

Baotou 500,000 Tons/Year Water Slag and 500,000 Tons/Year Steel Slag Solid Waste Resource Utilization Project

Investment Value Analysis Report (Bank Financing Supporting Version)

Report Positioning: This report analyzes the project's industrial value, operating value, cash flow value, financing value and main risks from the dual perspective of banks and project investors. The report is based on the feasibility study report and its financial appendices provided by the user, combined with national solid waste resource utilization policies for qualitative analysis.

I. Executive Summary

The project plans to build a comprehensive steel solid waste resource utilization project with annual processing of 500,000 tons of blast furnace water slag and 500,000 tons of steel slag in the Industrial Park of Kundulun District, Baotou. Total investment RMB 304.725 million, proposed financing RMB 210 million, capital RMB 94.725 million. The project adopts a dual-line parallel, terminal convergence route of "water slag ultra-fine grinding + steel slag physical field combined separation + tailings preparation of low-carbon cementitious materials", forming a diversified product structure of cementitious materials, iron concentrate, rare earth concentrate, other valuable metal concentrates and solid waste treatment income.

From the perspective of investment value, the project has strong policy adaptability, regional industrial synergy and comprehensive resource utilization value. National documents clearly propose expanding the scale of steel slag utilization, promoting steel slag powder as concrete admixture, and encouraging recovery of rare and scattered metals and other valuable components from smelting slag. The 2026 publicly released solid waste comprehensive treatment action plan further emphasizes solid waste source control, green design and comprehensive consumption in industrial parks. The project is located in Baotou, which has a strong steel and rare earth industrial foundation, and is selected adjacent to the Baogang plant area, with raw material end and industrial chain synergy advantages.

From the perspective of bank financing value, the project's feasibility study financial indicators are good, but financial yield cannot be directly equated with loan safety. The feasibility study report discloses after-tax IRR of 59.46%, after-tax NPV of RMB 375.733 million, after-tax static payback period of 2.90 years, comprehensive DSCR of 2.77, comprehensive ICR of 26.81. However, the feasibility study revenue includes solid waste treatment subsidies/treatment income, and the cashing basis for policy subsidies has not been independently verified in current materials; at the same time, key separation technology requires pilot and continuous operation verification, and there are significant unit differences between the product plan and financial appendices for rare earth and other metal output. Therefore, the project should adopt a financing strategy of "conditional support, phased disbursement, special account management, milestone triggering and post-loan monitoring".

II. Project Investment Value Sources

1. Solid Waste Resource Utilization and Policy Adaptability

The project converts blast furnace water slag and steel slag from stockpiling or low-value utilization into ultra-fine slag powder, iron concentrate, rare earth concentrate, other metal concentrates and low-carbon cementitious materials, conforming to the direction of reduction, resource utilization and harmlessness. Policy documents reposted by the Ministry of Ecology and Environment propose expanding the utilization of steel slag powder in construction engineering, exploring other large-scale utilization channels for steel slag, and encouraging the recovery of valuable components such as rare and scattered metals from smelting slag. The

project's policy value lies in combining resource recovery with tailings productization, forming a closed loop of "first extract rare earth, then extract metals, tailings make building materials", rather than relying solely on single steel slag powder sales.

2. Regional Industrial Synergy and Transportation Radius Advantages

The project's proposed location is in the Industrial Park of Kundulun District, Baotou, approximately 5-10 kilometers from the Baogang plant area. The feasibility study report discloses that Baogang Group produces approximately 2 million tons/year of steel slag and 3 million tons/year of blast furnace water slag. The project's annual processing volumes are 500,000 tons and 500,000 tons respectively, with certain regional supply foundation at the raw material end. In terms of project economics, a short transportation radius helps reduce bulk solid waste transportation and organization costs, and is also conducive to establishing collaborative relationships between waste-producing enterprises, resource utilization enterprises and downstream building material users. However, the above raw material scale is not equivalent to the project having obtained exclusive supply rights. Banks should still require formal supply agreements, price mechanisms, quality standards and minimum supply volume commitments.

3. Multi-product Structure Reduces Single Product Dependence

In the project's revenue structure, cementitious materials are the core revenue source, iron concentrate and solid waste treatment income provide important supplements, and rare earth concentrate and other valuable metal concentrates constitute high-value options. Feasibility study Appendix 4 full production year operating revenue is RMB 221.0353 million, including cementitious material revenue RMB 140.8 million, iron concentrate revenue RMB 40 million, solid waste treatment revenue RMB 40 million, while rare earth concentrate, other valuable metal concentrate and water slag line iron scrap recovery revenue are relatively small.

Full Production Year Operating Revenue	Revenue (RMB 10,000)	% of Operating Revenue	Financing Interpretation
All-solid-waste alkali-activated low-carbon cementitious materials	140.8	63.7%	Core product, need customer certification, stable quality and application
Iron concentrate	4,000.0	18.1%	Important cash flow source, need to implement grade, pricing and sales
Solid waste treatment income	4,000.0	18.1%	Need to clarify whether it is market-oriented treatment fee or policy subsidy
Rare earth and other valuable metals, iron scrap	23.5	0.1%	Limited current financial appendix contribution, but high technology value
Total	22,103.5	100.0%	Restored according to feasibility study appendix amount calibration

4. Long-term Application Value of Low-carbon Cementitious Materials

All-solid-waste alkali-activated low-carbon cementitious materials use S105 grade ultra-fine slag powder from the water slag line and steel slag powder tailings as main components, with target specific surface area not less than 500m²/kg. They can target high-performance concrete admixtures, geopolymers building materials and green low-carbon engineering material markets. Their commercial value lies not only in treating solid waste, but also in converting tailings into standardizable, certifiable and sustainably sellable building material products. Since the project's products still require application testing, customer certification, green building material certification and stable supply capability, banks should not judge sales cashing solely based on theoretical performance, but should incorporate actual orders, testing reports and payment collection records into post-loan conditions.

III. Financial Value and Cash Flow Quality

Under the original feasibility study caliber, the project's full production year operating revenue is RMB 221.0353 million, total cost expenses RMB 45.6799 million, total profit RMB 177.0454 million, net profit RMB 154.9147 million. The project adopts relatively low operating cost assumptions, with materials, fuel and power costs at only RMB 5,800 in the full production year, wages and benefits RMB 8.64 million, repair costs RMB 7.9309 million, other expenses RMB 2.4697 million. Among them, the unit expression of raw material and energy prices has issues that are easily misread. Formal credit review should re-verify based on contracts, invoices, equipment energy consumption and metering data.

The bank version model independently calculates Base, Upside and Downside. The Base scenario restores feasibility study revenue, costs and subsidy arrangements; the Upside scenario moderately increases load and main product prices; the Downside scenario reduces capacity load, reduces cementitious material price by 10%, iron concentrate price by 15%, treatment fee by 10%, increases operating costs and construction investment by 10%, and does not include policy subsidies. This Downside is an internal stress assumption, not an external fact.

Indicator	Base	Upside	Downside
After-tax Project IRR	59.4%	72.8%	29.4%
Project NPV (7.5%)	40,311.3	48,340.1	21,992.8
Static Payback Period	2.90 years	2.58 years	4.06 years
Break-even Point	20.5%	18.4%	27.8%
Full Production Year DSCR	3.15x	3.53x	2.48x
Minimum DSCR During Repayment Period	1.59x	1.89x	1.10x

The Base scenario's project cash flow mainly depends on cementitious materials, iron concentrate and solid waste treatment income, with policy subsidies listed as separate supplementary cash flow. In the Downside scenario, the minimum DSCR is approximately 1.10x. Although still greater than 1.0x, the safety margin significantly narrows, indicating that the loan structure should not concentrate all principal repayment arrangements in the early stage, nor should it disburse the full amount at once before sales contracts and raw material supply contracts are implemented.

IV. Key Risks and Mitigation Measures

1. Technology Industrial Scale-up Risk

DC RF dielectric separation is the key link for the project to recover rare earth concentrate. The feasibility study report has clearly stated that this link requires pilot verification, equipment selection confirmation and process parameter optimization. The risk is not only that the concentrate grade cannot reach the design value, but also includes feed stability, continuous operation capability, equipment maintainability, energy consumption, electromagnetic environment protection and key spare parts supply. Bank mitigation measures should include: using pilot reports and third-party testing as preconditions for disbursement; setting performance guarantees, breach liabilities and acceptance payment nodes in equipment procurement contracts; taking trial production with materials, continuous operation and product grade compliance as conditions for subsequent fixed asset loan disbursement; requiring equipment suppliers to provide sufficient warranty and spare parts plans.

2. Product Sales and Market Introduction Risk

Cementitious materials are the project's core revenue source, but new low-carbon cementitious materials require customer trials, formula adaptation, engineering certification, green building material certification and continuous supply verification from laboratory performance to batch application in engineering projects. Although iron concentrate has relatively mature downstream applications, it is still necessary to verify Fe grade, impurities, moisture content, settlement price and customer payment collection cycle. Banks should obtain sales intentions or framework contracts of not less than a certain proportion of designed capacity before the loan, and continuously monitor shipment volume, sales price, accounts receivable aging and payment collection rate after the loan.

3. Raw Material Supply and Price Mechanism Risk

The project has a large processing scale. Water slag and steel slag transportation, moisture content, particle size, impurities and composition fluctuations will affect processing costs, equipment load and product quality. The project's proximity to the Baogang plant area is conducive to transportation, but does not automatically form stable supply. It should be verified whether the supply agreement includes minimum supply volume, raw material quality, moisture content, settlement method, transportation responsibility, environmental responsibility, supply interruption compensation and price adjustment mechanism.

4. Policy Subsidies and Revenue Quality Risk

Feasibility study Appendix 4 includes solid waste treatment subsidies in project revenue, and Appendix 8 separately lists subsidy income. If part of it belongs to policy subsidies rather than market-oriented treatment fees, it is necessary to independently prove policy documents, funding sources, approval authority, distribution conditions, terms, historical cashing and budget arrangements. Banks should classify policy subsidies into three categories: "implemented, with clear policy basis but not yet approved, only feasibility study assumption", and adopt different cash flow discounts or not include them in repayment sources respectively.

5. Financial Data and Product Unit Caliber Risk

The feasibility study product plan lists rare earth concentrate at approximately 9,138 tons/year and other valuable metal concentrate at approximately 10,150 tons/year; however, the financial appendix revenue calculation corresponds to approximately 9.14 tons/year and 10.15 tons/year, with an approximately 1000x unit difference. The current bank version model strictly restores according to the financial appendix amount caliber, and marks this matter as Review. Formal financing materials should not directly replace product plan quantities into the financial model before obtaining written confirmation from the project unit, nor should rare earth product revenue be used as the main repayment source.

V. Investment Value Scoring

The following table presents in the manner of "value contribution - risk status - financing action", and does not use simple scores to replace due diligence conclusions.

Value Dimension	Value Judgment	Current Evidence	Financing Action
Policy Adaptability	Strong	National policies support steel slag and cementitious slag industrial decarbonization, agreed full subsidies have been	
Raw Material Security	Medium-strong, pending objective evaluation	Guangdong, good regional raw material supply agreements, minimum supply volume and quality terms	
Technology Maturity	Water slag line strong, rare earth iron slag blending/pengline green separation has application for mass production	Research on slag blending/pengline green separation has application for mass production	
Product Sales	Cementitious materials	Feasibility study has product plan, still selling raw materials and payments collected on data	payment collection monitoring
Profitability	Very strong under feasibility study	Basic data for R11 positive at 59.4%, D11 DSCR at 2.94, IRR as credit bottom line	
Cash Flow Safety	Medium-strong but dependent on cash flow	Domestic minimum DSCR approximately 1.65x	By 1.65x service reserve, cash flow collection and financial constraints
Data Completeness	Medium-weak	Product output, subsidy nature, three-stage data collection, need to strengthen verification	

VI. Recommended Financing Structure and Credit Conditions

1. Financing Purpose and Amount Boundary

The project feasibility study proposes financing of RMB 210 million, accounting for 68.91% of total investment. Under the bank prudent caliber, this amount can be used as the initial financing demand, but the final credit amount should be comprehensively determined based on approved investment estimates, capital sources, project self-financing ratio, collateral value, loan term, cash flow coverage and shareholder credit enhancement capability. It is recommended to separate construction investment loans from working capital needs, and not use construction investment loans to cover long-term operating working capital gaps.

2. Recommended Phased Disbursement

The first phase is used for land, design, EIA and energy assessment, engineering preparation and approved equipment procurement; the second phase is conditional on full capital in place, signing of main engineering contracts, key equipment performance guarantees and raw material supply agreements; the third phase is conditional on completion of main works, equipment installation and commissioning, pilot testing passing and environmental protection facilities being put into operation simultaneously; the fourth phase is conditional on trial production with materials, continuous operation, product quality compliance and sales order/payment collection verification. Each phase of disbursement should be based on special account payment and invoices, contracts, engineering metering, and equipment acceptance materials.

3. Recommended Debt Service and Cash Flow Management Clauses

It is recommended that all project operating income, treatment service fees and policy subsidies enter the supervision account recognized by the lender, and establish a payment collection and cash flow forecasting mechanism. Set minimum DSCR constraints, minimum cash balance, major capital expenditure approval, related party transaction restrictions, external guarantee restrictions and profit distribution restrictions. The project should not conduct high-ratio dividend distribution during the loan repayment period, unless after completing the current period's debt service, debt service reserve and operating fund retention, it still meets the agreed cash flow coverage indicators.

VII. Pre-disbursement and Post-loan Checklist

Item	Documents/Evidence to be Supplemented	Trigger Time
Raw Material Supply	Water slag and steel slag supply agreements, minimum supply volume	Before, feasibility study and price mechanisms
Product Sales	Cementitious materials, iron concentrate, rare earth concentrate	Before equipment frame work negotiation and production
Technology Verification	DC RF dielectric separation pilot report, performance indicators	Before pilot testing and equipment and subsystems debugging
Land and Planning	Land use rights, planning permits, construction permits, park entrance	Before project commencement
Environmental and Energy Assessment	Environmental assessment, discharge permits, solid waste utilization	Before waste water recycling trial production
Capital	Capital in-place vouchers, shareholder contribution capability and	Before first disbursement
Construction Contracts	EPC/construction/equipment procurement/installation contracts	Before phase disbursement and warranty terms
Revenue Subsidies	Subsidy policies, approvals, budgets, agreements, distribution	Conditions including to replace income vouchers
Financial Materials	Project company audit reports, tax payments, credit reports, related	Before credit approvals and contingent liabilities
Quality and Safety	Raw material testing, product testing, occupational health, safety	Before trial production and emergency plans

VIII. Overall Judgment

The project has strong industrial policy adaptability and resource recycling value, with relatively clear regional raw material foundation, location conditions and product synergy logic. Under the feasibility study restoration caliber, the project's profitability and cash flow coverage indicators are good; under the Downside scenario that does not include policy subsidies and superimposes capacity, price, cost and investment pressure, the project can still maintain positive after-tax IRR and DSCR greater than 1.0x, indicating that it does not completely rely on subsidies to maintain debt service.

However, the project should not currently be described as a financing project with "unconditional high returns and low risks". Whether the bank supports it depends critically on five verifiable conditions: whether raw material supply is locked, whether cementitious materials and iron concentrate form collectable orders, whether DC RF dielectric separation passes pilot testing and performance assessment, whether policy subsidies have clear and enforceable basis, and whether construction investment and engineering quality are controllable. After these conditions are met, the project has the foundation for further advancing credit and green finance/resource comprehensive utilization financing; before these conditions are implemented, phased disbursement and prudent cash flow caliber should be adopted, and the high feasibility study IRR should not directly replace due diligence.