培育能效“领跑者”。

  Set energy efficiency benchmarks for key processes and position ourselves as a leader in energy efficiency.

- 加快创建绿色工厂，厚植钢铁绿色发展底色。

  Build green factories and promote the green development of the steel industry.

我们的绩效
Our performance

环保总投入
155.97 亿元
A total investment of RMB **15.597** billion in environmental protection

绿色指数总体提升
9.3 分
The overall green index increased by **9.3** points

吨钢综合能耗较 2022 年下降 **1.0** %

吨钢二氧化碳排放较 2022 年下降 **1.3** %

Compared to 2022, the comprehensive energy consumption per tonne of steel and the carbon dioxide reduction rate per tonne of steel decreased by **1.0**% and **1.3**%, respectively.

二氧化硫排放较 2022 年下降 **13** %

氮氧化物排放较 2022 年下降 **10** %

化学需氧量排放较 2022 年下降 **15** %

Compared to 2022, the emissions of sulfur dioxide, nitrogen oxides, and chemical oxygen demand (COD) decreased by **13**%, **10**%, and **15**%, respectively.

注：按《中国钢铁生产企业温室气体排放核算方法与报告指南》（2013）核算 CO_2 排放。

Note: CO_2 emissions are calculated in accordance with the *Guidelines for Greenhouse Gas Emission Accounting and Reporting for Chinese Steel Production Enterprises (2013).*

探索绿色低碳新技术，打造原创技术策源地

Exploring low-carbon metallurgical technologies and establishing incubation bases for original technologies

实现碳达峰碳中和是一项复杂的系统工程，不可能一蹴而就。要克服碳减排约束与未来经济增长之间的矛盾问题，唯有科技创新。中国宝武以绿色制造为目标，积极布局碳中和技术研究，以重大战略项目落地为牵引，引领并促进钢铁绿色新生态。立足长流程钢厂这一现实基础，围绕富氢碳循环氧气高炉（HyCROF）为核心的高炉转炉流程和以氢基竖炉为基础的氢还原电熔炼工艺（HyRESP）流程两条主要技术路径，掌握适合不同场景的碳中和冶金关键核心技术，全力打造具有全球影响力的新型低碳冶金现代产业链链长和绿色低碳原创技术策源地。

An oak is not felled at one stroke. Similarly, achieving carbon peaking and carbon neutrality is not something that can be accomplished overnight. Technological innovation is the key to resolve the tension between the need for carbon reduction and future economic growth. With a focus on green manufacturing, Baowu has actively integrated research on carbon neutrality technologies into its strategic framework and has pushed forward the implementation of major strategic projects to lead and promote the greening of the entire new steel ecosystem. By leveraging its extensive experience in long-process steel manufacturing and focusing on two main technological paths–the blast furnace and basic oxygen furnace (BF-BOF) process centered around the HyCROF and the HyRESP based on a hydrogen-based shaft furnace. Baowu has mastered key core technologies for carbon-neutral metallurgy across various scenarios. These efforts have positioned the Group as a leader in the modern low-carbon metallurgical industrial chain, enabling it to exert global influence and establish incubation bases for green and low-carbon original technologies.

富氢碳循环氧气高炉（HyCROF）技术取得重大突破

Achieving significant breakthroughs in HyCROF technology

以八钢公司 430m^3 试验高炉为基础，建立了 HyCROF 工业级低碳冶金试验平台，打通了 HyCROF 工艺全流程，成功实现了固体燃料消耗降低 30%、碳减排 21% 的阶段性目标。2023 年 9 月 28 日，2500m^3 富氢碳循环氧气高炉（HyCROF）商业示范项目正式投运；10 月 26 日，实现全氧冶炼、煤气自循环工艺全线贯通，标志着中国宝武低碳冶金技术研发历经多年锤炼进入商业化试运行阶段，为中国宝武绿色低碳高质量发展奠定基础。

Leveraging the 430 m^3 blast furnace at Bayi Iron & Steel, Baowu has established an industrial-scale HyCROF low-carbon metallurgy experimental platform that encompasses the entire HyCROF process, successfully achieving the phased targets of reducing solid fuel consumption by 30% and carbon emissions by 21%. On September 28, 2023, the 2,500 m^3 HyCROF commercial demonstration project was officially put into operation. By October 26, 2023, the oxygen smelting and gas self-circulation processes were fully integrated, marking the complete commercialization of Baowu's achievements in low-carbon metallurgical technologies after years of refinement and iteration, and laying a solid foundation for Baowu's continued low-carbon and high-quality development.

HyCROF 阶段性重大技术突破

Major technical breakthroughs based on HyCROF

探索 Exploration

- 2020 年 10 月 11 日，突破传统高炉富氧极限，达到鼓风含氧 35% 的一期试验目标。
  On October 11, 2020, the HyCROF pushed the boundaries of the oxygen enrichment rate of traditional blast furnaces in its first phase, achieving Phase I experimental goals of 35% oxygen content of blast furnace.
- 2021 年 6 月 11 日，完成脱碳煤气喷吹，成为全球首座实现喷吹脱碳煤气的工业级高炉。
  On June 11, 2021, HyCROF accomplished decarburized gas injection, becoming the world's first industrial grade smelting furnace with decarburized gas injection.
- 2021 年 8 月 8 日，成功喷吹焦炉煤气，实现了 50% 高富氧、15% 碳减排的二期试验目标。
  On August 8, 2021, coke oven gas was successfully injected into the HyCROF tuyere for hydrogen-enriched smelting, achieving Phase II experimental goals of 50% high oxygen content and 15% reduction in carbon emissions.

突破 Breakthrough

- 2021 年 12 月 18 日，HyCROF 三期项目改造工程开工建设。
  On December 18, 2021, the renovation project for HyCROF Phase III began.

赶超 Overtaking

- 2022 年 7 月，全球首台 430m^3 工业级富氢碳循环氧气高炉（HyCROF）建成投运，打通创新工艺全流程，实现固体燃料消耗降低达 30%，碳减排超 21%，成为冶金行业首个实现工业化应用的绿色低碳新工艺。
  In July 2022, the world's first 430 m^3 industrial HyCROF was completed and put into operation, connecting the entire HyCROF process, achieving a 30% reduction in solid fuel consumption and over 21% reduction in carbon emission. The HyCROF technology hence becomes the metallurgical industry's first new low-carbon process suitable for industrial application.

跨越 Leaping forward

- 2023 年 9 月 28 日，2500m^3 富氢碳循环氧气高炉（HyCROF）商业示范项目建成投运。
  On September 28, 2023, the 2,500 m^3 HyCROF commercial demonstration project for low-carbon metallurgy was completed and put into operation.

案例 八钢公司 2500m³ 富氢碳循环氧气高炉（HyCROF）商业示范项目建成投运

Case Bayi Iron & Steel's 2,500 m³ HyCROF commercial demonstration project for low-carbon metallurgy was completed and put into operation

2023 年 9 月 28 日，八钢公司 2500m³ 富氢碳循环氧气高炉（HyCROF）商业示范项目建成投运，标志着中国宝武低碳冶金技术研发历经多年锤炼进入商业化试运行阶段，将为八钢公司低碳、高效、低成本、高质量发展奠定基础。该项目预计将实现年减排二氧化碳近 100 万吨，相当于在新疆再造一个 1000 平方公里的森林，同时也标志着中国宝武打造工业绿色低碳原创技术策源地取得重大突破，为全球炼铁技术低碳发展指明了方向，在世界冶金史上掀开崭新的一页。

On September 28, 2023, the 2,500 m³ HyCROF commercial demonstration project for low-carbon metallurgy at Bayi Iron & Steel was completed and put into operation, marking the full commercialization of Baowu's low-carbon metallurgical technology research and development after years of refining and iterating. This lays a solid foundation for Bayi Iron & Steel's low-carbon, efficient, low-cost, and high-quality development, and is expected to achieve an annual emission reduction of nearly 1 million tonnes of carbon dioxide, equivalent to planting a 1,000 km² forest in Xinjiang. This groundbreaking achievement positions Baowu as a leader developing original green and low-carbon industrial technologies, providing a roadmap for global low-carbon blast furnace smelting, and marking a new chapter in the history of global metallurgy.

CO_2

该项目预计将实现年减排二氧化碳近
100 万吨
This project is expected to achieve an annual emission reduction of nearly **1** million tonnes of carbon dioxide

相当于在新疆再造一个森林
1000 平方公里
Equivalent to planting a **1,000** km² forest in Xinjiang

相关方评价
Stakeholder Evaluation

亚洲钢铁企业对高炉仍有很大依赖性。预计到 2050 年，仍有 50% 的钢铁产品采用高炉工艺生产。在此背景下，宝武集团通过探索富氢碳循环氧气高炉（HyCROF）技术寻求创新突破，对钢铁行业减排具有积极意义。

Asian steel companies still rely heavily on blast furnaces. It is expected that by 2050, 50% of steel products will still be produced using blast furnace technology. In this context, Baowu seeks for innovative breakthroughs by exploring HyCROF technology, which holds significant potential for reducing emissions in the steel industry.

——世界钢铁协会总干事 艾德温・巴松

– Dr. Edwin Basson, Director General of the World Steel Association

氢还原电熔炼工艺（HyRESP）技术取得重大进展
Making significant progress in HyRESP technology

氢能是最具发展潜力的清洁能源之一。与传统碳冶金相比，氢冶金以氢气为燃料和还原剂，可以使炼铁摆脱对化石能源的依赖，从源头上解决碳排放问题。在中国宝武碳中和冶金技术路线图中，将氢基竖炉为核心的氢冶金工艺确定为碳中和冶金技术的重要路径之一。2022 年 2 月 15 日，氢基竖炉项目在湛江钢铁基地开工建设；2023 年 12 月 23 日，建成投运进行热负荷试车。中国宝武探索“氢基竖炉 + 高效电炉”的全流程高等级薄板“零碳工厂”迈出坚实的步伐。

Hydrogen energy is one of the most promising clean energy sources. Unlike traditional carbon metallurgy, hydrogen metallurgy uses hydrogen as both a fuel and a reducing agent, enabling iron smelting to reduce its reliance on fossil fuels and address carbon emissions at the source. In its technology roadmap for carbon neutrality metallurgy, Baowu positions the hydrogen metallurgical process centered around hydrogen-based shaft furnace as one of the important paths to achieve carbon-neutral metallurgy. On February 15, 2022, construction began on the hydrogen-based shaft furnace project at the Zhanjiang Iron & Steel Base. On December 23, 2023, the project was completed and put into operation for thermal load testing, marking a significant milestone as Baowu explores the development of a zero-carbon plant, featuring a full production process with a hydrogen-based shaft furnace and a high-efficiency electric furnace.

案例 国内首套百万吨级氢基竖炉项目建成投产

Case China's first million-tonne hydrogen-based shaft furnace project ignited and put into operation

2023 年 12 月 23 日，国内首套百万吨级氢基竖炉项目建成投产，该项目是国内最大集成采用多气源并最终采用全氢进行工业化生产直接还原铁的示范产线。项目投产标志着湛江钢铁向打造世界最高效率、最具竞争力的绿色碳钢制造基地，实现绿色低碳可持续发展又迈出了坚实的一步，也意味着宝武集团以勇当新型低碳冶金现代产业链链长的战略主动，面向世界科技前沿，实现绿色低碳冶金技术新突破，引领世界钢铁行业在低碳转型发展道路上走在最前列。

On December 23, 2023, China's first million-tonne hydrogen-based shaft furnace project was completed and put into operation. As the country's largest demonstration production line, it integrates multiple gas sources and ultimately utilizes full hydrogen for the industrial production of direct reduced iron (DRI), representing a significant advancement for Zhanjiang Iron & Steel in its pursuit to establish the world's most efficient and competitive green carbon steel manufacturing base, while also achieving green, low-carbon, and sustainable development. It also signifies that Baowu Group has strategically positioned itself as a leader in the modern low-carbon metallurgy industry chain, advancing to the forefront of global technology, achieving new breakthroughs in green and low-carbon metallurgical technology, and leading the global steel industry in low-carbon transformation and development.

相关方评价
Stakeholder Evaluation

钢铁工业是实现绿色低碳发展的重要领域，湛江钢铁百万吨级氢基竖炉如期热试成功，是宝武集团绿色低碳发展征程的又一跨越，充分体现了宝武集团坚持高端化、智能化、绿色化、高效化的方向引领，充分展示了中国钢铁的减碳决心。

The steel industry is important for achieving green and low-carbon development. The successful hot commissioning of Zhanjiang Iron & Steel's million-tonne hydrogen-based shaft furnace as scheduled marks another leap for Baowu in its green and low-carbon development journey, fully reflecting the Baowu's commitment to high-end, intelligent, green and high-efficiency development, and fully demonstrating China's steel industry's determination to reduce carbon emissions.

——中国钢铁工业协会副秘书长，冶金工业信息标准研究院院长 张龙强

– Zhang Longqiang, Deputy Secretary General of the China Iron and Steel Association (CISA) and Director of the China Metallurgical Information and Standardization Institute (MISI)

强化基础研究，深入推进低碳冶金新技术创新

Strengthening basic research for advancing innovation in low-carbon metallurgical technologies

高炉－转炉流程方面

BF-BOF process

优化 430m^3 工业级富氢碳循环氧气高炉（HyCROF）工艺技术，平均作业率已达到 96%；推进转炉大废钢比冶炼技术研究，实现全流程减碳 40% 以上；开发高温无缺陷坯生产及直接轧制技术，实现装炉温度 830°C条件下的稳定生产；支撑中石油、中石化、中海油等中央企业百万吨级 CO_2 捕集储存利用示范项目建设；与中石化、壳牌、巴斯夫签署合作谅解备忘录，共同开发千万吨级 CCUS 项目。

We optimized the process technology of the HyCROF experiment platform, increasing the average monthly operating rate to up to 96%. This has contributed to a carbon reduction of over 40% across the entire process, further advancing research on smelting technology for high scrap ratio in basic oxygen furnace (BOF). We also developed high-temperature, defect-free billet production and direct rolling technology, achieving stable production with an average furnace loading temperature of 830℃ and a casting speed of 2.0 m/min. Furthermore, we developed a series of CO_2-resistant products to support the construction of million-tonne CO_2 capture, utilization and storage (CCUS) demonstration projects for enterprises such as CNPC, Sinopec, and CNOOC. We also entered into memorandums of understanding with Sinopec, Shell, and BASF to jointly develop a ten-million-tonne CCUS project.

氢冶金流程方面
Hydrogen metallurgy process

建成国内首台套氢冶金中试平台，开展氢基竖炉高品位球团制备技术、还原气体预处理技术、工艺模型优化技术等研究；完成千吨级钒钛矿预还原——电熔分——钛渣分选工业试验；研究电炉冶炼高等级薄板技术，为湛江建设“零碳工厂”提供技术支持。

We established China's first hydrogen metallurgy pilot-scale experimental platform to research hydrogen-based shaft furnace high-grade pelletizing technology, reduction gas pre-treatment technology, and process model optimization technology. We also completed industrial trials for pre-reduction, electric smelting separation, and titanium slag separation of thousand-tonne vanadium-titanium ore. Additionally, we conducted research on electric furnace smelting technology for high-grade thin plates, providing technical support for Baosteel Zhanjiang Iron & Steel's zero-carbon steel plate factory construction.

低碳冶金创新基金项目方面
Low-carbon metallurgy innovation fund projects

组织 2021 年度 22 个低碳创新基金项目中期评议，发表论文 87 篇（其中 SCI 收录 34 篇），申请发明专利 45 项（授权 9 项）；组织 2022 年度低碳创新基金项目遴选，从 119 项申报书中公开遴选 16 个项目，支持研究资金 2750 万元；发布 2023 年度低碳创新基金项目指南，确定 9 个项目指南方向和 1 个青年项目指南。

Firstly, we organized mid-term evaluations for 22 low-carbon innovation fund projects in 2021, published 87 papers (including 34 indexed by SCI), and applied for 45 invention patents (9 granted). Secondly, we organized the process for the 2022 low-carbon innovation fund projects, choosing 16 projects from 119 applications on an open basis, offering a total research fund of RMB 27.5 million. Thirdly, we released the guidelines for the 2023 low-carbon innovation fund projects, which determined nine guiding directions and one youth project guide.

案例 开展 CCUS 技术研究
Case Technological research carried out on CCUS

CCUS 被认为是钢铁等相关难减排行业低碳转型的可行技术选择以及实现碳中和目标的重要技术保障。现阶段，CO_2 资源化利用技术均未进入商业化、规模化工业应用阶段。2023 年，宝武集团中央研究院遴选一批与钢铁生产结合紧密、被广泛认为最具工业化应用前景的 CCUS 技术开展研究。

CCUS is considered a viable technological solution for low-carbon transformation in steel and many other hard-to-abate industries, and for achieving the carbon neutrality goal. While the commercial utilization and large-scale industrial application of CO_2 are still in the early stages of development, in 2023, Baowu Central Research Institute selected and conducted research on specific CCUS technologies that are closely integrated with steel production and widely considered to have the most industrial application prospects.

- 开发利用钢铁流程浓盐废水吸收固化 CO_2 工艺流程，建成 3.3m³/h 小型实验装置并成功完成实验研究，验证了该技术的可行性，为中试放大装置设计及中试研究奠定了基础。

  We developed a process for using concentrated salt wastewater from steel production to absorb and solidify through technological processes. We built a 3.3 m³/h small-scale experimental device and successfully completed the experimental research, verifying the feasibility of the technology. This has laid a foundation for the design of the pilot scale-up device and pilot-scale research.

- 建成 CO_2 加氢合成甲醇、CO_2 微生物发酵制乙醇等实验装置。

  We built experimental facilities for research on CO_2 hydrogenation for methanol synthesis and CO_2 microbial fermentation for ethanol production, with the experimental research currently underway.

- 建设 CO_2 捕集、钢渣矿化 CO_2 等中试试验示范装置。

  We built pilot experimental and demonstration facilities for CO_2 capture and steel slag mineralization, with corresponding pilot-scale research projects already initiated.

名词解释 Terminology

CCUS 即碳捕获、利用与封存（Carbon Capture, Utilization and Storage）技术，是 CCS 技术新的发展趋势，即把生产过程中排放的二氧化碳进行捕获、提纯，继而投入到新的生产过程中进行循环再利用或封存的一种技术。该技术具备实现大规模温室气体减排与化石能源低碳利用的协同作用，是未来应对全球气候变暖的重要技术选择之一。

Abbreviation for Carbon Capture, Utilization and Storage technology, a new evolution of CCS (Carbon Capture and Storage) technology that captures and purifies dioxide emitted during the production processes, allowing it to be recycled or stored in new production cycles. This technology combines large-scale greenhouse gas reduction with the low-carbon utilization of fossil energy and is considered one of the important alternative technologies for addressing global climate change in future.

- 与中石化、壳牌、巴斯夫签署四方 CCUS 合作项目联合研究协议，提供国内最大规模 CCUS 项目样板案例。

  Baowu inked a joint CCUS research agreement with Sinopec, Shell, and BASF for a four-party CCUS cooperation project in East China, aiming to provide sample cases for CCUS projects with the largest scale in China.

搭建技术交流平台，探索钢铁国际合作新范例

Strengthening technical exchanges to facilitate international cooperation in the steel industry

钢铁行业绿色低碳发展事关全社会的可持续发展。中国宝武积极推进行业技术交流和共享工作，以“全球低碳冶金创新联盟”为依托，积极对接全球冶金同行、上下游企业、高等院校、研究机构成员；以“全球低碳冶金创新论坛”为平台，推动全球钢铁行业树立创新、协调、绿色、开放、共享的新发展理念，凝聚全球冶金生态圈可持续发展强大合力，积极应对全球气候治理；以“全球低碳冶金创新基金”为抓手，聚焦绿色低碳冶金工艺技术，资助低碳冶金领域基础和应用基础研究、低碳冶金工艺技术探索和重大创新实践，支撑低碳冶金技术进步和行业转型升级。

The green and low-carbon development of the steel industry is crucial to attaining sustainable development goals. China Baowu has actively promoted technological exchanges and sharing within the industry, engaging closely with global metallurgical peers, upstream and downstream enterprises, universities, and research institutions through the Global Low-Carbon Metallurgical Innovation Alliance. Leveraging the Global Low-Carbon Metallurgical Innovation Forum, the Group has also fostered the establishment of a new development model centered on innovation, coordination, sustainability, openness, and shared growth within the global steel industry, with the goal of consolidating global efforts toward sustainable development in the metallurgical ecosystem and proactively addressing global climate change. Additionally, taking the Global Low-Carbon Metallurgical Innovation Fund as a starting point and focusing on green and low-carbon metallurgical processes, the Group has supported basic research and applied research, the exploration of low-carbon metallurgical technologies, and significant innovation practices in this field, thereby driving the progress of low-carbon metallurgical technologies and the transformation and upgrading of the sector.

2023 年 10 月，举办第十二届中国国际钢铁大会暨 2023 年全球低碳冶金创新论坛，聚焦钢铁行业未来低碳发展的路径、措施进行“华山论剑”，进一步凝聚绿色低碳转型共识，携手走向绿色未来，充分展现了负责任企业讲好中国钢铁故事、积极应对气候变化的生动实践。

In October 2023, the 12th China International Steel Congress and 2023 Global Low-Carbon Metallurgical Innovation Forum was held to share insights on the future low-carbon development paths and solutions for the steel industry, aiming to further consolidate the consensus on green low-carbon transformation and to foster collaboration toward a sustainable future, fully demonstrating the commitment of Chinese steel enterprises to act responsibly and take concrete steps in proactively addressing climate change.

积极参与《联合国气候变化框架公约》第 28 次缔约方大会（COP28），协同清华大学、力拓集团举办“面向碳中和的金属工业转型”主题边会活动。

Baowu actively participated in the 28th Conference of the Parties to the *UN Framework Convention on Climate Change* (COP28) and collaborated with Tsinghua University and Rio Tinto Group to hold a side event themed "Transition of Metal Industry Towards Carbon Neutrality".

受邀参加世贸组织（WTO）在日内瓦世贸组织总部举行的“促进钢铁脱碳公平竞争环境”公共论坛，提出在“共同但有区别责任”的原则下进行国际互认合作。

Baowu was invited to participate in the World Trade Organization (WTO) public forum "Promoting a Fair Competitive Environment for Steel Decarbonization," held at the WTO headquarters in Geneva, proposing to implement the international mutual recognition and cooperation based on the principle of Common But Differentiated Responsibilities.

推动能效标杆创建，加快培育能效“领跑者”

Promoting the creation of energy efficiency benchmarks and positioning ourselves as a leader in energy efficiency

宝武集团积极落实国家有关能效约束、能效达标等政策要求，以对标找差为基础、以节能项目为抓手、以能效达标杆为阶段性管理目标、以能源结构优化为长远追求，不断深化“极致能效”工作。2023 年，宝钢股份武钢有限、梅钢公司，中南钢铁中南股份、鄂城钢铁，昆钢公司等五家单位入选中国钢铁工业协会第二批“双碳最佳实践能效标杆示范厂培育企业”名单。

Baowu has actively implemented national policies and requirements related to energy efficiency constraints and conformity, continuously advancing its efforts in achieving "extreme energy efficiency" by identifying gaps through benchmarking, using energy-saving projects as the foundation, setting the attainment of energy efficiency benchmarks as phased management targets, and optimizing the energy structure as a long-term goal. In 2023, Wuhan Iron & Steel of Baosteel, Meishan Iron & Steel, Guangdong Zhongnan Iron & Steel of Zhongnan Iron & Steel, Echeng Iron & Steel, and Kunming Iron & Steel were selected by the CISA as part of the second batch of "Best Practice of Carbon Peaking and Carbon Neutrality Goals–Energy Efficiency Benchmark Demonstration Factory Incubating Enterprises."

完善对标评价体系

Refining the benchmarking and evaluation system

深入研究国家发改委发布的《工业重点领域能效标杆水平和基准水平（2023 年版）》、国家统计局发布的《关于原料用能及可再生能源统计的新规范》等政策文件；加强与新政策、新规范及新标准的衔接，聚焦重点工序能耗、余热余能回收等极致能效技术应用，修订完善对标评价体系，发布《中国宝武钢铁基地主要工序关键能效指标对标评价办法 V2.0》，为钢铁企业能效标杆创建提供支撑。

Baowu has conducted an in-depth study of the *Benchmark and Reference Levels for Energy Efficiency in Key Industrial Sectors (2023)* issued by the National Development and Reform Commission and the *New Standards for Statistical Reporting of Energy Used as Raw Materials and Renewable Energy* issued by the National Bureau of Statistics, among other related policies. The Group has made significant efforts to adapt to new policies, regulations, and standards, with a focus on applying energy efficiency maximization technologies, such as key process energy consumption and waste heat/energy recovery. It has revised and refined its benchmarking and evaluation system and has released the *China Baowu Benchmarking and Evaluation Measures for Key Energy Efficiency Indicators of Main Technological Processes in Iron and Steel Bases (V2.0)* to support steel enterprises in creating energy efficiency benchmarks.

推动能效标杆创建

Promoting the creation of energy efficiency benchmarks

编制并印发《中国宝武能效标杆创建工作方案（2023——2025 年）》，明确各钢铁子公司能效标杆创建的主要目标和重点任务；签订《节能环保目标责任书》，加快培育双碳最佳实践能效标杆示范工厂；组织集团专业团队开展极致能效评估指南研究，推进宝钢股份宝山基地、湛江钢铁、马钢股份、太钢不锈、新钢股份 5 家第一批中钢协示范培育企业开展试点评估。

Baowu has formulated the *China Baowu Work Plan for Creating Energy Efficiency Benchmarks (2023–2025)*, which outlines the primary goals and key tasks for creating energy efficiency benchmarks across its steel subsidiaries. The Group has also signed the *Letter of Responsibility on Energy Conservation and Environmental Protection Targets* to accelerate the development of demonstration factories in creating the energy efficiency benchmarks, aligned with the best practices for achieving the carbon peaking and carbon neutrality goals. Additionally, a specialized team from the Group has conducted research on the guidelines for the evaluation of energy efficiency maximization, promoting pilot evaluations for the first batch of demonstration enterprises, as designated by the CISA, including Baosteel's Baoshan Base, Zhanjiang Iron & Steel, Masteel, Shanxi Taigang Stainless Steel, and Xinyu Iron & Steel.

案例 马钢股份践行能效标杆创建行动，完成年度首笔省内绿电交易

Case Masteel's active role in creating energy efficiency benchmarks and completion of the first intra-provincial green power transaction of the year

马钢股份作为首批“双碳最佳实践能效标杆示范厂培育企业”，积极开展绿电资源调研，布局绿电开发与应用，推动能源结构转型发展。2023 年，马钢股份分别与上海申能新能源投资有限公司、国家电投集团安徽海螺售电有限公司、中广核新能源安徽有限公司三家单位旗下 8 家新能源电厂完成了 2023 年度首笔省内绿电交易，交易量为 75681 兆瓦时。

As one of the first batch of "Best Practice of Carbon Peaking and Carbon Neutrality Goals–Energy Efficiency Benchmark Demonstration Factory and Incubating Enterprises," Masteel has actively engaged in the investigation and research of green power resources, integrating the development and application of green power into its strategic business framework, and advancing the transformation and development of its energy structure. In 2023, Masteel completed the first intra-provincial green power transaction of 75,681 MWh with eight new energy power plants under Shanghai SHENERGY New Energy Investment Co., Ltd., SPIC Anhui Hailuo Electricity Sales Co., Ltd., and CGN New Energy Anhui Co., Ltd.

持续推广极致能效技术应用

Continuously promoting the application of energy efficiency maximization technologies

根据《中国宝武极致能效技术推荐目录（2022）》，组织各钢铁基地制定应用实施计划，截至 2023 年底，极致能效推荐技术应用比例达到 49%，较 2022 年提升 15 个百分点；烧结环冷余热回收蒸汽（发电）技术、高炉炉顶煤气余压回收（发电）技术等 27 项技术产线应用比例超过 74%；组织开展极致能效技术交流研讨活动，推动钢铁基地和多元产业能效提升。

We have guided all steel bases in developing their own application and implementation plans in alignment with *China Baowu Catalogue of Recommended Energy Efficiency Maximization Technologies (2022)*. As of the end of 2023, the application of these recommended technologies has reached 49%, a 15 percentage-point increase from 2022. Notably, the implementation of 27 technologies, including sintering circular-cooler waste heat recovery (steam power generation) and blast furnace top gas pressure recovery (power generation), has surpassed 74% across production lines. We have also organized several energy efficiency maximization technology exchanges and seminars to further enhance energy efficiency across steel bases and diversified businesses.

推进能源结构优化

Promoting optimization of energy structure

积极推动各钢铁企业因地制宜发展分布式可再生能源，加大天然气、绿电等清洁能源使用，努力减少化石能源使用；推动宝武清能规模化发展可再生能源，建设西藏扎布耶源网荷储一体化综合能源供应项目、河南三门峡源网荷储一体化项目等清洁能源示范项目；提升外购绿电比例、开展绿电交易，持续提升终端用电的绿色化与低碳化。

We have actively promoted the development of distributed renewable energy across all steel enterprises, tailoring efforts to local natural conditions. This includes increasing the use of clean energy sources, such as natural gas and green electricity, while minimizing the reliance on fossil fuels. Baowu Clean Energy has been encouraged to spearhead the large-scale development of renewable energy, establishing several clean energy demonstration projects, including the Xizang Zabuye "source + grid + load + storage" integrated comprehensive energy supply project and the Henan Sanmenxia "source + grid + load + storage" integration project. We have also increased the proportion of purchased green electricity, actively participated in green electricity transactions, and continuously expanded the green and low-carbon end-use of electricity.

加快创建绿色工厂，厚植钢铁绿色发展底色

Accelerating the development of green factories to consolidate the foundation for the steel industry's green development

牢固树立和积极践行“绿水青山就是金山银山”理念，统筹污染治理、生态保护、应对气候变化，协同推进降碳、减污、扩绿，促进人与自然和谐共生的现代化，助力钢铁行业碳达峰碳中和目标实现。

We have firmly embraced and actively implemented the principle that "lucid waters and lush mountains are invaluable assets," coordinating efforts in pollution control, ecological protection, and climate change response, and working collaboratively with all stakeholders to promote carbon reduction, pollution reduction, and green development. These efforts are aimed at accelerating the modernization process for harmonious coexistence between humans and nature, thereby supporting the steel industry in achieving its carbon peaking and carbon neutrality goals.

废气超低排

Ultra-low waste gas emissions

坚持方向不变、力度不减，持续深化超低排放结对协同工作机制，滚动更新超低排放改造重点项目清单，以项目化推进新进入集团的钢铁企业加快超低排放改造。

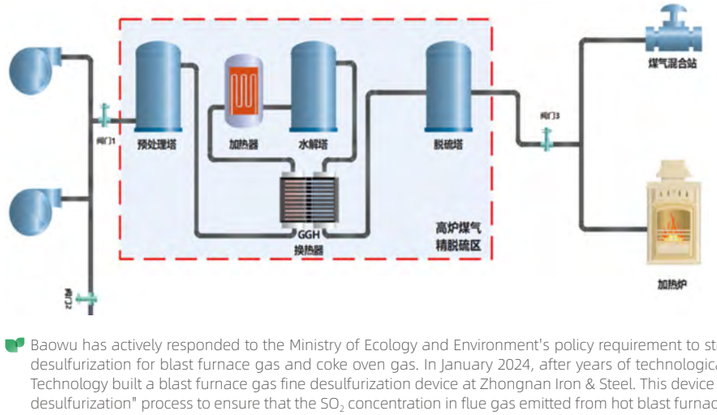
We have continued to advance the paired and coordinated mechanisms for achieving ultra-low emissions as planned by regularly updating the list of key projects for ultra-low emission transformations and accelerating the transformation processes for new steel subsidiaries on a project-by-project basis.

全面完成超低排放改造

Fully completed ultra-low emission transformation

2023 年，宝钢股份宝山基地、武钢有限、梅钢公司，以及马钢股份、长江钢铁、鄂城钢铁全面完成超低排放改造公示，获得地方环保主管部门认定的环保绩效 A 级企业。截至 2023 年底，8 家基地（包括 2023 年之前完成的太钢不锈和宝钢股份湛江钢铁）9300 万吨钢铁产能全面完成超低排放改造并公示。

In 2023, Baosteel's Baoshan Base, Wuhan Iron & Steel, Meishan Iron & Steel, Masteel, Changjiang Iron & Steel, and Echeng Iron & Steel fully completed their ultra-low emission transformation, with the corresponding public announcements made and their environmental performance rated Grade A by local environmental authorities. As of the end of 2023, eight bases (including Shanxi Taigang Stainless Steel and Baosteel's Zhanjiang Iron & Steel, which had completed their tasks before 2023) fully completed the ultra-low emission transformation for a total steel production capacity of 93 million tonnes and made the corresponding public announcements.



积极响应环境生态部提出的“加强源头控制，高炉煤气、焦炉煤气应实施精脱硫”政策，2024 年 1 月，宝武水务经过多年的技术开发研究，在中南股份建设成高炉煤气精脱硫装置，采用预处理→水解→干法脱硫工艺，保证热风炉、轧材等工序排放烟气中 SO_2 浓度达到超低排放标准要求。

Baowu has actively responded to the Ministry of Ecology and Environment's policy requirement to strengthen source control and implement fine desulfurization for blast furnace gas and coke oven gas. In January 2024, after years of technological development and research, Baowu Water Technology built a blast furnace gas fine desulfurization device at Zhongnan Iron & Steel. This device adopts a "pre-treatment → hydrolysis → dry desulfurization" process to ensure that the SO_2 concentration in flue gas emitted from hot blast furnaces, rolling mills, and other steps meets ultra-low emission standards.

废水零排放

Zero liquid discharge

制定《中国宝武废水零排放评价指标体系》（试行版），强化对标找差，持续降低废水排放总量，16 家长流程钢铁基地废水零排放能力评价结果总体提升 3.6 分。严格落实雨污分流的管理要求，对初期雨水进行收集与集中处理，处理后的雨水回用于生产过程。实施工业废水进行集中处理，通过工艺技术创新持续减少废水排放总量、降低废水中污染物排放浓度，严格落实达标排放，有效管控风险。2023 年，湛江钢铁在行业内首家实现全流程废水零排放，相关成果获得中国钢铁工业协会科学技术进步奖一等奖。

We have formulated the *China Baowu Evaluation Indicator System for Zero Liquid Discharge (Trial)* to strengthen gap identification through benchmarking and continuously reduce total liquid discharge. The overall evaluation scores for the zero liquid discharge capability across our 16 long-process steel bases have increased by 3.6 points. We have also strictly implemented management requirements for separating rainwater from sewage, collected and centrally treated initial rainwater, and reused the treated rainwater within the production process. Furthermore, we have implemented centralized treatment of industrial wastewater, continuously reducing total liquid discharge and pollutant concentrations through technological innovation, strictly supervising discharge compliance, and effectively managing all associated risks. In 2023, Zhanjiang Iron & Steel became the first in the industry to achieve zero liquid discharge across the entire process, winning the first prize in the Science and Technology Progress Award from the CISA for this achievement.

案例 宝武集团独有环保技术成功用于冶金焦化工业废水处理

Case Baowu's proprietary environmental technology successfully applied to the treatment of industrial wastewater from metallurgical coking process

2023 年，宝武水务成功研发臭氧微纳米气泡高级氧化工艺的应用技术，有效弥补传统臭氧氧化时水中臭氧的溶解度小且氧化具有选择性的不足问题，增强对难降解有机物的去除效果，有效解决技术瓶颈，实现关键核心技术的突破。该工艺技术投用后，可实现工业废水处理能力达 1000 吨 / 天，COD 去除率从原来的 25% 提升至 50%，臭氧利用率近 100%。该工艺不需要使用传统的固体催化剂，无污泥无危废产生，整套系统在稳定运行的同时可大大降低运营成本。

In 2023, Baowu Water Technology successfully developed an advanced oxidation process based on the ozone micro/nanobubble technology, effectively addressing the shortcomings of low solubility and selective oxidation of ozone in water inherent in traditional ozone-based oxidation processes. The technology enhances the removal of refractory organic substances, effectively solving technical bottlenecks, and achieving breakthroughs in key core technologies. With the application of this technology, the industrial wastewater treatment capacity can reach 1,000 tonnes per day, and the COD removal rate can be increased from 25% to 50%, with an ozone utilization rate nearing 100%, eliminating the need for traditional solid catalysts and producing no sludge or hazardous waste. The entire system operates stably while greatly reducing operating costs.

固废不出厂

No solid waste leaving the factory

研究编制《中国宝武钢铁集团有限公司“无废集团”建设试点工作方案》；制定并落实《中国宝武“无废城市”建设 2023 年度工作计划》，指导宝钢股份宝山基地发布“绿色无废城市钢厂”方案，支撑上海市“无废城市”建设工作。组织开展危险废物贮存更新标准专项培训。大力发展循环经济，持续开展固体废物、危险废物资源化利用，推动镁合金废料回收利用和报废汽车回收拆解和再生利用，提高资源综合利用效率。研究编制《钢铁企业固体废物管理指南》《钢铁企业固废不出厂管理指南》团体标准，以最大程度提高固废资源利用效率和减少其在社会上周转、加工、利用、处置等环境风险。2023 年，长流程钢铁基地按计划实现固废不出厂率≥ 99% 目标。构建矿山企业绿色发展指数评价体系，《铁矿采选企业生态环境管理指南》入选工信部 2023 年“百项”团体标准应用示范名单。

We have developed *China Baowu Pilot Work Plan for Building a Zero Waste Group* and formulated the *China Baowu Annual Work Plan for Building a Zero Waste City 2023*, providing guidance to Baosteel's Baoshan Base for releasing its Zero Waste Green Urban Steel Factories plan and supporting Shanghai's construction into a Zero Waste City. We have also organized special training on updated standards for hazardous waste storage, vigorously developed the circular economy, continuously promoted the resource utilization of solid waste and hazardous waste, and encouraged the recycling and reuse of magnesium alloy waste and scrapped vehicles to improve the comprehensive efficiency of resource utilization. Moreover, we have developed the social organization standards–*Guidelines for Solid Waste Management in Steel Enterprises* and *Guidelines for "No Waste Leaving the Factory" in Steel Enterprises*–to maximize the efficiency of solid waste resource utilization and reduce environmental risks associated with turnover, processing, utilization, and disposal outside of the factory. In 2023, the long-process steel bases achieved the target of ensuring that greater than or equal to 99% of solid waste does not leave the factory. Constructing the green development index evaluation system for mining enterprises. The *Guide to Ecological Environment Management of Iron Ore Mining and Dressing Enterprises* was selected into the 2023 "100 items" list of application demonstration group standards of the Ministry of Industry and Information Technology.

冶金尘泥综合利用 Comprehensive utilization of metallurgical dust and sludge

2023 年 2 月 26 日，八一钢铁建成投产国内规模最大、自动化程度最高的冶金尘泥综合利用项目，该项目采用回转窑工艺，设计产能为日处理冶金尘泥 600 吨，每年可处理 19 万吨冶金尘泥，实现尘泥资源再利用和零出厂。项目投产后，在实现固废资源的循环利用和零排放、消除环境污染的同时，每年可为企业产生经济效益 1 亿元。

On February 26, 2023, Bayi Iron & Steel completed and put into operation China's largest and most automated metallurgical dust and sludge comprehensive utilization project. The project employs rotary kiln technology, designed to process 600 tonnes of metallurgical dust and sludge daily, with an annual capacity of up to 190,000 tonnes. This enables the reuse of dust and sludge as resources, ensuring that no metallurgical dust or sludge leaves the factory. Once operational, the project can achieve the recycling and zero emission of solid waste, eliminate environment pollution, and generate annual economic benefits of RMB 100 million for the enterprise.

苯酐项目推动实现“生态循环” Ecological cycle in phthalic anhydride production projects

2023 年 7 月 14 日，宝武碳业宝化湛江 4 万吨 / 年混合法苯酐项目成功产出第一包产品，实现全流程贯通。该项目是宝武集团首个苯酐项目，产生的塔底残渣通过技术研究按比例返回生产综合利用实现危废“生态循环”，属于行业首创，是行业内循环经济的集大成者。

On July 14, 2023, Baosteel Chemical Zhanjiang (a subsidiary of Baowu Carbon) successfully produced the first batch of products from its 40,000 tonnes/year mixed phthalic anhydride project, marking the full integration of the production process. This project is Baowu's first venture into phthalic anhydride production. Notably, the tower bottom residues generated are reintroduced into the production line for proportional comprehensive utilization, effectively promoting ecological hazardous waste recycling. It is the first of its kind within the industry and represents a significant advancement in circular economy practices.

镁合金废料回收利用 Magnesium alloy waste recycling

2023 年 5 月 6 日，宝武镁业的镁合金废料回收及深加工循环生产数字化车间通过认定。该项目以镁合金废料回收利用为对象，通过关键智能化设备与配套软件系统，推进多种信息化系统集成应用，建成镁合金废料数字化回收车间，将镁合金废料循环与生产制造过程有机协同起来，实现回收循环与生产制造数字化、一体化，项目完成后将达到年处理 30000 吨镁合金废料的回收能力，回收率可以达到 98% 以上。

On May 6, 2023, Baowu Magnesium's digital workshop for recycling and deep processing of magnesium alloy waste successfully passed technological validation. The project team focuses on the recycling of magnesium alloy waste, leveraging key intelligent equipment and supporting software systems to promote the integration and application of various information systems. This project aimed to ultimately create a digital workshop that dynamically coordinates the recycling of magnesium alloy waste with production and manufacturing processes, achieving digitalization and integration of both recycling and production. Upon completion, it will process 30,000 tonnes of magnesium alloy waste annually, with a recycling rate exceeding 98%.

报废机动车回收拆解 Scrapped vehicle recycling and dismantling

2023 年 9 月，欧冶链金马钢智信报废机动车回收拆解项目正式投产试运行。报废汽车回收拆解和再生利用是节约资源、实现资源永续利用的重要途径，是我国实现循环经济可持续发展的重要措施之一。该项目年拆解能力可达 10000 辆，在践行“双碳”经济、循环经济，打通汽车产业链上下游过程中迈出关键性一步。

In September 2023, Magang Zhixin Resource Technology (a subsidiary of Ouyeel Lianjin Recycling Resources) officially launched the trial operation of its scrapped motor vehicle recycling and dismantling project. The recycling, dismantling, and reuse of scrapped vehicles are important in conserving resources and promoting sustainable resource utilization, and are also key measures in China's pursuit of sustainable development within the circular economy. With an annual dismantling capacity of 10,000 vehicles, this project marks a significant step toward achieving carbon peaking and carbon neutrality goals, developing the circular economy, and strengthening the integration of the upstream and downstream of the automotive industry chain.

领跑绿色精品新赛道

Leading the Way in the New Track of High-Quality Green Products

我们的挑战
Our challenges

2023 年 10 月，欧盟碳边境调节机制（CBAM）正式进入试运行阶段，过渡期到 2025 年底，2026 年至 2034 年逐步全面实施，2035 年后则完全取消欧盟碳排放交易体系（EU-ETS）所覆盖高碳产品的免费碳配额。欧盟将对从境外进口的特定产品额外征收碳边境调节费用，被称为“碳关税”，产品覆盖范围包括“电力、钢铁、铝业、水泥、化工、氢”六大行业。

In October 2023, the European Union (EU) officially launched the Carbon Border Adjustment Mechanism (CBAM) on a trial basis, with a transition period extending through the end of 2025. The CBAM will be gradually implemented from 2026 to 2034, with the complete elimination of free carbon quotas for high-carbon products covered by the EU Emissions Trading System (EU-ETS) after 2035. The EU will then impose additional carbon border adjustment fees, known as carbon tariffs, on specific imported products. These tariffs will impact six major industries: electricity, steel, aluminum, cement, chemicals, and hydrogen.

欧盟碳边境调节机制（CBAM）的出台，将对中国钢铁工业的工艺流程结构、供应链和市场竞争力带来深刻的影响。但机遇与挑战并存，将进一步促进中国钢铁企业加快科技创新，加快低碳产品研发，满足汽车、能源等下游用户转型发展的需求。

The introduction of CBAM will have a profound impact on the process structure, supply chain, and market competitiveness of China's steel industry. However, along with these challenges come opportunities, which will further promote Chinese steel enterprises to accelerate technological innovation and the R&D of low-carbon products, enabling them to better meet the transformation and development needs of downstream industries, including automotive and energy.

我们的绩效
Our performance

完成碳排放权交易履约 **100** %
100 % fulfillment rate of carbon trading contracts

有 **32** 家法人企业纳入全国和地方碳排放权交易市场。
32 corporate entities have been included in both national and local carbon trading markets.

地方碳配额履约情况
Performance of local emission allowance trading contracts

2023 年，湖北、广东、福建、重庆和上海等地方碳市场履约碳配额量 **1.3** 亿多吨。

In 2023, over **130** million tonnes of carbon emission allowance trading contracts have been performed in the local carbon markets of Hubei, Guangdong, Fujian, Chongqing, and Shanghai.

全国碳交易履约情况
Performance of nationwide carbon trading contracts

集团下属电力企业履约碳配额量 **2000** 多万吨（两个履约周期）。

The Group's subsidiary electricity enterprises have performed over **20** million tonnes of emission allowance trading contracts across two performance periods.

我们的行动
Our actions

- 实施钢铁产品全生命周期评价（LCA），开展钢铁产品绿色设计。
  Implement life cycle assessments (LCAs) for our steel products and adopt green design for steel products.
- 加大推动“高强度、高耐蚀、高效能”绿色产品的生产与应用。
  Advance the production and application of green products characterized by high strength, high corrosion resistance, and high efficiency.
- 布局低碳“零碳”产品开发，加强产品碳足迹认证。
  Take strategic measures to develop low-carbon and zero-carbon products and strengthen product carbon footprint certification.

中国宝武致力于打造绿色产品，不断开辟新赛道，面向建筑、桥梁、交通运输、能源、船舶等行业，向用户提供寿命延长、能效提升的高性价比绿色用材解决方案。聚焦高强度、高耐蚀和高效能核心关键，加快超低碳、零碳产品研发，形成一批中国宝武独有、首发的绿色精品。

China Baowu has committed itself to delivering green products and has been continuously exploring new opportunities, and providing users with cost-effective green material solutions that extend lifespan and improve energy efficiency across construction, bridge, transportation, energy, shipbuilding, and other industries. The Group has focused on core technologies for products with high strength, high corrosion resistance, and high efficiency, while accelerating the R&D of ultra-low carbon and zero carbon products, aiming to create a portfolio of unique and original premium green products under the China Baowu brand.

高强度 High strength

在延伸韧性保障的前提之下，以高强度为突出特色的产品可以实现轻量化，进而实现材料减量化生产和使用，从而达到材料生产环节和使用环节双重节能、减碳的效果，有效降低社会能耗。

While maintaining elongation, high-strength products have lighter weight, which reduces material consumption during production and decreases the quantity of products required for end use, and is, therefore, conducive to achieving the dual effect of energy saving and carbon reduction both in the material production process and at the end-use stage, effectively lowering overall societal energy consumption.

高耐蚀 High corrosion resistance

全世界每年被腐蚀损耗的钢铁材料总量十分显著，更换或涂装不仅带来更高的成本，还会产生更多的碳排放。以高耐蚀为突出特色的产品可以提升钢铁制品的使用寿命，实现材料减量化使用和少维护或免维护，降低成本的同时，实现减碳目标。

Each year, significant quantities of steel materials are lost to corrosion worldwide. The need for replacement or painting not only incurs higher costs but also generates additional carbon emissions. High corrosion resistance products can extend the service life of steel products, allowing for the use of lighter materials and requiring little to no maintenance. As a result, the carbon reduction goals can be achieved at a lower cost.

高效能 High efficiency

开发电磁性能更好、耐热温度更高、以高能效为突出特色的产品可以显著提升能源转换效率，助力社会能源结构转型，实现节能降碳。

Developing products with unique features of better electromagnetic performance, enhanced heat resistance, and higher energy efficiency can significantly improve energy conversion efficiency, support the transformation of the social energy structure, and realize energy saving and carbon reduction.

开发低碳排放钢产品
Developing low-carbon steel products

能源电力 Energy and electric power

当前，绿色、清洁电力能源是工业企业乃至全社会实现碳达峰碳中和目标的重要支撑，已成为国家能源发展的重要目标。中国宝武积极布局绿色、清洁电力能源开发与应用，开发优质钢材支撑国家能源转型，支持核电、水电、风电、光伏、输配电等领域建设，助力能源电力行业绿色发展。

Green and clean electricity sources are essential for industrial enterprises and society as a whole to achieve carbon peaking and carbon neutrality goals, and have become a key focus of national energy development. China Baowu has strategically advanced the development and application of green and clean electricity sources, developing high-quality steel to support the country's energy transformation, and contributed to the construction of nuclear power, hydropower, wind power, photovoltaic power, and electricity transmission and distribution systems, thereby supporting the green development of the energy and power industries.

水电 Hydropower

高强磁极水电钢领域的持续研发和技术创新，填补国内超高水头大管径水电站和超高水头抽水蓄能电站建设用材料的空白，为水电工程的建设和运营提供了可靠的支持。研制1000 兆帕级超高强、高性能水电钢，是目前世界上水电用钢中的顶级厚板产品，坚定了我国水电行业坚持“更高、更强”的技术创新道路的信心。

Our continuous research and technological innovation in high-strength magnetic pole steel based on hydropower have bridged the gap in China's materials required for the construction of ultra-high head hydropower plants with large-diameter pipes and ultra-high head pumped storage hydropower plants, providing reliable support for the construction and operation of these projects. Our development of 1,000 MPa ultra-high strength, high-performance hydropower steel is currently the world's best thick hydropower steel plate product, bolstering China's hydropower industry's confidence in pursuing "higher and stronger" technological innovation.

风电 Wind power

精品高强钢助力新疆标志性风电项目——达坂城二场项目，宝钢股份中厚板在云南金钟风电场工程项目中份额占比 86%，服务国家重大基础设施建设，支持绿色能源产业发展。

Our high-quality, high-strength steel has supported wind power projects such as the landmark Dabancheng Second (Longyuan) Wind Farm Project in Xinjiang. Additionally, Baosteel's medium-thick plates comprise 86% of the materials used in the Jinzhong Wind Farm Project in Yunnan. These contributions have served major national infrastructure projects and supported the development of the green energy industry.

核电

Nuclear power

开发出系列高品质核电用不锈钢产品，满足了当今最为先进的压水堆、快堆、聚变堆等不同核电技术的不锈钢材料需求，实现了我国核电用关键不锈钢材料从进口到自主、从堆外到堆内、从常规到尖端的转变。

We have developed a series of high-quality stainless steel products tailored to meet the diverse requirements of various nuclear power technologies, including pressurized water reactors, fast reactors, and fusion reactors. This transitioned key stainless steel materials in China's nuclear power industry from reliance on imports to domestic production, from external to internal reactor components, and from conventional to cutting-edge applications.

光伏

Photovoltaic

自主研发的光伏支架用超级耐候拉杆用钢全球首发，产品可实现光伏行业拉杆用钢的全生命周期免涂镀、免维护，为“双碳”战略目标赋能添彩；成功应用于楚雄双柏光伏项目，助力云南省乃至全国的能源结构调整。

Our independently developed super weather-resistant steel for photovoltaic brackets is the first of its kind in the world, which ensures that photovoltaic tie rods made from it remain in good conditions throughout their lifecycle without the need for coating or maintenance, thereby empowering and accelerating the achievement of carbon peaking and carbon neutrality goals. This steel has also been successfully applied to the Chuxiong Shuangbai Photovoltaic Project, supporting the adjustment of the energy structure in Yunnan Province and across the nation.

输配电

Electricity transmission and distribution

致力于取向硅钢的自主技术集成与产品迭代升级，从效率和成本上有效支撑变压器产业的转型发展，助力工业和电力传输领域推进“双碳”战略的落地。

We have committed to independently integrating technology and iteratively upgrading oriented silicon steel products, effectively supporting the transformer industry's transformation and development in both efficiency and cost, and assisting the implementation of the carbon peaking and carbon neutrality goals within the industry and power transmission sectors.

天然气

Natural gas

宝钢股份 UOE 焊管、LNG 储罐助力国家天然气产供储销和国家石油天然气基础设施重点工程项目，为粤港澳大湾区提供持续稳定的清洁能源；宝钢股份中厚板满足液化天然气船舶制造对于产品的极高要求，在—40°C的超低温条件下，屈服强度、焊接性能、耐腐蚀性能等各项指标均保持不变。

Baosteel's UOE welded pipes and LNG storage tanks have significantly supported national natural gas production, supply, storage, and sales, as well as key national oil and gas infrastructure projects, ensuring a sustained and stable clean energy supply for the Guangdong-Hong Kong-Macao Greater Bay Area. Additionally, Baosteel's medium-thick plates have met the exceptionally high standards required for LNG shipbuilding, maintaining yield strength, welding properties, corrosion resistance, and other performance metrics even under ultra-low temperature conditions of -40°C.

案例 宝钢股份 BG155V 高强高韧石油套管助力刷新亚洲陆上最深井纪录

Case Baosteel's BG155V high-strength and high-toughness oil casing enabled China's oil and gas to break record for the deepest onshore well in Asia

2024 年农历新年，我国首口万米科探井中国石油深地塔科 1 井，钻至地下 9850 米，创造了亚洲最深井纪录，宝钢股份 BG155V 高强高韧石油套管将助力该井实现深度超万米，刷新亚洲陆上最深井纪录，成为全球第二口陆地垂深超过万米的特深井。

During the Chinese New Year of 2024, China's first scientific exploration borehole, the drilling of the CNPC deep Tarim Science-1 well, reached a depth of 9,850m underground, setting a new record of the deepest well in Asia. Baosteel's BG155V high-strength and high-toughness oil casing is designed to enable the well to reach a depth of over 10,000m, breaking the record of the deepest onshore well in Asia and would make it the world's second ultra-deep well with a vertical depth of over 10,000m on land.

中石油深地塔科 1 井是我国首口万米科学探井，目标深度 11100 米，肩负着深地科学探索和为国家能源安全找油找气的历史使命。宝钢股份有针对性地开发了 4 种高强度高韧性、高抗挤毁、高气密封能力、特殊间隙的非标套管，开发出具有完全知识产权的全球首套无缝钢管在线控制冷却装备和关键核心技术，确保了产品在超高温高压以及复杂地质条件下的安全使用，同时也极大地推动了我国热轧无缝钢管绿色高效制造的技术引领示范和产品持续地迭代升级。

CNPC deep Tarim Science-1 well is China's first 10,000-meter scientific exploratory borehole, with a target depth of 11,100m. It shoulders the historical mission of deep-earth scientific exploration and the search for oil and gas to support national energy security. Baosteel has developed four types of non-standard customized oil casings with high strength, high toughness, high crush resistance, excellent gas tightness, and specialized clearances. Baosteel has also developed the world's first set of online controlled cooling equipment and key core technologies for seamless steel pipes with exclusive intellectual property rights, ensuring the safe use of products under ultra-high temperature, ultra-high pressure, and complex geological conditions. At the same time, this achievement has greatly promoted technological leadership and demonstrative effects, as well as the continuous iteration and upgrading of green and efficient manufacturing processes for hot-rolled seamless steel pipes in China.

案例 技术引领！国内首套水电站钢岔管用 1000 兆帕级超高强钢板交付

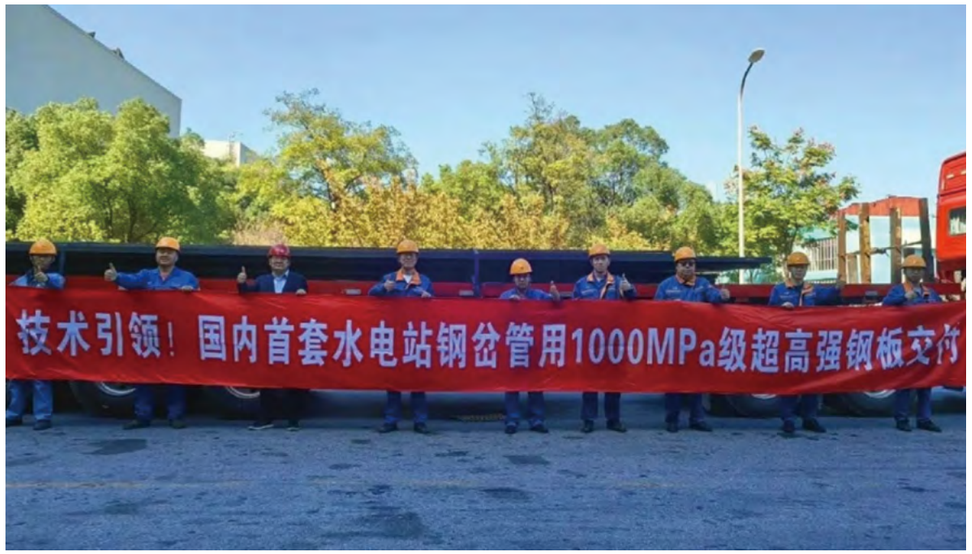
Case We lead the industry! China's first 1,000 Mpa-grade ultra-high-strength steel plates for bifurcated pipes in hydropower project delivered

2023 年 11 月，宝钢股份厚板事业部完成了某抽水蓄能电站项目用 1000 兆帕级超高强、高性能水电钢板的交付，标志着宝钢股份厚板全面掌握了 1000 兆帕级超高强、高性能水电用钢的批量稳定生产工艺技术，实现了 600 兆帕、800 兆帕、1000 兆帕级全系列水电用高强钢的持续技术引领。

In November 2023, Baosteel's Thick Plate Division successfully delivered 1,000 MPa ultra-high-strength, high-performance steel plates for a pumped storage hydropower project, marking that Baosteel's Thick Plate has full mastered the stable mass production technology for 1,000 MPa-grade ultra-high-strength, high-performance hydropower steel. It has also reinforced Baosteel's continued technological leadership across the full range of 600 MPa, 800 MPa, and 1,000 MPa high-strength hydropower steel products.

1000 兆帕级超高强、高性能水电钢，是目前世界上水电用钢中的顶级厚板产品，钢板技术要求极为严苛。为满足钢板高纯净、超高强度、低温韧性、高塑性的综合技术要求，宝钢股份水电钢研发团队迎难而上，不断攻克关键核心技术，历时 6 年完成了 1000 兆帕级高性能水电用钢的研制、第三方焊接工艺评定及专家鉴定，填补了国内空白。

The 1,000 MPa-grade ultra-high-strength, high-performance hydropower steel is currently the world's leading thick steel plate product for hydropower, with exceptionally stringent technical requirements. To meet the integrated technical requirements of high purity, ultra-high strength, low-temperature toughness, and high plasticity, Baosteel's hydropower steel R&D team confidently tackled key technological challenges. After six years of dedicated effort, they successfully developed the 1,000 MPa high-performance hydropower steel, which has passed third-party welding process evaluations and expert appraisals, filling the technological gap in China.



案例 中国宝武精品高强钢助力新疆标志性风电项目“迎风起舞”

Case China Baowu's premium high-strength steel powered Xinjiang's landmark wind power project completed

中国宝武精品高强钢变身“擎天柱”撑起“大风车”，助力新疆标志性风电项目——达坂城二场项目“迎风起舞”。达坂城二场项目是行业内首个采用 BWind420M 高强风电钢的风塔项目，创造了多个“首次”。此项目标志着中国宝武中央研究院综合材料解决方案中心以研促创，满足风电行业“钢需”取得标志性进展，也是八钢公司、宝钢股份东山基地多基地协同，为我国新能源建设贡献力量的生动案例。

China Baowu's premium high-strength steel has been supporting the wind turbines in Xinjiang's landmark Dabancheng Second Farm Project, enabling them to "dance in the wind." The Dabancheng Farm II Project is the industry's first wind turbine tower project to utilize BWind420M high-strength wind power steel, marking multiple groundbreaking achievements. This project marks a significant milestone for Baowu Central Research Institute's Comprehensive Material Solutions Center in advancing innovation through research to meet the steel demands of the wind power industry. It also serves as a representative case of collaboration among multiple production bases, including Bayi Iron & Steel and Baosteel's Dongshan Base, contributing to the development of new energy infrastructure in China.

2023 年 5 月，宝钢股份举办风电塔筒用高性能钢技术研讨会暨产品发布会，对外发布 BWind420MD、BWind500MD 产品，正式获颁“BWind500MD、BWind420MD 高强钢对接接头疲劳性能评估”技术评估符合证书，这标志着中国宝武正式成为业内首家成功突破国际标准限制、能够应用高强钢进行基于疲劳设计的轻量化减重风电塔筒设计与制造的材料供应商，揭开国内风电装备发展的新篇章。

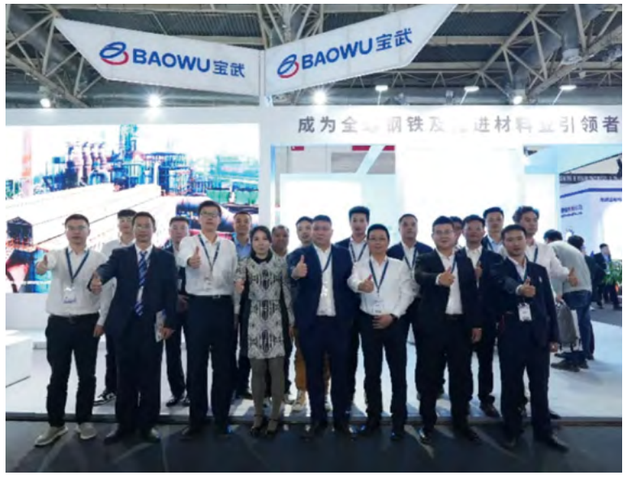
In May 2023, Baosteel held a technological seminar on high-performance steel for wind turbine towers, alongside a product launch event where the BWind420MD and BWind500MD products were officially introduced to the market. During the event, it was awarded the technical conformity certificate for the "BWind500MD and BWind420MD High-Strength Steel Butt Joint Fatigue Performance Evaluation", positioning China Baowu as the first material supplier in the industry to overcome international standard limitations, enabling the use of high-strength steel in fatigue-based lightweight and weight-reducing wind turbine tower design and manufacturing, thereby writing a new chapter in the development of domestic wind power equipment.

案例 太钢集团深耕 LNG 储罐行业市场，助力国家能源项目建设

Case TISCO developed the LNG tank market in support of China's energy construction projects

2023 年 2 月，太钢集团成功中标国家天然气产供储销和国家石油天然气基础设施重点工程项目——中海油珠海 LNG 二期扩建项目辅助供应商资格，承担 2 座 LNG 储罐用 6514 吨 9Ni 钢的保供工作，为粤港澳大湾区提供持续稳定的清洁能源。

In February 2023, TISCO successfully secured the contract for the CNOOC Zhuhai LNG Phase II Expansion Project, a demo project for the National Natural Gas Production, Supply, Storage, and Sales and National Oil & Gas. As a qualified auxiliary supplier, TISCO has undertaken the supply of 6,514 tonnes of 9Ni steel for two LNG storage tanks, ensuring a sustained and stable clean energy supply for the Guangdong-Hong Kong-Macao Greater Bay Area.



2023 年 10 月，宝钢股份首次亮相北京国际风能大会暨展览会，向行业展示 BaoWind 绿色风电解决方案，助推风电大型化、高效化发展，引发风电全产业链的关注。

In October 2023, Baosteel made its debut at the China Wind Power (CWP) exhibition and event held in Beijing, showcasing its BaoWind green wind power solutions to the industry and promoting the large-scale and efficient development of wind power, which drew significant attention from the entire wind power industry chain.

交通运输 Transportation

交通运输是推动“双碳”战略目标实现的重要领域。中国宝武聚焦轨道交通和公路运输领域，专研绿色精品，持续提升我国城轨装备技术水平和核心竞争力，推动汽车行业绿色低碳转型，助力交通运输行业向绿而行。

Transportation plays a critical role in advancing the achievement of the carbon peaking and carbon neutrality goals. With a focus on rail and highway transportation, China Baowu has dedicated itself to the R&D of premium green products, striving to continuously improve China's technical capabilities and core competitiveness in urban rail equipment, and the green and low-carbon upgrades of the automotive industry to transform the transportation industry toward a greener future.

案例 宝钢股份低碳钢（BeyondECO®-30%）量产供货第一卷成功下线

Case Baosteel's first coil of mass-produced low-carbon steel, BeyondECO®-30%, rolled off the production line

2023 年 3 月 27 日，国内首个量产供货的低碳排放汽车板产品、宝钢股份量产供货的第一卷低碳钢（BeyondECO®-30%）在宝山基地 1550 电镀锌机组成功下线，实现向北京奔驰汽车有限公司的量产供货。产品严格遵守相关减碳、降碳措施和生产工艺路径，经核算与评估，该卷低碳钢相较于原非减碳路径生产的钢卷可减碳超过 30%，钢卷质量等关键指标全部满足供货技术协议要求。

On March 27, 2023, Baosteel successfully produced the first coil of its mass-produced low-carbon steel and China's first mass-produced low-carbon emission automotive sheet product, BeyondECO®-30%, which was achieved on the 1,550 galvanizing unit production line at the Baoshan Base, enabling bulk supply to Beijing Benz Automotive Co., Ltd. The production has strictly complied with the requirements for carbon reduction and the specified production process path. According to calculations and evaluations, this low-carbon steel coil can reduce carbon emissions by more than 30% compared to the steel coil produced using the original process path without carbon reduction measures. The quality and other key indicators of this steel coil have all met the technical specifications agreed upon with the buyer.

本次量产供货第一卷宝钢股份低碳钢产品成功下线，是宝钢股份打造新能源车整体解决方案品牌 SMARTeX，以宝钢股份汽车板 QCDDS 为品牌基因，探索生产制造低碳绿色钢及产品取得的重大突破。

The successful production and supply of the first low-carbon steel coil marks a major breakthrough for Baosteel in establishing the brand SMARTeX for integrated new energy vehicle solutions and in exploring the development and manufacturing of low-carbon green steel products, leveraging Baosteel's Automotive Sheets' Quality, Cost, Development, Delivery and Service (QCDDS) framework.

案例 马钢交材多个轮轴产品助力城轨交通实现高质量发展

Case Multiple wheel axle products by Masteel Rail Transit Materials Technology contributed to high-quality urban rail transit development

2023 年 9 月，马钢交材全球首发低碳 45 吨轴重重载车轮。45 吨轴重重载车轮制造全流程降低碳排放 20% 以上，为国际轮轴行业全生命周期“碳中和产品”实践提供了马钢方案，引领高品质低碳重载车轮产品的开发与应用。

In September 2023, Masteel Rail Transit Materials Technology produced the world's first low-carbon, 45-tonne axle load heavy-duty wheel. The entire manufacturing process of this heavy-duty wheel has reduced carbon emissions by more than 20%, offering Masteel's solution for producing full life-cycle carbon-neutral products in the global axle industry. This has also positioned Masteel at the forefront of developing and applying high-quality, low-carbon heavy-duty wheel products.

案例 宝钢股份武钢有限新能源无取向硅钢结构优化工程正式开工

Case Construction began on the New Energy Non-Oriented Silicon Steel Structure Optimization Project by Wuhan Iron & Steel

2023 年 6 月 29 日，宝钢股份武钢有限新能源无取向硅钢结构优化工程开建，项目投产后，每年可为 440 万辆新能源汽车提供高等级用材，减少碳排放 400 万吨，相当于 36 万公顷森林的吸收量。宝钢股份是多数全球知名汽车厂家新能源汽车驱动电机用材的第一供应商，项目的建设将进一步促进新能源硅钢产线建成绿色、低碳、智慧的世界一流现代化产线，为现代化产业体系建设和城市建设注入新动能。

On June 29, 2023, Baosteel's Wuhan Iron & Steel began the construction of its New Energy Non-Oriented Silicon Steel Structure Optimization Project. Once operational, the project will provide high-grade materials for 4.4 million new energy vehicles annually, reducing carbon emissions by 4 million tonnes–equivalent to the carbon absorption capacity of 360,000 hectares of forest. Baosteel is the first supplier of materials for the new energy vehicle drive motors used by many globally renowned automobile manufacturers. The construction of this project will further promote the development of a green, low-carbon, and intelligent world-class production line for new energy silicon steel, injecting fresh momentum into the modern industrial system and urban development.

2023 年 4 月 19 日，宝钢股份牵手东风日产共同启动宝钢汽车板 SMARTeX & 东风日产启辰绿色伙伴“和”计划，积极探索汽车产业低碳转型路径，携手打造绿色高品质新能源产品。

On April 19, 2023, Baosteel and Dongfeng Nissan jointly launched the Baosteel Automotive Sheet SMARTeX & Dongfeng Nissan Venucia Green Partner Program to actively explore the low-carbon transformation path of the automotive industry and collaboratively create green and high-quality new energy products.

马钢集团重型 H 型钢“托举”成都空客机库。

Magang Group's heavy-duty H beams were used to support the Airbus maintenance hangar in Chengdu.

建筑建造 Building and construction

建筑领域全生命周期碳排放占全社会碳排放总量超过 50%，建筑行业碳达峰、碳中和对全社会实现“双碳”目标至关重要。中国宝武瞄准绿色建筑，积极研发绿色钢铁精品，助力建筑行业节能低碳转型。

The construction sector's life cycle carbon emissions account for over 50% of society's total carbon emissions. Achieving carbon peaking and carbon neutrality in this sector is critical for society as a whole to reach the carbon peaking and carbon neutrality goals. In this regard, China Baowu has targeted green buildings and is actively developing high-quality green steel products to support the construction sector's transition toward energy conservation and low carbon.

案例 工业建筑再突破，中国宝武高性能钢工业建筑解决方案首次在单层轻钢厂房中全面应用

Case Baowu's another breakthrough in industrial construction with first application of high-performance steel structure industrial building solution in single-story light steel framed building

宝钢股份与鸿路钢构在建筑轻量化、绿色低碳等方面联合开展工作，共同推动我国钢结构建筑的可持续发展。宝钢股份为鸿路钢构涡阳六期厂房提供高性能钢，应用比例超过 95%，相比传统方案整体用钢量下降 11%，碳排放减少近 1300 吨。

In collaboration with Honglu Steel Structure, Baosteel has advanced the development of lightweight, green, and low-carbon building practices, driving the sustainable development of steel structure buildings in China. For Honglu Steel Structure's Guoyang Phase VI Plant, Baosteel supplied high-performance steel, which accounted for over 95% of the materials used. Compared to the traditional solution, overall steel consumption has decreased by 11%, and carbon emissions decreased by nearly 1,300 tonnes.

延伸阅读 Further reading

宝钢高等级建筑用钢解决方案：拥有四大核心技术，即高性能材料技术、轻量化设计技术、构件制作与连接技术、绿色低碳技术，与普通钢结构用钢相比，可使结构钢用钢量降低 15%——20%、综合成本降低 10%——15%、碳排放减少 15%——20%。

Baosteel's high-grade building steel solution: It is built on four core technologies, including high-performance material technology, lightweight design technology, member fabrication and connection technology, and green low-carbon technology. Compared to ordinary structural steel solutions, this approach reduces steel consumption by 15% to 20%, overall costs by 10% to 15%, and carbon emissions by 15% to 20%.

案例 宝钢股份彩涂“TRUSTEEL”品牌助力建筑行业更强、更轻、更绿色、更长寿

Case Baosteel's "TRUSTEEL" color-coated steel sheets enhanced the construction industry with stronger, lighter, greener, and more durable solutions

宝钢股份坚持高质量发展路线，不断开发更环保、更绿色、更高性能的高端围护建筑用涂镀产品，通过宝钢股份“TRUSTEEL”建筑围护系统用钢的应用助力建筑行业向更强、更轻、更绿色、更长寿的方向发展，其产品广泛应用于浦东国际机场、大兴国际机场、呼和浩特机场、深圳会展中心、杭州大会展中心等重点工程建设，推动建筑行业绿色低碳转型。

Baosteel has remained committed to its high-quality development strategy, continually developing the production of high-end color-coated steel products for building enclosure with better physicochemical and environmental performance. Baosteel's "TRUSTEEL" color-coated steel products enable the construction industry to achieve stronger, lighter, and greener structures with extended service life. These products have been widely applied in many key construction projects, including Pudong International Airport, Daxing International Airport, Hohhot Airport, Shenzhen Convention and Exhibition Center, and Hangzhou Grand Convention and Exhibition Center, thereby promoting the green and low-carbon transformation of the construction industry.

案例 太钢集团建筑用绿色不锈钢中标广州白云机场三期扩建工程

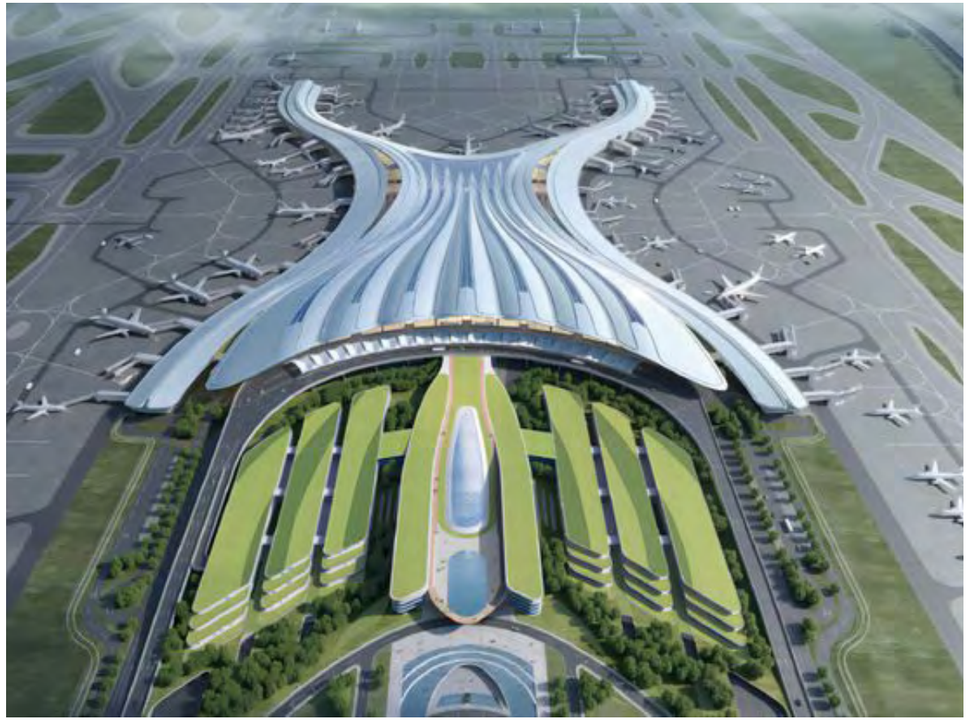
Case TISCO secured success with green stainless steel for building in Guangzhou Baiyun Airport's Phase III Expansion Project

2024 年，太钢集团建筑用高耐蚀、长寿命、免维护、绿色环保型大型公共建筑用 TTS445J2/TJ22 不锈钢成功中标广州白云国际机场三期扩建工程 T3 航站楼屋面工程。

In 2024, TISCO successfully secured the bid to supply TTS445J2/TJ22 stainless steel for the roof of Guangzhou Baiyun International Airport's T3 terminal. This self-developed material is known for its high-corrosion resistance, long service life, maintenance free performance, and environmental friendliness.

长期以来，太钢集团积极践行习近平生态文明思想，推动自身生产系统绿色低碳发展，生产与应用高强度、高耐蚀、高能效绿色产品，面向公共建筑和工业建筑围护系统开发 TJ 系列建筑用不锈钢产品，为公共建筑和工业建筑提供檩条、屋面、墙面、幕墙等全场景长寿命、免维护、绿色环保解决方案，助力建筑行业转型升级和绿色低碳发展。

TISCO has consistently adhered to the concept of ecological civilization by actively promoting green and low-carbon development within its production system. It has produced and applied high-strength, high-corrosion resistance, and high-efficiency green products, developing the TJ series stainless steel products for public and industrial building enclosure systems, and providing long-term, maintenance-free, and environmentally friendly solutions for purlins, roofs, walls, curtain walls, and other structural components of public and industrial buildings used in various scenarios. These efforts have supported the construction industry's transformation, upgrade, and pursuit of green and low-carbon development.



建设碳数据管理系统
Establishing a carbon data management system

当前低碳钢标准的研发呈现碎片化、多元化趋势，发布的低碳钢评价方法的核算模型、边界范围迥异。宝武集团主动担责，推进开展我国的低碳钢评价方法研究，统筹低碳技术、资源能源和成本对钢铁减碳的影响，对比分析研究国际诸多低碳排放钢标准在核算方法、核算边界等方面存在的差异，启动研究基于中国钢铁企业实际的低碳排放钢标准。

Given the fragmentation and diversification in the R&D of green steel products, as well as the significant differences in accounting models and statistical boundaries used across various low-carbon steel evaluation methods, Baowu has actively shouldered the responsibility of advancing research on China's low-carbon steel evaluation methods, taking into account the impact of low-carbon technologies, resource and energy utilization, and associated costs on carbon reduction within the steel industry. It has also compared and analyzed the differences in accounting methods and boundaries across various international low-carbon steel standards, and initiated research on low-carbon steel standards tailored to the specific conditions of Chinese steel enterprises.

在积极推进全国碳市场及地方试点碳市场履约的基础上，有序推进三方面工作：一是推进钢铁业子公司建设碳数据信息管理系统，构建组织碳产品碳核算模型，建设碳核算、碳资产、碳足迹的信息管理系统；二是建设钢铁环境产品声明（EPD）平台，注册用户已达 3373 家，发布 100 份 EPD 报告，报告下载量 14500 多人次，平台已成为中国汽研中心认可的汽车行业碳足迹数据库；三是建设欧贝零碳平台，打造面向供应链的碳核算模型库，服务上游企业用户 1338 家，发布碳足迹报告突破 3000 份，引导企业减少产品全生命周期碳排放，推进供应链绿色低碳发展。

Building on its active promotion of carbon trading contract performance in the national carbon market and local pilot carbon markets, Baowu has systematically advanced three key initiatives. First, it has guided its steel subsidiaries in establishing carbon data and information management systems, developed carbon accounting mode of carbon product, and established an information management system for carbon accounting, carbon assets, and carbon footprint management. Second, Baowu has further advanced the construction of the environmental product declaration (EPD) platform, with 3,373 registered users and 100 EPD reports published, and the number of report downloads reached more than 14,500 person-times. The platform has also been recognized by the China Automotive Technology & Research Center (CATARC) as one of the carbon footprint databases for the automotive industry. Third, Baowu has developed the Obei Zero Carbon Platform to create a carbon accounting database for the supply chain, which has provided services to 1,338 enterprise users in upstream industries, released over 3,000 carbon footprint reports, and guided enterprises in reducing carbon emissions throughout the product lifecycle, thereby promoting green and low-carbon development across the supply chain.

截至 2023 年底 As of the end of 2023

- 钢铁环境产品声明（EPD）平台注册用户已达 **3373** 家
  Baowu's environmental product declaration (EPD) platform has registered **3,373** users

发布 EPD 报告 **100** 份
published **100** EPD reports

EPD 报告下载量 **14500** 多人次
the number of report downloads reached more than **14,500** person-times

欧贝零碳平台服务上游企业用户 **1338** 家
the Obei Zero Carbon Platform has provided services to **1,338** enterprise users in upstream industries

发布碳足迹报告突破 **3000** 份
has relesed over **3,000** carbon footprint reports

案例 钢铁行业 EPD 平台第 100 份 EPD 报告发布

Case Release of the steel industry EPD platform's 100th EPD Report

宝武集团勇担新型低碳冶金现代产业链链长，积极推进钢铁业的绿色低碳转型升级。2021 年下半年，宝武集团旗下的子公司欧冶云商在中国钢铁工业协会指导下，按照国际公认标准开发了国内首个工业领域 EPD 平台，并承担了平台运行和维护等相关工作。2022 年 5 月 19 日，EPD 平台成功首发，这是中国工业领域首发的 EPD 平台，对于中国钢铁行业推进绿色低碳发展、迈向碳中和目标具有里程碑意义。该平台的正式发布和运行，对中国钢铁行业乃至整个工业领域的绿色低碳发展之路都起到积极的示范作用和促进作用。

Baowu has boldly taken the lead in advancing the modern low-carbon metallurgy industry chain, actively promoting the green and low-carbon transformation and upgrading of the steel industry. In the second half of 2021, under the CISA's guidance, Ouyeel, a subsidiary of Baowu, developed China's first industrial EPD platform, adhering to internationally recognized standards, and undertook related tasks, including the platform's operation and maintenance. On May 19, 2022, the EPD platform was successfully launched, which is the first EPD platform in China's industrial field, marking a milestone in China's steel industry's pursuit of green and low-carbon development and the achievement of its carbon neutrality goals. The launch and subsequent operation of this platform have served as a positive model in advancing green and low-carbon practices within China's steel industry and across the broader industrial sector.

截至 2023 年底，平台已累计发布产品种类规则（PCR）8 份、EPD 报告 100 份。其中，涉及钢铁类产品 77 份、铁矿石产品 12 份、熔剂矿产品 8 份、空气分离气体产品 3 份。平台注册用户总数为 3373 家，包括政府部门、钢铁企业、铁矿石企业、汽车、家电、建筑等用钢企业、高校及研究机构；入驻平台的第三方认证机构达 19 家，均为国内外具有较大影响力的认证机构。平台国际影响力得到彰显，受到WTO、世界钢协等国际组织的关注和肯定，并受邀参与 COP28“钢铁标准原则”发布，还为中国零碳钢标准积极参与国际互认奠定基础等。随着持续健康发展，EPD 平台得到了越来越多钢铁下游行业采信，将 EPD 作为产品环境绩效的评价依据。

As of the end of 2023, the platform has released a total of 8 product category rules (PCRs) and 100 EPD reports, including 77 for steel products, 12 for iron ore products, 8 for flux mineral products, and 3 for industrial gases from air separation. The platform has registered 3,373 users, comprising steel-consuming enterprises, universities and research institutions such as government agencies, steel enterprises, iron ore enterprises, automotive, home appliance, and construction companies. A total of 19 third-party certification agencies, both domestically and internationally recognized, have also joined the platform. This demonstrates the platform's international influence, drawing attention and gaining recognition from global organizations such as the WTO and the World Steel Association. It was also invited to participate in the release of the "Steel Standards Principles" at COP28, laying the foundation for China's active participation in the international mutual recognition of zero-carbon steel standards. As the platform continues to develop robustly, it has gained increasing acceptance and trust from downstream industries, which now use the EPDs as a key reference for evaluating product environmental performance.

名词解释 Terminology

EPD 称为III型环境产品声明，是基于ISO 14025：2006进行的一项国际公认的、可量化的环境影响数据报告。同时，EPD 是按照 PCR（产品种类规则）的规定对 LCA（生命周期评价）研究成果的“规整化”输出。除了 LCA 研究输出的量化环境绩效指标，EPD 还可包含附加的环境、社会、经济等信息。其中，LCA（生命周期评价）是一种“从摇篮到坟墓”的环境管理和分析工具，它量化了产品全生命周期的资源消耗、能源消耗及环境排放，并评价这些消耗和排放对资源、生态环境及人体健康带来的影响。

An EPD is a voluntary ISO Type III environmental declaration based on ISO 14025:2006, serving as an internationally recognized report providing quantifiable data on environmental impacts. The EPD is also the formal output of a LCA, conducted in accordance with PCR. In addition to the quantitative environmental performance indicators generated by LCA, an EPD may also include supplementary information on environmental, social, economic, and other relevant aspects. LCA is an environmental management and analysis tool for assessing a product's entire life cycle, "from cradle to grave." It quantifies resource consumption, energy consumption, and environmental emissions throughout the product's life cycle and evaluates their impacts on resources, the ecological environment, and human health.

案例 欧贝零碳助力生态伙伴绿色低碳供应链建设

Case Obei Zero Carbon assisted ecosystem partners in building green and low-carbon supply chains

中国宝武以“高端化、智能化、绿色化、高效化”为方向引领，通过技术升级、产品创新持续推动节能降碳和低碳冶金，推动供应链上下游绿色化低碳化改造，支撑制造业绿色转型发展，打造绿色低碳供应链生态圈。作为中国宝武绿色低碳供应链建设的重要组成部分，欧冶工业品欧贝零碳平台承担着核算供应链企业产品碳足迹并协助实现低碳转型的重任。

Guided by its commitment to high-end, intelligent, green, and high-efficiency development, China Baowu has advanced energy conservation, carbon reduction, and low-carbon metallurgy through technological upgrades and product innovation. The Group has promoted the green and low-carbon transformation of upstream and downstream stakeholders across the supply chain, providing support for the manufacturing industry's green transformation and development, ultimately creating a green and low-carbon supply chain ecosystem. As a key component of China Baowu's green and low-carbon supply chain, Obei Zero Carbon Platform of Obei is responsible for calculating the product carbon footprint of supply chain enterprises and assisting them in achieving low-carbon transformation.

零碳服务 Zero carbon service

采用国际标准的全生命周期碳核算评价方法为供应链企业和生态圈客户进行产品碳足迹核算及量化评价，协助识别减少产品碳排放的潜在改进点，引导企业减少产品全生命周期碳排放，推进供应链绿色低碳发展，助力中国宝武各钢铁基地降低钢铁产品碳排放。2023 年，欧贝零碳产品碳足迹报告突破 3000 份，覆盖工业品行业 34 个，覆盖供应链企业 1338 家。欧贝零碳被纳入上海市 2023 年度第一批碳管理试点名单。

Obei Zero Carbon has adopted international standard life cycle carbon accounting and evaluation methods to conduct product carbon footprint accounting and quantitative evaluations for supply chain enterprises and ecosystem customers. This has assisted these entities in identifying opportunities for improvement to reduce product carbon emissions, guided them in minimizing carbon emissions throughout the product life cycle, and promoted green and low-carbon development across the supply chain, thereby supporting all of China Baowu's steel bases in reducing the carbon emissions of their steel products. In 2023, Obei Zero Carbon released over 3,000 product carbon footprint reports, covering 34 industrial goods subsectors and 1,338 supply chain enterprises. Obei Zero Carbon has also been among the earliest entities included in the First Batch of Pilot Lists for Carbon Management in Shanghai in 2023.

制定标准 Development of standards

依托碳核算积累的经验，联合龙头供应商，形成行业规范。编制《耐材产品碳足迹评价规范》文件并申报国家标准，已完成《石墨电极产品碳足迹评价规范》《锌制品产品碳足迹评价规范》《油品产品碳足迹评价规范》《轧辊产品碳足迹评价规范》4 项企业标准的编制。

Building on the experience gained from carbon accounting, Obei Zero Carbon has collaborated with leading suppliers to develop industry standards. Obei Zero Carbon has drafted the *Carbon Footprint Evaluation Standards for Refractory Products* and has applied for its adoption as a national standard. Additionally, it has completed the establishment of four enterprise standards: *Carbon Footprint Evaluation Standards for Graphite Electrode Products, Carbon Footprint Evaluation Standards for Zinc Products, Carbon Footprint Evaluation Standards for Oil Products*, and *Carbon Footprint Evaluation Standards for Rolled Products.*

生态赋能 Empowering ecosystem

以中国宝武绿色低碳供应链为示范，为更多核心企业提供服务。已在南京钢铁鑫智链平台上部署了欧贝零碳服务，建设并运营长三角绿色低碳供应链公共服务平台，共建绿色供应链。

Obei Zero Carbon has extended its services to more core enterprises by using China Baowu's green and low-carbon supply chain as a demonstrative case. It has deployed its services on the Xin Intelligent Chain platform of Nanjing Steel Group, and has established and is currently operating a public service platform for green and low-carbon supply chains in the Yangtze River Delta, with a goal to jointly build a green supply chain.

打造绿色低碳产业链

Developing Green and Low-Carbon Industrial Chain

我们的挑战
Our challenges

绿色经济已成为全球产业变革的主基调之一。党的二十大报告指出，“推动经济社会发展绿色化、低碳化是实现高质量发展的关键环节”“推动制造业高端化、智能化、绿色化发展”。钢铁行业是承载绿色低碳发展的重要脊梁，绿色转型也是钢铁工业高质量发展的必选项。钢铁行业涉及面广、产业关联度高，促进钢铁产业绿色低碳转型是一项系统性工程，需将其置于全社会碳达峰、碳中和的框架之中，如何统筹兼顾全产业链协同，以推动碳中和目标实现，是我们要努力的方向。

The green economy has become one of the general principles of the global industrial revolution. Given that the steel industry is crucial for supporting green and low-carbon development, green transformation is inevitable for the steel industry to achieve high-quality development. The steel industry encompasses a broad range of sectors and is characterized by high industrial interdependence. Therefore, promoting the green and low-carbon transformation of the steel industry is a systematic initiative that needs to be incorporated into society's overall framework for achieving carbon peaking and carbon neutrality. Moving forward, we will focus on coordinating the entire industry chain to drive progress toward the goal of carbon neutrality.

我们的绩效
Our performance

清洁能源利用总量
201.6 万吨标准煤
Total utilization of clean energy reached **2.016** million TCE

较 2022 年提升
27 %
A **27** % increase compared to 2022

绿电交易量约 **20** 亿千瓦时
Trading volume of green power amounted to approximately **2** TWh

我们的行动
Our actions

坚持“高端化、智能化、绿色化、高效化”为方向引领，积极探索跨产业耦合发展新模式，持续提升资源循环利用水平；全方位布局绿色产业，聚焦绿色新材料、绿色资源、绿色能源、绿色智慧服务、绿色产业金融等产业，为宝武集团转型发展提供强大新动能，为构建钢铁绿色低碳生态圈而努力。

Adhering to the principle of developing high-end, intelligent, green, and high-efficiency products and services, we have actively explored new models for cross-industry coupling development and continuously improved resource recycling practices. Strategic arrangements have also been made to develop green business segments across all aspects and levels, with a focus on green new materials, green resources, green energy sources, green intelligent services, and green industrial finance, thereby injecting strong new impetus for Baowu's transformation and development, while contributing to a greener future for the steel industry.

绿色新材料
Green new materials

当下钢铁业长周期结构性调整对钢铁材料提出性能更高、更加环保的要求。宝武集团深化推进《2022——2027 年科技创新规划》，聚焦钢铁材料升级与先进材料创新的战略性任务，布局新型钢材料、碳基新材料、钒钛新材料、环保涂料等新材料产业，培育发展新动能；重点布局镁基材料，推进全镁产业链建设，镁合金全球市占率超过 30%，铝镁合金型材等轻量化材料销售增长近 10%。

The ongoing long-term structural adjustment within the sector requires steel materials to possess higher functional performance and enhanced environmental properties. In view of this, Baowu has refined its *Science and Technology Innovation Plan 2022-2027,* focusing on the strategic objectives of upgrading steel materials and innovating advanced materials. Strategic arrangements have been made to develop the new materials business, including new steel materials, carbon-based materials, vanadium-titanium materials, and environmentally friendly coatings, to cultivate new drivers for growth. The Group has also focused on the strategic development of magnesium-based materials to promote the construction of the entire magnesium industry chain, resulting in a global market share of over 30% for magnesium alloys and a nearly 10% increase in the sales of lightweight materials, such as aluminum-magnesium alloy profiles.

案例 宝武特冶全球首发新材料 G115 通过“三新”论证

Case The world's first new material G115 launched by Baowu Special Metallurgy passed the Case "Three New" review

宝武特冶成功研发出全球首发的世界上唯一可工程用于 630℃ -650℃温度范围的耐热材料 G115，不仅为更高参数火电机组建设提供关键支撑材料，而且具备应用于化工工程、煤化工、四代核电、新能源、固体氧化物燃料电池等领域的条件，对推动国家新材料高水平科技自立自强、打破能源行业关键耐热材料长期依赖进口局面，大力推进能源产业链碳减排，助力实现“双碳”目标具有重要战略意义。2023 年 3 月 5 日，G115 钢通过“三新”论证。

Baowu Special Metallurgy has successfully developed the world's first and only mature new material G115 that can be used within the temperature range of 630℃ - 650℃ . It not only provides key support materials for the construction of higher parameter thermal power units, but also has the conditions for application in chemical engineering, coal chemical industry, new energy, solid oxide fuel cells and other fields. It has important strategic significance for promoting the high-level self-manufactured of national new materials, improving self-reliance on the energy industry on imports of key heat-resistant materials, vigorously promoting carbon emission reduction in the energy industry chain, and achieving the carbon peaking and carbon neutrality goals. On March 5, 2023, G115 steel passed the "Three New" ("New Industry, New Management Mode and New Business Model") review.

国家市场监督管理总局特种设备安全监察局召开 G115 钢“三新”论证会。
The Special Equipment Safety Supervision Bureau of the State Administration for Market Regulation held the G115 steel "Three New" review meeting.

案例 铁镍基合金宽厚板工艺自主创新助力光伏产业关键材料国产化替代

Case Independent innovation of wide and thick plates made of iron-nickel alloy provides key materials in the photovoltaic industry

光伏产业已成为我国新能源发展的支柱产业，光电转换关键材料多晶硅的需求急速增长，其关键材料反应器用铁镍基合金宽厚板长期依靠进口。

The photovoltaic power has become a pillar of the new energy industry and has been included in the national strategy of China. The demand for polycrystalline silicon (a key material for photovoltaic conversion) increases rapidly, and there is a great demand for the wide and thick plates made of iron-nickel based alloy for key material reactors.

太钢集团贯彻落实国家重大战略领域要求，实现 13 吨以上 N08810 和 8 吨以上 N08120 合金宽厚板全球首发，整体技术经行业鉴定达到国际领先水平。铁镍基合金宽厚板短流程制造创新设计，使吨钢能耗和对空气排放强度分别降低 9%。近三年，太钢集团开发的铁镍基合金宽厚板为我国光伏项目批量供货 20000 余吨，市占率 70%，所生产的多晶硅用于光伏发电相对燃煤发电每年可减排约 9.7 亿吨 CO_2。项目解决了我国光伏产业快速、高质量发展的关键装备材料“卡脖子”问题，经济和社会效益显著。

TISCO has launched the wide and thick plates made of N08810 alloy weighing over 13 tonnes and plates made of N08120 alloy weighing over 8 tonnes for the first time in the world. The whole technological solution has been evaluated by the industry to reach the international leading level. The innovative design for short process manufacturing of wide and thick plates made of iron-nickel based alloy reduces both the energy consumption and emission intensity per tonne of steel by 9%. In the past three years, more than 20,000 tonnes of wide and thick plates made of iron-nickel based alloy developed by TISCO have been supplied in bulk to various photovoltaic projects in China, with a market share of 70%. The polycrystalline silicon produced has been used for the photovoltaic power generation, which can reduce about 970 million tonnes of CO_2 emissions annually compared to coal-fired power generation. The project has solved the problem of China's photovoltaic industry in the key equipment materials required for the rapid and high-quality development, creating significant economic and social benefits.

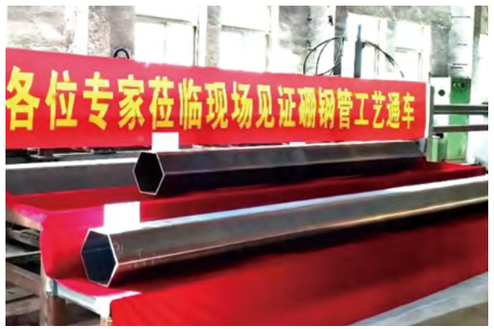
铁镍基合金宽厚板
Wide and thick plates made of iron-nickel based alloy

宝钢金属与重庆大学、云海金属携手启动《中温高密度低成本镁基固态储氢材料产品的研发及中试》项目，推动镁基储氢材料的研发和产业化，为氢能源应用提供更安全可靠的解决方案，助推镁产业的规模化发展。

Baosteel Metal, in collaboration with Chongqing University and RSM Group, launched the project titled *Research and Pilot-Scale Experiment of Medium Temperature, High Density, Low Cost Magnesium-Based Materials for Solid-State Hydrogen Storage*, aiming to promote the development and commercialization of magnesium-based materials for hydrogen storage, offering safer and more reliable solutions for hydrogen energy applications while fostering the scaled growth of the magnesium industry.

宝武特冶商业化高温气冷堆用镍基焊材全球首发，这是我国在核电领域核岛主设备用镍基合金焊材的首批国产化产品，标志着我国核电用镍基焊材研发、制造和应用水平实现了质的突破，有力促进了我国核电领域自主化能力提升。

Baowu Special Metallurgy held the launch ceremony for the world's first nickel-based welding material for commercial high-temperature gas-cooled reactors. This welding material is the first batch of domestically produced nickel-based alloy welding product for the main nuclear island equipment in China's nuclear power sector, marking a qualitative breakthrough in the R&D, manufacturing, and application of nickel-based welding materials for nuclear power in China.



太钢不锈、中国核动力研究设计院和中国核电工程有限公司联合研发的俄罗斯 VVER 核电技术燃料贮运搁架用硼不锈钢六边形无缝管顺利下线，标志着该材料打破国外技术垄断，硼不锈钢材料全面国产化迈上新台阶。

The borated stainless steel hexagonal seamless tube, developed collaboratively by Shanxi Taigang Stainless Steel, the Nuclear Power Institute of China (NPIC), and China Nuclear Power Engineering Co., Ltd. (CNPE), for use in the fuel storage and transportation shelving of Russia's VVER nuclear power technology, has successfully rolled off the production line.

名词解释 Terminology

镁基固态储氢合金
Magnesium-based alloys for solid-state hydrogen storage

被誉为最具潜力的新型储氢材料之一，拥有丰富的矿产资源，具备高理论储氢量，以及卓越的安全性能和绿色环保特性。

These alloys are considered one of the most promising new hydrogen storage materials due to their ability to leverage abundant mineral resources, high theoretical hydrogen storage capacity, excellent safety performance, and environmentally friendly characteristics.

硼不锈钢
Borated stainless steel

具有良好的热中子吸收和 γ 射线屏蔽特性，该材料广泛应用于反应堆屏蔽、乏燃料水池贮存格架、核燃料转运容器和乏燃料后处理等核能开发领域，是该领域的重要材料。由于大量硼的加入，导致硼不锈钢的成形能力极差，冶炼难度极高，这也是目前该类材料全部依靠进口的主要原因。

This material possesses excellent thermal neutron absorption and gamma ray shielding properties, making it widely used and important in nuclear energy development for applications such as reactor shielding, spent fuel pool storage racks, nuclear fuel transfer containers, and spent fuel reprocessing. Due to the high borate content, borated stainless steel has very poor formability and is extremely challenging to smelt, which is the main reason this material is currently in short supply.

绿色资源
Green resources

“十四五”时期是我国加快能源绿色低碳转型、落实应对气候变化国家自主贡献目标的攻坚期。宝武集团积极响应国家能源绿色低碳转型战略，推进“安全、绿色、智慧、高效、可持续”的“五星矿山”创建，做强境内矿产资源开发、构建铁矿石保障“基本盘”，做大海外矿产项目产能、打造铁矿石供给“保障盘”；在全球资源、能源、物流优势区域卡位布局绿色炉料产能，保障绿色低碳转型；着力加快全球产业链供应链建设，推动智慧化全程物流配送体系升级，打造好铁矿石及绿色炉料供应链平台；加强固废资源回收利用，推进绿色钢厂、无废钢厂建设；盘活存量不动产资源和城市钢厂转型释放的土地资源，打造绿色低碳园区；助力“无废城市”建设，赋能城市更新和产城融合发展，充分发挥“一基五元”产业资源和生态圈资源优势，促进资源节约、节能减排、环境保护的多重效能提升。

The 14th Five Year Plan period is critical for China to accelerate the green and low-carbon transformation of its energy sector and achieve the Nationally Determined Contribution (NDC) goals for addressing climate change. In response, Baowu has actively embraced the national strategy for energy transformation, promoting the development of safe, green, intelligent, efficient, and sustainable mines. The Group has strengthened its domestic competitiveness by bolstering its core capabilities in exploiting mineral resources and securing iron ore supply and has expanded its overseas project capacity to ensure a stable long-term supply of iron ore resources. We have also proactively established production capacity for green furnace charges in regions worldwide that offer resource, energy, and logistics advantages, supporting the Group's green and low-carbon transformation. Furthermore, the Group has accelerated the development of a global industrial and supply chain, enhanced intelligent end-to-end logistics distribution system, and created a robust platform for the supply of iron ore and green furnace materials. Additionally, we have strengthened solid waste recycling efforts, promoted the construction of green steel factories and zero waste steel factories, and leveraged existing real estate and land resources released by the transformation of urban steel factories to create green and low-carbon industrial parks. The Group has also supported the development of a Zero Waste City, empowered urban renewal, and fostered the integrated development of industry and city. By fully leveraging the advantages of our "One Basis and Five Business Segments" in industrial and ecosystem resources, we have driven significant improvements in resource conservation, energy efficiency, emission reduction, and environmental protection.

案例 宝武资源全球首家采用强力混匀技术的矿石精混加工基地投产

Case Baowu Resources' world-first mixing and processing base using strong mixing technology now operational

2023 年 5 月 13 日，宝武资源马迹山港矿石加工中心正式投产，标志着全球首家采用强力混匀技术的矿石精混加工基地成功落地，马迹山港由转运港升级转型为加工贸易港，真正成为铁矿石贸易加工配送中心。该基地通过把混矿作业集中于港口，有助于钢厂合理控制铁矿石库存，降低环保投资、能源消耗和混匀成本；采用的“配料槽 + 强力混匀”技术，能将多种进口铁矿石集中精混，所生产的混匀矿能直接满足钢厂生产需求，且项目应用多种扬尘治理和清洁化输送设备，生产工艺环保，为铁矿石供应端进一步优化整合打下了坚实基础，助推宝武资源铁矿石供应链升级。

On May 13, 2023, Baowu Resources officially launched the Majishan Port Ore Processing Center, marking the successful establishment of the world's first ore precise mixing and processing base using strong mixing technology. This milestone transformed Majishan Port from a transit port into a processing and trading port, solidifying its status as a key center for iron ore trading, processing, and distribution. This base has implemented mixing operations at the port, enabling steel factories to effectively manage iron ore inventory while reducing environmental investments, energy consumption, and mixing costs. The "batching tank + strong mixing" technology adopted allows for the uniform and precise mixing of various imported iron ores based on the specific needs of steel factories. The project is also equipped with various dust control and clean conveying systems and features an environmentally friendly production process, laying a solid foundation for further optimization and integration of the iron ore supply chain and driving the upgrade of Baowu Resources' iron ore supply chain.

案例 宝武资源西芒杜项目助推全球铁矿行业发展，探索绿色矿山建设新路

Case Baowu Resources' Simandou Project contributed to a greener future for the global iron ore industry

2023 年 9 月，宝武资源与赢联盟控股公司（WCS）在北京签署了西芒杜铁矿北部区块项目投资合作协议，携手合作伙伴共同致力于西芒杜铁矿北部区块的开发，助力推动全球铁矿行业发展，为全球钢铁工业的高质量发展积极提供绿色低碳选择。同时，项目建设团队坚持矿山绿色发展理念，将土壤、水体、植被等侵蚀管理纳入“源头”治理，系统排查梳理矿山基建期存在的侵蚀风险，因地制宜制定削坡减载、喷播覆绿、修建排洪沟等防控措施，力求将建设过程中对生态环境的影响降至最低。

In September 2023, Baowu Resources and Winning Consortium Simandou (WCS) signed an investment cooperation agreement in Beijing for the development of the North Block Project of the Simandou Iron Mine, aiming to jointly advance the development of the North Block Project of the Simandou Iron Mine with strategic partners, support the global steel industry's development, and actively pursue green and low-carbon solutions for the high-quality development of the global steel industry. At the same time, the project team adhered to the concept of green mine development and implementing comprehensive environmental protection measures that address soil, water, vegetation, and other ecological factors. To minimize the project's ecological impact during construction, the construction team systematically assessed and identified potential environmental risks during the construction of mining facilities and formulated targeted prevention and control measures, including slope stabilization, load reduction, spray-seeding, greening, and the construction of flood discharge ditches tailored to local conditions.

案例 宝武环科建设首个无废城市重点技术联合实验室

Case Baowu Environment and Resource Technology established first joint laboratory for key technologies in building Zero Waste Cities

宝武环科积极践行产城融合，助推产业发展绿色化又有新亮点。2023 年 8 月，宝武环科与眉山市环境投资有限公司签订《无废城市重点技术联合研究实验室合作协议》，眉山市首个无废城市重点技术联合实验室正式成立，双方将进一步深入贯彻落实国家绿色低碳发展要求，共同开展环保产业技术攻关，研究工艺路径，为眉山市无废城市建设贡献力量。

Baowu Environment and Resource Technology has actively explored the integration of industry and urban development, achieving significant milestones in promoting green industrial development. In August 2023, Baowu Environment and Resource Technology signed the *Cooperation Agreement on Joint Laboratory for Key Technologies in Building Zero Waste Cities* with Meishan Environmental Investment Co., Ltd. to establish the first joint laboratory for key technologies in building Zero Waste Cities in Meishan City. Both parties will further implement national requirements for green and low-carbon development, collaborate on research into key environmental protection technologies, explore technological process pathways, and contribute to the transformation of Meishan City into a Zero Waste City.

案例 互联宝地·杨浦园成为双创“明珠”

Case B-Link Yangpu Park emerged as a cradle for business startups and innovation

互联宝地·杨浦园承载着中国宝武老工业基地转型升级和杨浦区城市更新的重要使命。中国宝武与杨浦区政府围绕“互联网 + 创新创业产业园”的定位建设，持续吸纳高端企业入驻、以增值服务有效联动产业资源、以繁华的商业 + 醇熟的配套释放产业集聚效应，打造出了“宜业、宜创、宜商”的高质量产业生态圈，是宝武集团“厂区——园区——城区”的示范项目、首发项目，具有标杆意义。

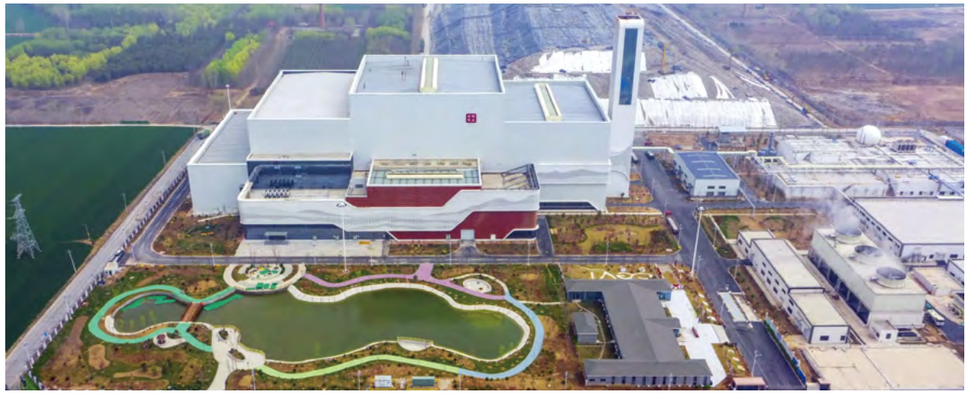
B-Link Yangpu Park has played a vital role in supporting the transformation and upgrading of China Baowu's old industrial base and the urban renewal of Yangpu District. With its focus on becoming a new technology hub as well as an innovation industrial park for startups, China Baowu, in collaboration with the Yangpu District Government, has continuously attracted high-end enterprises, effectively coordinated industrial resources with value-added services, and unleashed the industrial agglomeration effect, which is supported by thriving businesses and mature supporting facilities. This approach has created a high-quality industrial ecosystem that fosters industry, innovation, and business. Today, it stands as a pioneering demonstration project for Baowu, exemplifying the successful implementation of its "factory area - park area - urban area" development model.

案例 重钢集团设计项目获 2023 年河南省工程建设优质工程

Case The project designed by Chongqing Iron & Steel Group recognized as a Quality Construction Project in Henan Province

2023 年 9 月，重钢集团设计的焦作市静脉产业园东部园区项目荣获 2023 年河南省工程建设优质工程。焦作市静脉产业园东部园区项目是河南省和焦作市的重点环保民生工程，主要处理焦作市五个中心城区、修武县以及武陟县的生活垃圾、医疗废物和餐厨垃圾。重钢集团通过科学创新设计，构建协同处置的高度集中的废弃物处理体系，实现多种固废处理“减量化、资源化、无害化”，是河南省内面积最大、产业门类最为齐全的环保静脉产业园。

In September 2023, the Eastern Park Project of Jiaozuo Vein Industry Park, designed by the Design Institute of Chongqing Iron & Steel Group, was recognized as a Quality Construction Project in Henan Province for 2023. This project is a key environmental protection and livelihood initiative for Henan Province and specifically, Jiaozuo, primarily addressing the treatment of household waste, medical waste, and kitchen waste from the five central urban areas of Jiaozuo, as well as Xiuwu County and Wuzhi County. Through scientific and innovative design, Chongqing Iron & Steel Group has developed a highly centralized waste treatment system for collaborative disposal, achieving the goals of "reduction, recycling, and bio-safe disposal" of various solid wastes. This park stands as the largest and most comprehensive eco-industrial park in Henan Province.



武钢云谷·606 园区聚焦导入科创、文创、现代低碳冶金产业链企业等，建设“高品质、标杆性、创新型”的文化创意产业园区，已成为武汉市重大工程项目、市级重点文创园区。

Wugang Group's Yungu 606 Park is dedicated to attracting enterprises involved in scientific and technological innovation, cultural and creative design, and the modern low-carbon metallurgical industry chain, aiming to build a "high-quality, benchmarking, and innovative" cultural and creative industry park. It has since become a major construction project and a key municipal-level cultural and creative industry zone in Wuhan.

绿色能源
Green energy sources

发展绿色能源产业是支撑钢铁主业转型发展、助力“双碳”的必由之路。中国宝武持续优化能源结构，培育风光电力、氢能、天然气、储能、增量配电网等绿色能源产业，逐步实施低碳能源替代；加快源网荷储一体化及多能互补技术、规模化绿氢制备及储氢等技术开发，持续推进绿氢规模化、低成本供给难题突破；推动可再生能源规模化发展，建设扎布耶、三门峡等清洁能源示范项目；加大天然气、绿电等清洁能源使用比例，致力探索清洁运输等，实现绿色低碳发展。

Developing green energy sources is essential for China Baowu to support the transformation and growth of its core steel business and to promote the implementation of its carbon peaking and carbon neutrality strategy. We have continuously optimized our energy structure, expanded our green energy portfolio–including wind and solar power, hydrogen energy, natural gas, energy storage, and incremental power distribution networks–and steadily increased the proportion of low-carbon energy sources. We have also accelerated the integration of "source, network, load, and storage" and the development of hybrid complementation technologies and large-scale green hydrogen production and storage technologies, while continuing to drive technological breakthroughs for the large-scale, low-cost supply of green hydrogen. Furthermore, the Group has promoted the large-scale development of renewable energy sources and built several clean energy demonstration projects, such as the Zabuye and Sanmenxia projects. Additionally, we have increased the proportion of clean energy sources, including natural gas and green power, and actively explored clean transportation solutions to achieve green and low-carbon development.

2023 年 In 2023

分布式能源建成并网
300 兆瓦
300 MW
of distributed energy resources (DER) projects were completed and connected to the grid

在建
600 兆瓦
with an additional
600 MW under construction

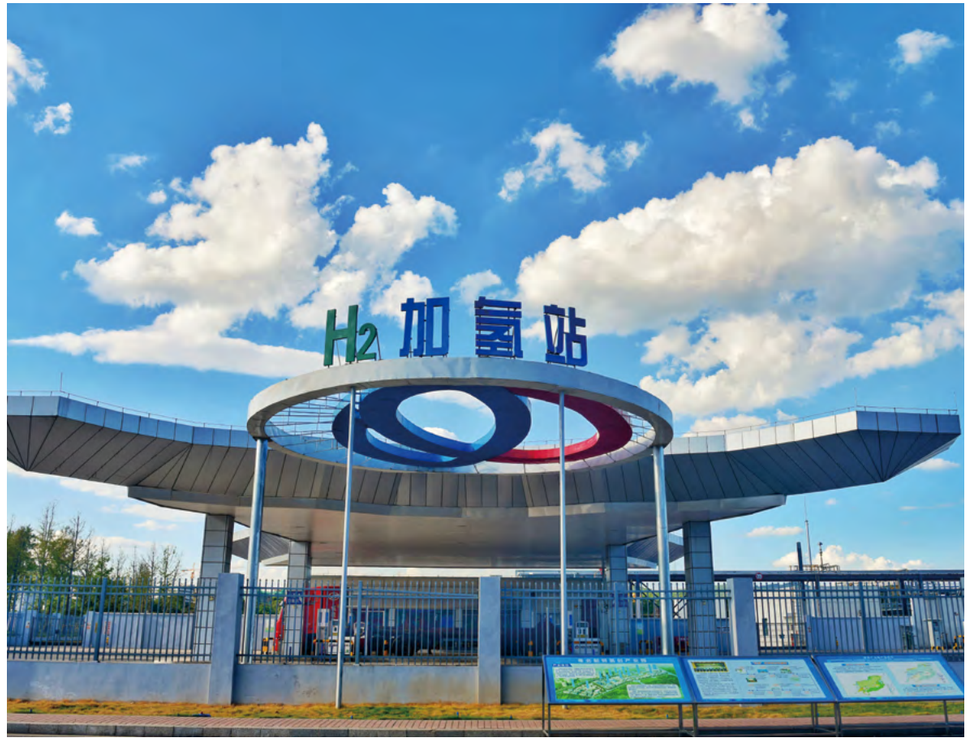
集中式新能源项目指标入库 **0.8** 吉瓦
0.8 GW of centralized new energy projects were recorded in the statistics

案例 中南股份打造氢能源产业，助力老工业城市“绿色崛起”

Case Guangdong Zhongnan Iron & Steel contributed to hydrogen energy industry to support the "green revitalization" of old industrial city

2023 年 8 月，中南股份在韶关市交通系统指导下，启动韶关市百台氢能源车辆应用推广计划，一期项目制定 120 台氢能源车推广计划，带头推广氢能源车应用。氢能源车采用氢燃料电池提供动力，水是唯一排放物，可实现真正的零排放、零污染。中南股份建设的韶关市首个焦炉煤气制氢项目，每小时可生产 8000 标准立方米的高纯氢，为韶关和周边地区提供稳定的氢源；建设的广东省韶钢产业园 1 号加氢站配套绿氢制备系统，每日可为 500 多辆氢能源车提供氢气加注服务，极大助力城市绿色货运配送、绿色物流高质量发展。

In August 2023, under the guidance of the municipal transportation department of Shaoguan, Guangdong Zhongnan Iron & Steel launched a program to promote the application of 100 hydrogen energy vehicles in Shaoguan. The first phase of this program plans to introduce 120 hydrogen energy vehicles, positioning the company as a leader in advancing the adoption of hydrogen energy vehicles in the region. Hydrogen energy vehicles are powered by hydrogen fuel cells, emitting only water as a byproduct, thereby achieving true zero emissions and zero pollutants. The first coke oven gas-based hydrogen production project in Shaoguan City, constructed by Guangdong Zhongnan Iron & Steel, can produce 8,000 standard cubic meters of high-purity hydrogen per hour, ensuring a stable hydrogen supply for Shaoguan and its surrounding areas. Additionally, the No. 1 hydrogen refueling station built by Guangdong Zhongnan Iron & Steel in Shaogang Industrial Park, Guangdong Province, is equipped with a green hydrogen generation system, capable of refueling over 500 hydrogen energy vehicles per day, significantly supporting the high-quality development of urban green freight, distribution, and logistics.



案例 宝武清能新疆南疆钢铁焦炉煤气综合利用项目顺利开工

Case Construction began on Baowu Clean Energy's South Xinjiang Iron and Steel Coke Oven Gas Comprehensive Utilization Project

2023 年 10 月，宝武清能与八钢公司深度合作项目——新疆南疆钢铁焦炉煤气综合利用项目在拜城县产业园区举行开工仪式。作为一次集团内部生态圈单位间的深度合作，宝武清能与八钢公司优势互补、合力打造“资源 + 储运 + 应用”示范性工程，实现双方互利共赢。项目充分利用南疆公司焦化系统富余的焦炉煤气资源，通过净化、回收，将其转化为具有高附加值的 LNG 等清洁能源，实现资源综合利用和节能减排的目标，充分实现“资源——能源——环境”一体化可持续发展理念。

In October 2023, a groundbreaking ceremony was held for the South Xinjiang Iron and Steel Coke Oven Gas Comprehensive Utilization Project, a deep cooperation project between Baowu Clean Energy and Bayi Iron & Steel, in the Baicheng County Industrial Park. Through deep cooperation between Baowu Clean Energy and Bayi Iron & Steel, both subsidiaries of the Baowu, the two companies have leveraged their respective strengths to create a complementary partnership and develop a demonstration project based on the model of "resources + storage and transportation + application," ensuring mutual benefits for both parties. The project fully utilizes surplus coke oven gas resources from the company's coking system in South Xinjiang, converting it into LNG and other high value-added clean energy through purification and recovery processes, thereby achieving comprehensive resource utilization, energy conservation, and emission reduction, fully embodying the concept of integrated sustainable development of resources, energy, and the environment.

案例 中钢矿业绿色高效提钒技术通过专家评审

Case Sinosteel Mining's green and efficient vanadium extraction technology passed expert review

在国家“双碳”目标引领下，储能电站的建设是高效利用绿色能源的最佳途径，全钒液流电池因其容量更大、更安全环保、循环寿命更长、能量转换效率更高等优点逐渐成为未来储能的首选技术，但高效绿色提取钒是业界公认的难题。

In alignment with China's carbon peaking and carbon neutrality goals, establishing energy storage power stations has become key to the efficient utilization of green energy. Vanadium redox flow batteries (VRFBs) have increasingly emerged as the preferred technology for future energy storage due to their larger capacity, superior safety, enhanced environmental performance, longer cycle life, and higher energy conversion efficiency. However, finding a clean and efficient method for extraction of vanadium remains a significant challenge for the industry.

中钢矿业抓住绿色能源、储能技术转型升级的市场机遇，与钒电池企业合作提供新型储能产品。2023 年 11 月，石煤提钒项目可行性研究报告通过业内知名专家和生产企业一线专家的评审，取得阶段性成果，为中钢矿业钒矿资源利用创造了新的契机，为国内“钒储能”全产业链布局提供新动能。

Leveraging market opportunities arising from the transformation and upgrading of green energy and energy storage technologies, Sinosteel Mining has collaborated with vanadium battery enterprises to introduce new energy storage products. In November 2023, the feasibility study report for the project of vanadium extraction from stone coal successfully passed the review by renowned industry experts and frontline production experts, not only enabling Sinosteel Mining to better utilize vanadium ore resources but also providing new driving force for the future development of a comprehensive vanadium-based energy storage industry chain in China.

绿色智慧服务
Green intelligent services

宝武集团大力推进新一代信息技术和钢铁行业的深度融合，通过数字化重塑传统钢铁业，牵引下游产业加快实现数字化转型升级。持续构建智慧工厂，在高炉闭环控制、热轧“1+N”核心技术、数字化产品研发等方面形成了一批核心技术突破和应用，实现超大规模、超级复杂场景下的智能运营和智慧决策；借助数智化技术创新，推动基于工业互联网的跨产业、跨空间、跨界面“三跨”融合，实现极致的跨界协同效率，探索构建数据、算力、算法、工业知识及智慧应用于一体的钢铁工业大脑，升级智慧决策。

Baowu has vigorously promoted the synergy of next-generation information technology with the steel industry, reshaping the traditional steel industry through digitization and guiding downstream industries to accelerate their digital transformation and upgrading. The Group has consistently focused on building smart factories, achieving a series of breakthroughs and applications in core technologies, such as closed-loop blast furnace control, hot rolling technology, and digital product research and development, thereby enabling intelligent operations and decision-making on an ultra-large scale in highly complex scenarios. Leveraging innovations in digital and intelligent technology, Baowu has also advanced cross-industry, cross-space, and cross-interface integration (the "Three-Cross" integration) based on the Industrial Internet, achieving optimal cross-border collaboration efficiency. The Group has also explored and developed a steel industry "brain" integrating data, computing power, algorithms, industrial knowledge, and intelligent applications, thereby enhancing intelligent decision-making capabilities.

案例 宝武集团固危废资源智慧管理平台上线投运，助力“无废城市”建设

Case Baowu's solid and hazardous waste intelligent management platform was launched and opreated to support Zero Waste City initiatives

2023 年 2 月 28 日，宝武集团固危废资源智慧管理平台上线投运。该平台通过数智化手段，对接各产废单位管理系统，实现固危废从“废料”到“原料”再到“材料”的资源化利用循环和固危废产品高值化、全量化的循环利用处置链网。同时通过“互联网 + 绿色生态”，以中国宝武固危废管理的一张网为基础，将服务逐渐延伸到构筑未来城市固危废管理的一张网上，为建设“无废城市”提供中国宝武方案，实现产城融合创新发展。

On February 28, 2023, Baowu launched and put into operation its solid and hazardous waste intelligent management platform. This platform connects with the management systems of various waste-generating units through digital integration, enabling the transformation of solid and hazardous waste from waste to resources, and ultimately to materials. It also establishes a high-value, fully quantified recycling and disposal chain network for solid and hazardous waste. At the same time, leveraging its Internet Plus Green Ecology model and the established solid and hazardous waste management network, China Baowu has gradually extended its services to build a broader urban solid and hazardous waste management network, aiming to provide a solution for constructing Zero Waste Cities and to drive innovative development through industry-city integration.

2023 年 10 月 18 日，在由欧冶云商承办的 2023 新型低碳冶金现代产业链共链行动暨钢铁产业互联网大会上，22 份 EPD 集中发布，三份新品类 PCR 全球首发，为更多的企业为自家产品发布 EPD 提供依据，进一步提升钢铁行业 EPD 平台在工业领域的国际影响力。

On October 18, 2023, during the 2023 New Low-Carbon Metallurgy Modern Industry Chain Sharing & Participation Action and the Iron and Steel Industry Internet Conference organized by Ouyeel, 22 EPDs were released, and 3 PCRs for new product categories were launched globally for the first time, providing more enterprises with a foundation for releasing their own EPDs and further enhance the global influence of the steel industry EPD platform within the industrial sector.

宝武智维挂牌“宝武环境监测总站”和“宝武特种设备检验总站”，深度参与钢铁行业超低排放评估、监测，切实发挥“绿色化”支撑功能。

Baowu Equipment Intelligent Technology has been officially designated as the "Baowu Environment Monitoring Master Station" and "Baowu Special Equipment Inspection Master Station," enabling it to play a significant role in the ultra-low emission assessment and monitoring of the steel industry, and effectively fulfilling its responsibilities in supporting green initiatives.

欧冶云商承办2023新型低碳冶金现代产业链共链行动暨钢铁产业互联网大会及系列活动，以“数聚产业生态、创新平台赋能”为主题，邀请钢铁生态圈各方伙伴共同参与，推动数字经济和实体经济深度融合，共同描绘现代化产业体系建设新蓝图。

Ouyeel organized the 2023 New Low-Carbon Metallurgy Modern Industry Chain Sharing & Participation Action and the Iron and Steel Industry Internet Conference, along with related events, under the theme "Harnessing the Power of the Industry Ecosystem Through Digitalization, Empowering with an Innovative Platform." The event invited partners within the steel industry ecosystem to collaboratively promote the deep integration of the digital and real economies, and to chart a new course for the development of a modern industrial system.

2023 年 8 月，武钢集团协助承办“2023 年第三届智慧海绵城市论坛”，以“智慧赋能系统治理——全域推进海绵城市高质量发展”为主题，为国内外城市智慧水系统的理论研究、实际应用搭建了交流平台。

In August 2023, Wugang Group assisted in organizing the "2023 Third Forum of Smart Sponge City" themed "Energizing Systematic Governance with Intelligence to Promote High-Quality Development of Sponge Cities Across the Region," providing a platform for the theoretical research and practical application of smart water management systems in cities both domestically and internationally.

绿色产业金融
Green industrial finance

《工业重点领域能效标杆水平和基准水平（2023 年版）》提出“推动金融机构在风险可控、商业可持续的前提下，向节能降碳改造升级项目提供高质量金融服务，落实节能专用装备、技术改造、资源综合利用等税收优惠政策，加快企业改造升级步伐，提升行业整体能效水平”。中国宝武研究学习、贯彻落实相关政策要求，持续完善绿色产业金融支撑服务体系、创新绿色金融服务模式，为钢铁企业绿色发展提供金融支撑。

The *Benchmark and Reference Levels for Energy Efficiency in Key Industrial Sectors (2023)* advocates for promoting financial institutions to provide high-quality financial services for energy-saving and carbon-reduction renovation and upgrading projects with controllable risks and commercial viability, implementing tax incentives for energy-saving equipment, technological transformation, and comprehensive resource utilization, accelerating enterprise renovation and upgrading, and improving the overall energy efficiency level of the industry. China Baowu has actively studied and implemented these relevant policies and requirements, continuously improving its green industry financial support system, innovating green financial service models, and providing strong financial support for the green development of steel enterprises.

2023 年，华宝股权积极围绕绿色产业链投资布局，完成宝武绿碳基金百亿规模落地；华宝投资加大绿色金融平台创新，建设区块链绿色供应链金融服务平台；华宝证券创新碳金融协同降本履约、碳资产盘活、碳金融产品等服务模式，获得证监会发布的参与碳排放权交易无异议函，成为唯一一家具有产业背景的碳交易资格证券公司；华宝基金开发华宝 ESG 责任投资、华宝绿色能源 ETF 等 7 只双碳概念的公募基金产品；财务公司开发绿色融资租赁、排污权贷款等创新性绿色信贷产品，开拓绿色金融应用场景，绿色金融规模超百亿。

In 2023, Hwabao Equity Investment Fund Management actively invested in green and low-carbon sectors centered on the industrial chain and completed the registration and launch of the Baowu Green Carbon Fund, with a total scale of RMB 10 billion. Furthermore, Hwabao Investment intensified innovation efforts in the green financial platform by developing a blockchain-based green supply chain financial service platform. Meanwhile, Hwabao Securities introduced innovative service models, including carbon finance for collaborative cost reduction and compliance, carbon asset activation, and carbon financial products. It obtained a letter of no objection from the China Securities Regulatory Commission for participating in carbon emission trading, making it the only securities firm with an industrial background to hold carbon trading qualifications. Additionally, Hwabao WP Fund Management launched seven publicly offered fund products related to the carbon peaking and carbon neutrality goals, including Huabao ESG Responsible Investment and Huabao Green Energy ETF. Baowu Group Finance Company developed innovative green credit products, such as green financial leasing and pollutant discharge right loans, while expanding the application scenarios of green finance. Its green finance, with a green finance portfolio surpassing RMB 10 billion.

案例 华宝证券大力发展绿色金融业务，服务绿色低碳高质量发展

Case Hwabao Securities vigorously expanded green finance to serve green, low-carbon, and high-quality development

作为国内首家获批碳金融牌照的中小券商，华宝证券高度重视碳金融业务发展，通过“碳金融 + 绿色研究 + 绿色投行”等综合金融服务，构建服务绿色实体经济的业务生态，探索出了一条符合华宝证券实际的特色化绿色金融发展道路。2023 年 1 月，华宝证券获得自营参与碳排放权交易资格；9 月华宝证券凭借其在绿色金融领域作出的突出贡献，荣膺 2023 年中国国际服务贸易交易会“绿色金融发展服务示范案例”奖项。

As the first small- and medium-sized securities firm in China to obtain a carbon finance license, Hwabao Securities attaches great importance to the development of its carbon finance business. Leveraging its comprehensive financial services, such as "carbon finance + green research + green investment banking," Hwabao Securities has established a business ecosystem dedicated to serving the green real economy. It has also explored a characteristic green finance development path tailored to its strengths and capabilities. In January 2023, Hwabao Securities obtained the qualification to participate in carbon trading through proprietary trading. In September, Hwabao Securities was recognized with the "Green Finance Development Service Demonstration Case" award at the 2023 China International Fair for Trade in Services (CIFTIS) for its outstanding contributions to green finance.

与北京绿色交易所签订合作协议，携手探索碳市场多元化主体共赢之路。

Hwabao Securities signed a cooperation agreement with China Beijing Green Exchange to explore paths for achieving mutual benefits among various stakeholders in the carbon market.

荣膺 2023 年中国国际服务贸易交易会“绿色金融发展服务示范案例”奖项。

Hwabao Securities was recognized as a "Green Finance Development Service Demonstration Case" at the 2023 CIFTIS.

创新金融服务模式，为中南钢铁重庆钢铁等多家企业提供碳金融、碳资产等服务。

Hwabao Securities innovated financial service models to offer carbon finance, carbon asset management, and other services to Chongqing Iron & Steel of Zhongnan Iron & Steel and other enterprises.

2023 年，华宝证券利用碳交易牌照助力中南钢铁重庆钢铁完成控排履约成本；与马钢集团开展碳交易专项战略合作与储备交易，打造一批绿色碳汇储备、可供交易的林业碳汇产品；将碳汇数据平台建设体系模式推广至帮扶地区，帮助帮扶地区寻找碳中和需求机会，挖掘绿水青山的经济价值，实现收益变现；陆续与北京绿色交易所、中建材绿能、承德塞罕坝生态开发集团、上海环境能源交易所、东珠生态等签订合作协议，共同探索深化碳金融市场的合作模式，为“双碳”发展注入金融“活水”，助推实体经济绿色转型、高质量发展。

In 2023, Hwabao Securities leveraged its carbon trading license to assist Chongqing Iron & Steel of Zhongnan Iron & Steel in fulfilling its emission control obligations. It has established a strategic cooperation with Magang Group, focusing on carbon trading and reserve transactions, to develop a portfolio of green carbon sink reserves and tradable forest carbon sink products. It has also promoted the framework and model of the carbon sink data platform in supported regions, helping them identify carbon neutrality demands, and tap into the economic value of the lucid waters and lush mountains, thereby achieving economic gains. Furthermore, Hwabao Securities has signed cooperation agreements with China Beijing Green Exchange, CNBM Green Energy, Chengde Saihanba Ecological Development Group, Shanghai Environment and Energy Exchange, Dongzhu Ecology, and others to jointly explore and expand cooperation models in the carbon finance market, financially contributing to the carbon peaking and carbon neutrality goals, and supporting the green transformation and high-quality development of the real economy.

分别与马钢集团、上海环境能源交易所、东珠生态宁能电力签订战略合作协议。

Hwabao Securities signed strategic cooperation agreements with Magang Group, Shanghai Environment and Energy Exchange, and Ningneng Power of Dongzhu Ecology.

案例 华宝股权探索建立宝武绿碳基金 ESG 投资体系

Case Hwabao Equity Investment Fund Management explored establishment of ESG investment system for Baowu Green Carbon Fund

2023 年，华宝股权探索建立宝武绿碳基金 ESG 投资体系，组织专门力量对 GRI、SASB、TCFD 等国际通行框架与体系进行了解，与集团内部优秀实践单位，以及外部相关投资和评级机构进行沟通和互动；探索并初步建立宝武绿碳基金 ESG 投资评价体系，并在实际投资管理中逐步应用和优化完善，在促进被投企业 ESG 绩效改善方面取得了一定的成果。

In 2023, Hwabao Equity Investment Fund Management explored the establishment of an ESG investment system for the Baowu Green Carbon Fund, organizing specialized teams to study international frameworks and standards, such as GRI, SASB, and TCFD. Additionally, it engaged in communication and collaboration with leading practice units within the Group, as well as external investment and rating agencies. As a result, it has successfully developed and initially implemented an ESG investment evaluation system tailored for the Baowu Green Carbon Fund, which has been gradually applied and optimized in real-world investment management activities, yielding positive results in improving the ESG performance of the invested enterprises.

截至 2023 年底，宝武绿碳基金共完成了 12 个投资项目的出资，其中 6 个项目向绿碳基金公布碳排放数据，合计排放强度总体下降 5.73%；共完成 5 个宝武集团内部项目、8 个宝武集团外部项目的投资决策。2023 年 12 月 12 日，宝武绿碳基金以认缴规模超百亿元正式完成基金封闭，并于 12 月 29 日，按照协议约定完成了实缴工作，同时在绿色低碳领域累计完成近 30 亿元的股权投资任务，实现了基金投资运营的高效和高质，落实“践行绿色低碳投资理念，助推产业生态圈高质量发展”的使命任务。5 月，华宝股权荣获投中网“2022 年度中国新锐私募股权投资机构 TOP10”奖项；12 月，荣获清科“2023 年中国国资投资机构 50 强”。

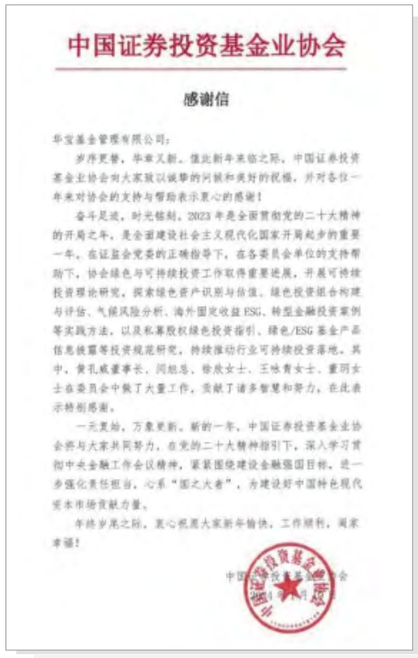
As of the end of 2023, the Baowu Green Carbon Fund has invested in 12 projects, with 6 of them disclosing their carbon emission data to the fund, resulting in an overall 5.73% reduction in emission intensity. The fund has also finalized investment decisions for five internal projects within Baowu and eight external projects. On December 12, 2023, the Baowu Green Carbon Fund officially closed with a subscribed scale of over RMB 10 billion. The payment was completed according to the agreement on December 29, 2023, and nearly RMB 3 billion in equity investments in the green and low-carbon sector were successfully executed. Hwabao Equity Investment Fund Management has thereby ensured the high-efficient and high-quality operation of the fund, making significant progress in fulfilling its mission to promote green and low-carbon investment pratices and facilitate the high-quality development of the industry ecosystem. In May 2023, Hwabao Equity Investment Fund Management was recognized as one of the 2022 Top 10 Young Private Equity Investment Institutions in China by ChinaVenture Investment Consulting Ltd. In December, it was listed among the 2023 Top 50 China State-Owned Investment Institutions by Zero2IPO Group.

案例 华宝信托设立首单绿色公益慈善信托

Case Hwabao Trust established its first green public welfare charity trust

2023 年 12 月，华宝信托联合成都市武侯社区发展基金会和成都市金堂社区发展基金会，设立“华宝信托博施济众 1 号成都社区垃圾分类慈善信托”。信托财产主要用于支持社区垃圾分类减量，致力于提升公民参与社区“双碳”行动、垃圾分类减量等方面的积极性，减少环境污染，提高资源再利用率，推动垃圾分类成为低碳生活新时尚，通过“慈善 + 环保”的形式，支持成都社区绿色慈善公益事业发展。

In December 2023, Hwabao Trust, in collaboration with the Wuhou Sub-District Development Foundation and the Jintang Sub-District Development Foundation in Chengdu, established the Hwabao Trust No. 1 Charity Trust for Waste Sorting in Chengdu Communities. The trust assets are primarily used to support community waste sorting and reduction initiatives, aiming to enhance citizens' enthusiasm for participating in community's carbon peaking and carbon neutrality actions, waste sorting, and reduction efforts, ultimately decreasing environmental pollutants, improving resource recycling rates, promoting waste sorting as a new trend in low-carbon living, and supporting the development of green charity and public welfare initiatives in Chengdu communities through the "charity + environment protection" model.



华宝基金研究建立《可持续投资标准规范》，作为基金业协会绿色与可持续投资专委会年度重点课题，获得基金业协会积极肯定。

The Hwabao WP Fund Management formulated the *Standards and Guidelines for Sustainable Investment*, which served as an annual key research subject for the Green and Sustainable Investment Special Committee of the Asset Management Association of China (AMAC), earning significant recognition from AMAC.

植绿篇
绿色理念落地生根
Green Practices
Embedding Green Philosophy in Organizational Culture

宝武集团积极倡导全员参与绿色低碳，共建共享美丽中国宝武大家园。持续开展形式多样的生态环境保护、绿色低碳发展宣传教育和“极致低碳”劳动竞赛等活动，践行绿色的生产生活方式，提升全员生态文明意识，养成保护环境的行为自觉，共同建设人与自然和谐共生的美丽家园。

Baowu advocates for all employees to participate in green and low-carbon initiatives, fostering a shared commitment to building a greener Baowu. The Group has carried out various ecological conservation activities, green and low-carbon development campaigns, and ultra low-carbon competitions and other events, aiming to promote green production and lifestyle practices, enhance ecological awareness among all employees, cultivate a culture based on environmental protection, and together build a harmonious home where humanity and nature coexist.

开展环保培训

Organizing Environmental Protection Training

宝武集团组织环保法律法规培训，宝武集团一级子公司主要领导及能源环保主管领导 100 多人参加培训；组织绿色低碳高端培训班，对全集团“一基五元”产业子公司的 46 名中高层管理人员进行系统培训；在直管干部、部长 / 高级经理等履职培训班中增加低碳技术、碳核算等培训课程；组织开展危险废物贮存更新标准专项培训，督促各单位按新标准要求全面更换危险废物标志标识；邀请上海市生态环境局开展排污许可守法培训；组织“绿色矿山生态环境管理”专题培训，260 余名相关管理、技术人员参加学习；组织极致能效技术交流研讨活动，近 500 人次通过技术和案例的交流，促进经验共享，推动钢铁基地和多元产业能效提升。

Baowu has organized training sessions focused on environmental laws and regulations, with participation from over 100 key leaders and energy and environmental protection supervisors from its first-tier subsidiaries. Additionally, the Group has conducted green, low-carbon, and advanced training courses, providing systematic instruction to 46 middle and senior managers from its "One Basis and Five Industries" subsidiaries. Low-carbon technology and carbon accounting courses were also added to the performance training curriculum for directly managed officials, ministers, senior managers, and others. Furthermore, the Group has organized special training on the updated standards for hazardous waste storage, urging all subsidiaries to fully replace hazardous waste signs and labels in accordance with the new regulations, and invited the Shanghai Municipal Bureau of Ecology and Environment to conduct training on compliance with pollutant discharge permits. It has also organized a special training session on "Green Mining Ecological Management," attended by more than 260 managers and technical personnel. In addition, a technology exchange and seminar on achieving optimal energy efficiency was organized, with nearly 500 participants sharing technologies and case studies to improve energy efficiency across steel bases and diversified industries.

宣贯绿色文化

Promoting Green Culture

宝武集团组织开展形式多样、内容丰富的绿色低碳宣传活动，提高全员低碳意识。积极开展“全国生态日”“世界环境日”“零碳公司日”“全国节能宣传周”等活动，营造浓厚绿色低碳发展氛围；参与第 28 届联合国气候变化大会（《联合国气候变化框架公约》第二十八次缔约方大会）中国角边会，中国国际碳交易大会，上海国际碳中和技术、产品与成果博览会，世贸组织（WTO）开放性论坛等活动，宣传钢铁行业在应对气候变化中的积极行动和实践。

Baowu has organized various green and low-carbon awareness campaigns to enhance the low-carbon consciousness of all employees, including activities such as National Ecology Day, World Environment Day, Zero Carbon Company Day, and National Energy Efficiency Promotion Week, creating an atmosphere of green and low-carbon development. The Group has also participated in key events such as the China Pavilion activities at the COP28, China International Carbon Trading Conference, the Carbon Neutrality Expo in Shanghai, and the WTO Public Forum, all aiming to showcase the steel industry's proactive measures and practices in addressing climate change.

宝钢股份举办六五环境日主题活动，发布“绿色无废城市钢厂”实施方案、绿色低碳发展战略与行动口号等内容。

Baosteel held a themed event on June 5 the World Environment Day, during which it released a "Zero Waste Green Urban Steel Factories" implementation plan, the green and low-carbon development strategy, and a corresponding slogan.

八一钢铁开展环保管理培训、“6·5”世界环境日系列活动，普及低碳环保知识。

Bayi Iron & Steel conducted environmental management training and a series of activities themed on June 5 the World Environment Day to promote low-carbon awareness.

新钢集团在六五环境日、节能宣传周开展环保知识宣传活动，举办主题摄影展览。

Xinsteel held environmental protection knowledge popularization activities and themed photography exhibitions for June 5 the World Environment Day and the National Energy Efficiency Promotion Week.

宝武环科参加全国节能宣传周活动，共同签署《重点行业领域碳达峰碳中和宣言》。

Baowu Environment and Resource Technology participated in the National Energy Efficiency Promotion Week and signed the *Declaration on Carbon Peaking and Carbon Neutrality in Key Industrial Areas.*

马钢股份参与马鞍山市六五环境日主题活动。

Masteel participated in Ma'anshan City's themed activity for June 5 the World Environment Day.

践行绿色办公

Implementing Green Office Practices

宝武集团从节约用能和提升能效两个方面切入，加强办公环境、办公设备、差旅出行、用水用电用纸等方面的管理。倡导随手关灯、室温适宜时不使用空调、调低电脑屏幕亮度等绿色办公的方式，减少非必要能耗；大力推进设施的节能改造，将高能耗设备替换为节能装置，引入智能化控制系统以实现能效的自动化管理；鼓励绿色出行、光盘行动、垃圾分类、视频会议等低碳行动，减少日常工作和生活造成的碳排放，全方位推进节能降耗，进一步实现绿色办公。

Baowu has managed its office environment, office equipment, corporate travel, and workplace resources such as water, electricity, and paper with a focus on energy conservation and efficiency improvement, advocating for green office practices such as turning off unused lights, avoiding air conditioning when unnecessary, and reducing computer screen brightness to minimize unnecessary energy consumption. It has also promoted the energy-saving renovation of old facilities, replacing high energy-consuming equipment with energy-efficient alternatives and introducing intelligent control systems to achieve automated energy efficiency management. Additionally, the Group has encouraged low-carbon initiatives such as green commuting, the Clean Your Plate Campaign, waste sorting, and video conferencing, aiming to reduce carbon emissions from daily work and life and promote comprehensive energy conservation.

	2022	2023
办公用电量（宝武大厦） Electricity consumption for office use (Baowu Building)	427,032.41 千瓦时 kWh	415,681.82 千瓦时 kWh

中国宝武广州宝地广场获评全国首批零碳数智楼宇试点单位。

China Baowu's Baodi Plaza in Guangzhou has been recognized as one of the first batch of zero-carbon smart building pilot units across the nation.

宝武大厦湿垃圾就地资源转化项目，采用高温好氧发酵技术，通过微生物菌剂及酶，将餐厨湿垃圾降解成有机肥基料，在堆肥处理后转化成有机肥，有效降低常规湿垃圾处理过程中所产生的碳排放。

Inside the Baowu Building, an on-site conversion project for wet waste has adopted high-temperature aerobic fermentation technology to transform kitchen wet waste into an organic fertilizer base using microbial agents and enzymes, effectively reducing carbon emissions typically generated through conventional wet waste treatment methods such as composting.

开展劳动竞赛

Organizing Competitions at Work

宝武集团按照《关于组织开展中国宝武 2023 年“全面对标找差，创建世界一流”劳动竞赛的指导意见》要求，组织开展 2023 年度“极致低碳”劳动竞赛，从极致能效、清洁能源替代、环保数据上平台和节能减碳优秀案例评选等四个方面，推动更多产业、更多企业、全体员工深入贯彻落实中国宝武“双碳”战略、积极践行绿色低碳的生产和生活方式。

In alignment with the *Guiding Opinions on Organizing the China Baowu 2023 Competitions for "Identifying Gaps Through Comprehensive Benchmarking to Build a World-Class Enterprise"*, Baowu has organized the 2023 ultra low-carbon competitions, with a focus on maximizing energy efficiency, replacing traditional energy with clean energy, migrating environmental data to digital platforms, and selecting exemplary cases in energy-saving and carbon reduction, thereby encouraging more business segments, enterprises, and employees to deeply implement China Baowu's carbon peaking and carbon neutrality strategy and actively embrace green and low-carbon principles in both their work and daily lives.

2023 年 In 2023

“全国重点大型耗能钢铁生产设备节能降耗对标竞赛”中，共获得 **2** 个冠军炉、**14** 个优胜炉、**11** 个创先炉。

A total of **2** champion furnaces, **14** excellent furnaces, and **11** pioneering furnaces were selected in the National Key Large-Scale Energy-Consuming Steel Production Equipment Energy Conservation and Consumption Reduction Benchmarking Competition.

累计奖励焦炉、高炉、转炉、电炉能效“三甲”**40** 个和进步冠军 **10** 个，奖励矿山采选及其他制造业企业能效进步产线 **30** 个。

Rewards were offered for **40** "3A" energy efficiency leaders and **10** progress champions in coke ovens, blast furnaces, converters, and electric furnaces, as well as for **30** energy efficiency improvement production lines in mining and other manufacturing enterprises.

共征集 **485** 项极致能效的好做法、好经验，评选出 **60** 项“节能减碳优秀案例”。

A total of **485** best practices and experiences in energy efficiency maximization were collected, **60** of which were selected as "Excellent Cases of Energy Conservation and Carbon Reduction."

宝钢股份、马钢集团、太钢集团、宝武资源、中钢集团、宝钢金属 **6** 家单位获得优秀组织奖。

Excellent Organization awards were granted to Baosteel, Magang Group, TISCO, Baowu Resources, Sinosteel, and Baosteel Metal.

守护生态环境

Protecting Ecological Environment

宝武集团不断提升各生产单位管理区域内的绿化率，各钢铁基地的厂区绿化率均达到 30% 以上，部分企业达到近 50% 的绿化覆盖率。矿山企业重视地质环境恢复、土地复垦复绿与生态修复等工作，建设项目从可研评审、工程建设以及生产运营高度关注所在地的生物多样性的保护，重视对生物资源的有效保护，采取必要措施尽可能减少对生态系统和物种的影响。

Baowu has consistently expanded green coverage across the management areas of each production unit, achieving a green coverage rate of over 30% at all production bases, with some subsidiaries reaching nearly 50%. Additionally, all mining subsidiaries have attached great importance to geological environment restoration, land reclamation greening, as well as ecological rehabilitation. For all construction projects, the protection of biodiversity within and around their sites has been a priority from feasibility review through to engineering design, construction, operation, and production, with significant measures taken to effectively protect biological resources and minimize the impact on ecosystems and species diversity.

案例 西藏矿业开展扎布耶盐湖生态修复工作

Case Ecological restoration of Zabuye Salt Lake by Tibet Mineral Development

2023 年西藏矿业开展扎布耶矿区历史遗留矿山恢复治理。加强矿山生态植被恢复，改变采坑凌乱不堪的总体形象，使之与周边人居环境相协调；人工种植草本植物，提高草原植被覆盖率，改善草原生态环境，保障草原生态安全。修复工作于 2023 年 9 月 15 日通过日喀则林业和草原局的验收。

取土点植被修复

Restoration of surface vegetation at borrow sites

In 2023, Tibet Mineral Development undertook restoration and rehabilitation efforts at the inherited mines in the Zabuye mining area, focusing on strengthening ecological vegetation restoration and reshaping disordered mining pits to harmonize with the surrounding environment. Additionally, herbaceous plants were planted to increase vegetation coverage, improve the ecological environment, and ensure the ecological safety of the grassland. The restoration work was inspected and approved by the Shigatse Forestry and Grassland Bureau on September 15, 2023.

案例 上海宝山宝钢股份水库湿地候鸟重要栖息地入选《陆生野生动物重要栖息地名录》（第一批）

Case Essential habitat for migratory birds in Baoshan Baosteel Reservoir Wetland in Shanghai included in the List of Essential Habitats for Terrestrial Wild Animals (First Batch)

2023 年 11 月 30 日，国家林业和草原局公布《陆生野生动物重要栖息地名录》（第一批），宝钢股份水库湿地候鸟重要栖息地入选。

On November 30, 2023, the National Forestry and Grassland Administration of China announced the *List of Essential Habitats for Terrestrial Wild Animals (First Batch)*. Baoshan Baosteel Reservoir Wetland was listed as an essential habitat for migratory birds.

宝钢股份水库湿地候鸟重要栖息地面积为 6.95 平方公里（上海市生态保护红线范围），其中陆域面积 3.47 平方公里、长江河口面积 3.48 平方公里，主要保护物种为小天鹅、角鹬鹛、凤头潜鸭等冬候鸟。宝钢股份积极开展湿地与候鸟保护行动，为保护生物多样性贡献自身力量。

The essential habitat for migratory birds in the Baoshan Baosteel Reservoir Wetland in Shanghai covers an area of 6.95 square kilometers (within Shanghai's ecological protection red line), including 3.47 square kilometers of land and 3.48 square kilometers of the Yangtze River estuary. The main species protected are winter migratory birds, such as tundra swans, horned grebes, and tufted ducks. Baosteel actively took actions in protecting the wetland and migratory birds, playing its part in supporting biodiversity conservation.

小天鹅

Tundra swans

角鹬鹛

Horned grebes

湛江钢铁在休渔期开展增殖放流活动。

Zhanjiang Iron & Steel carried out fish stock enhancement during the off-season.

名列《世界自然保护联盟濒危物种红色名录》的栗喉蜂虎鸟在湛江钢铁厂区安家筑巢。

Blue-tailed bee-eaters, listed on the *IUCN Red List of Threatened Species,* have nested the Zhanjiang Iron & Steel Plant.

案例 中钢国际开展海外项目运营地生态环境保护行动

Case Sinosteel Engineering & Technology, launched ecological environment protection campaign at overseas project sites

中钢国际在玻利维亚进行的穆通综合钢厂项目，需要从巴拉圭河取水，全长 120 公里，其中有 80 公里途经国家自然保护区。为防止动物跌落到开挖的管沟中，项目部严格控制开挖距离，同时沿管沟两侧采用织网做好防护；安排专人定期进行巡检，一旦发现动物受伤，第一时间进行救助治疗。同时，在建设期间，项目部人员与保护区单位多次就环境保护进行交流，做到联防联动，取得积极效果，得到良好评价。

The Mutun Steel Complex project in Bolivia, undertaken by Sinosteel Engineering & Technology, involves sourcing water from the Paraguay River, located 120 kilometers away. Notably, about 80 kilometers of the water intake route passes through a national nature reserve. To prevent animals from falling into the excavated trenches, the project department strictly controlled the excavation distances, installed protective barriers along both sides of the trenches, and assigned dedicated personnel for regular inspections. If any injured animals were found, rescue and treatment were provided promptly. At the same time, the project department actively communicated and cooperated with stakeholders within the protected area multiple times, offering the assistance that have yielded positive results and feedback in protecting the local ecological environment.

玻利维亚项目生态保护管线施工防止动物坠落

Ecological protection measures implemented for the project in Bolivia to prevent animals from falling into the excavated areas

结语 Conclusion

焕发绿色新动能，共创钢铁新未来！宝武集团将坚持深入学习贯彻习近平主席有关宝武“双碳”工作的重要批示精神，秉持“共建产业生态圈 共创绿色新未来”的新使命，以“碳中和引领者”的胸怀、格局和气度，勇当新型低碳冶金现代产业链链长，以全生命周期的绿色低碳提升企业竞争力，引领行业绿色低碳发展，推动绿色钢铁为工业文明与生态文明的和谐共融作出不可替代的贡献。

Let's together revitalize green energy and create a new future for steel! Baowu will undertake an in-depth study and implement President Xi Jinping's key directives on Baowu's carbon peaking and carbon neutrality goals, embracing the new mission of "jointly build an industrial ecosystem and create a greener future." With the determination and ambition to "strive to be a carbon-neutral leader," Baowu has positioned itself as the leader of the modern low-carbon metallurgical industrial chain. Through comprehensive green and low-carbon initiatives across the entire life cycle, Baowu has enhanced its competitiveness, led the industry, and advanced green steel, making invaluable contributions to the harmonious integration of industrial civilization and ecological civilization.

附 录 Appendix

关键绩效
Key Performance Indicators

环境绩效 Environmental performance	单位 Unit	2021 年 2021	2022 年 2022	2023 年 2023
环保投入 Investment in environmental protection	亿元 RMB 100 million	106.58	151.36	155.97
万元产值（收入）综合耗能（可比价） Comprehensive energy consumption per RMB 10,000 of output value/revenue (comparable price)	吨标准煤 / 万元 TCE/RMB 10,000	1.18	0.99	0.92
吨钢耗新水量 Fresh water consumption per tonne of steel	吨 / 吨 Tonnes / tonne	2.55	2.35	2.30
废水排放量 Liquid discharge volume	万吨 10,000 tonnes	12,668	8,895	8,235
化学需氧量排放量 [1] Chemical oxygen demand emissions[1]	万吨 10,000 tonnes	1,994	1,570	1,440
二氧化硫排放量 [2] Sulfur dioxide emissions[2]	万吨 10,000 tonnes	23,079	23,854	20,948
氮氧化物排放量 [3] Nitrogen oxides emissions[3]	万吨 10,000 tonnes	53,840	56,391	51,056
固体废物综合利用率 Comprehensive utilization rate of solid waste	%	99.27	99.75	99.90
吨钢二氧化碳下降率 Carbon dioxide reduction rate per tonne of steel	%	0.63	0.15	1.30

注： 1.2022 年数据对外不含中钢
2.2022 年数据对外不含中钢
3.2022 年数据对外不含中钢

Note 1 Sinosteel is not included in the data publicly disclosed for the year 2022
2 Sinosteel is not included in the data publicly disclosed for the year 2022
3 Sinosteel is not included in the data publicly disclosed for the year 2022

《2023 年绿色低碳优秀案例汇编》
Summary of Excellent Green and Low-Carbon Cases in 2023

序号 No.	单位 Subsidiary	案例名称 Case Titles
1	宝钢股份 Baosteel （6 项） (6 cases)	焦炉煤气水解法精脱硫技术（宝山基地） Hydrolysis-based fine desulfurization from coke oven gas (Baoshan Base)
2		炼钢厂一、二炼钢连铸新增氢氧在线切割装置（宝山基地） Newly added hydrogen and oxygen online cutting devices for the steelmaking plant's first and second steelmaking continuous casting machines (Baoshan Base)
3		离子风亚微米颗粒静电除尘技术在厚板等离子切割除尘中的运用（宝山基地） Application of ionic wind submicron particle in an electrostatic precipitator technology in thick plate plasma cutting dust removal (Baoshan Base)
4		基于集中管控的长流程钢厂水效提升关键技术开发与应用（东山基地） Development and application of key technologies for enhancing water efficiency in long-process steelmaking via centralized control (Dongshan Base)
5		高炉煤气精脱硫工艺在青山基地的应用（青山基地） Application of blast furnace gas fine desulfurization process in Qingshan Base (Qingshan Base)
6		钢渣捕集石灰窑烟气 CO_2 及其资源化利用技术（梅山基地） Technology for steel slag-based CO_2 capture from lime kiln flue gas and its resource utilization (Meishan Base)
7	中南钢铁 Zhongnan Iron & Steel （6 项） (6 cases)	降低韶钢 8 号高炉燃料比（中南股份） Fuel ratio reduction in Shaogang No. 8 blast furnace (Guangdong Zhongnan Iron & Steel)
8		棒三辊道直送，降本环保两手抓（中南股份） Direct conveyance on roller bed of bar steel production line No. 3 for cost reduction and environmental protection (Guangdong Zhongnan Iron & Steel)
9		轧材厂烟气再循环技术的研究及应用（鄂城钢铁） Research and application of flue gas recirculation technology in rolling mill (Echeng Iron & Steel)
10		鄂钢焦化西区循环氨水余热制冷技术（鄂城钢铁） Circulating ammonia water waste heat refrigeration technology in west coking area of Echeng Iron & Steel (Echeng Iron & Steel)
11		初期雨水作为非常规水资源回收利用工艺技术（重庆钢铁） Technology for recycling initial rainwater as an unconventional water resource (Chongqing Iron & Steel)
12		炼钢厂铁包加盖节能改造项目（重庆钢铁） Energy-saving renovation project by adding iron ladle covers in steelmaking plant (Chongqing Iron & Steel)
13	马钢集团 Magang Group （6 项） (6 cases)	提升固废返生产利用率的创新实践（马钢股份） Innovative practices to improve solid waste reuse in production (Masteel)
14		电炉余热回收系统的极致能效提升（特钢公司） Maximizing energy efficiency in electric furnace waste heat recovery system (Special Steel Company)
15		电炉除尘系统节能降耗经济运行（特钢公司） Economic operation for energy saving and consumption reduction in electric furnace dust removal system (Special Steel Company)

序号 No.	单位 Subsidiary	案例名称 Case Titles
16	马钢集团 Magang Group （6 项） (6 cases)	高炉热风炉烟气超低排放实践（长江钢铁） Ultra-low emissions in flue gas from hot blast (Changjiang Iron & Steel)
17		3 号烧结机脱硝低温催化剂应用节能先进案例（炼铁总厂） Advanced energy-saving application of low-temperature catalyst in sintering machine No. 3 (The Iron-Making Plant)
18		7m 焦炉煤气加热下横排温度均匀性（煤焦化公司） Uniform horizontal temperature in 7-meter coke oven gas heating (The Coal Coking Company)
19	太钢集团 TISCO （6 项） (6 cases)	压型生物质直接掺烧燃煤锅炉降碳技术应用（太钢不锈） Application of carbon reduction technology in direct combustion of pressed biomass in coal-fired boilers (Shanxi Taigang Stainless Steel)
20		提高焦油回收率（太钢不锈） Improvement of tar recovery rate (Shanxi Taigang Stainless Steel)
21		复合材料生产危废减量化、无害化处置（钢科公司） Reduction and bio-safe disposal of hazardous waste from composite material production (Steel Science Company)
22		转炉顶底 CO_2 能源化应用（炼钢二厂） Utilization of CO_2 from top and bottom of basic oxygen furnace as energy (Second Steelmaking Plant)
23		铁钢界面效率提升（制造部） Efficiency improvement at iron & steel interface (Manufacturing Department)
24		宝钢德盛冷轧厂循环水泵 ARC 高密度陶瓷技术应用（冷轧厂） Application of ARC high-density ceramic technology for circulating water pump in Baosteel Desheng Stainless Steel Cold Rolling Plant (Cold Rolling Plant)
25	八钢公司 Bayi Iron & Steel （4 项） (4 cases)	基于欧冶炉煤气的一种新型超低氮燃烧技术研究（能源环保部） Research on new ultra-low nitrogen combustion technology based on Ouyeel furnace gas (Energy and Environment Protection Division)
26		八钢低碳数智管理实践（碳中和办公室） Practice of low-carbon digital and intelligent management in Bayi Iron & Steel (Carbon Neutrality Office)
27		八一钢铁轧钢厂加热炉烟气余热综合利用节能案例（八一钢铁 苗岩） Case study on energy conservation through comprehensive use of waste heat from heating furnace flue gas in Bayi Iron & Steel Rolling Plant (Miao Yan, Bayi Iron & Steel)
28		巴州钢铁炼铁厂高炉持续优化燃料比案例（八一钢铁 刘博） Case study on continuous optimization of fuel ratio in blast furnace of Bazhou Steel's Steelmaking Plant (Liu Bo, Bayi Iron & Steel)
29	宝武资源 Baowu Resources （4 项） (4 cases)	高充填率纳米陶瓷球磨矿降噪节能降碳应用（马钢矿业） Application of high filling rate nano ceramic ball milling for noise cancelling, energy saving, and carbon reduction (Masteel Mining)
30		程潮矿雨水回用提高水资源利用效率（武钢资源） Rainwater reuse in Chengchao Mines to improve water resource utilization efficiency (Wugang Resources)
31		金山店矿井下生产用水零电耗技术（武钢资源） Technology for achieving zero electricity consumption in production water supply at Jinshandian Mine (Wugang Resources)
32		蒙库球团开展链篦机工业余热利用的生产实践（八钢矿业） Production practice of Mengku Pelletizing in recycling industrial waste heat from chain grate machine (Bagang Mining)

序号 No.	单位 Subsidiary	案例名称 Case Titles
33	新钢集团 Xinsteel （4 项） (4 cases)	2500m^3 高炉低碳技术开发及应用（炼铁事业部） Development and application of low-carbon technology for 2500 m^3 blast furnace (Iron-Making Division)
34		新钢铁水“一罐制”技术运行实践（技术中心、硅钢薄板事业部） "One tank to the bottom" operation mode for molten iron at Xinsteel (Technical Center, and Silicon Steel Thin Plate Division)
35		压泥成金，新钢尘泥综合治理低碳实践（能源环保部、新钢环科） Turning mud into gold: Low-carbon practice of comprehensive treatment of dust and sludge in Xinsteel (Energy and Environment Protection Department, and Xinsteel Environmental Technology)
36		100 吨转炉高效化炼钢技术研究与应用（厚板特钢事业部） Research and application of high-efficiency steelmaking technology for 100-tonnes basic oxygen furnace (Thick Plate Special Steel Division)
37	昆钢公司 Kunming Iron & Steel （2 项） (2 cases)	1# 高炉上料系统高炉均压煤气全回收实践 Practice of full recovery of blast furnace at equalized pressure in the No. 1 blast furnace feeding system
38		提高余热发电与烧结同步作业率 降低生产成本减少碳排放 Improving waste heat power generation and sintering synchronization rates to reduce production costs and carbon emissions
39	宝武碳业 Baowu Carbon （2 项） (2 cases)	新型保温材料气凝胶在焦油加工行业的运用（重庆宝丞） Application of new aerogel thermal insulation material in tar processing industry (Chongqing Baocheng Carbon Materials)
40		改质沥青低碳化系统改造（宝化湛江） Low-carbon system renovation for modified asphalt (Baosteel Chemical Zhanjiang)
41	中钢集团 Sinosteel （2 项） (2 cases)	井下有轨智能无人运输系统（山东富全矿业） Underground intelligent unmanned rail transportation system (Shandong Fuquan Mining)
42		选矿生产系统和工艺升级优化（刘塘坊矿业） Upgrading and optimization of concentrating mill production systems and technological processes (Liutangfang Mining)
43	宝武环科 Baowu Environment and Resource Technology （2 项） (2 cases)	“碳”索绿色建材应用，开辟矿渣粉低碳发展之路（宝钢建材） Exploring the application of green and low-carbon building materials for low-carbon development of slag powder (Baosteel Novel Building Material Technology)
44		加大高热值危废利用 实现节能减污降碳协同 Increasing the utilization of high-calorific-value hazardous waste to achieve coordinated energy conservation, pollution reduction, and carbon emission reduction
45	宝钢工程 Baosteel Engineering （3 项） (3 cases)	环保型脱硫渣自动浸泡系统（宝钢节能） Environmentally friendly desulfurization slag automatic soaking system (Shanghai Baosteel Energy Service)
46		八一钢铁厂配套 2500 立方米 HyCROF 投运能源系统适应性改造 Adaptive transformation of the 2,500 m^3 HyCROF energy system put into operation at Bayi Iron & Steel Plant
47		高炉热风炉极致低碳技术及应用 Ultra low-carbon technology and its application in blast furnace hot blast heaters

序号 No.	单位 Subsidiary	案例名称 Case Titles
48	宝钢金属 Baosteel Metal（2 项）(2 cases)	连拉、镀锌除尘风机永磁电机改造（南通宝钢制品） Transformation of permanent magnet motor for continuous annealing and galvanizing dust removal fans (Baosteel Nantong Wire Products)
49		大型竖罐双蓄热镁冶炼及镁渣处理技术项目（宝镁轻合金） Large-scale twin-regenerative magnesium smelting and magnesium slag treatment technology project (Baosteel Magnesium Light Alloys)
50	中钢洛耐 Sinosteel Luonai Materials Technology（2 项）(2 cases)	智能节能型密封辊道窑系统开发应用 Development and application of intelligent energy-saving sealed roller kiln system
51		氢基直接还原竖炉用耐火材料的研制与应用 Development and application of refractory materials for hydrogen-based direct reduction shaft furnaces
52	宝钢包装 Baosteel Packaging	污水处理站臭气处理工程（佛山宝钢制罐） Odor treatment project for wastewater treatment plant (Foshan Baosteel Can Manufacturing)
53	宝武水务 Baowu Water Technology	宝钢德盛 360m^2 烧结脱硫脱硝设施节能改造（福州分公司） Energy-saving renovation of the 360 m^2 sintering, desulfurization, and denitrification facility at Baosteel Desheng Stainless Steel (Fuzhou Branch)
54	华宝投资 Hwabao Investment	华宝租赁助力梅钢基地完成清洁运输达 A 指标创建（华宝租赁） Hwabao Finance & Leasing assisted Shanghai Meishan Iron & Steel Base in achieving Grade A clean transportation standards (Hwabao Finance & Leasing)
55	欧冶云商 Ouyeel	钢铁行业 EPD 平台建设与运营 Construction and operation of the EPD platform for the steel industry
56	宝地资产 Baoland Real Estate Asset Management	探索湿垃圾处置新模式，实现新领域减污降碳 Exploring new models for wet waste disposal to achieve pollution and carbon emission reduction in new sectors
57	欧冶链金 Ouyeel Lianjin Recycling Resources	广西公司热熔压饼线采用天然气燃烧节能降碳 Energy and carbon saving through natural gas combustion in the hot melt iron cake pressing line at companies in Guangxi
58	宝武清能 Baowu Clean Energy	云南省宁洱县林业生态产品开发案例 Case study on the development of forestry ecological products in Ning'er County, Yunnan Province
59	宝武重工 Baowu Heavy Industries	双频淬火机床中频电源 IGBT 节能低碳制造技术研究及应用（宝钢轧辊） Research and application of IGBT energy-saving and low-carbon manufacturing technology in dual-frequency quenching machine tool power supply for intermediate frequency power supply (Baosteel Roll)

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