



The present work was submitted to  
the German-Mongolian Institute of Resource and Technology

## **MARKET ANALYSIS OF COKING COAL PLANT: ERDENES TAVANTOLGOI JSC CASE STUDY**

Bachelor's Thesis

by

**GANTSETSEG Zorigt**

Study program: Industrial Engineering

Student ID: B2100259

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Ulaanbaatar/Nalaikh,

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## Statutory Declaration

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I hereby affirm in lieu of an oath that I provided the submitted bachelor thesis

### **MARKET ANALYSIS OF COKING COAL PLANT: ERDENES TAVANTOLGOI JSC CASE STUDY**

I did not use any sources other than those stated. In case that the work is additionally submitted on a data medium, I declare that the written and the electronic form are completely identical. The work was not submitted in the same or similar form to any examination authority.

2025.05.02

Place, Date



Signature

## Acknowledgment

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## **Abstract**

This thesis assesses the market feasibility and strategic competitiveness of the proposed coking coal plant by Erdenes TavanTolgoi JSC (ETT), a major state-owned coal producer in Mongolia. The study analyzes global and regional coking coal demand trends, with a particular focus on China—ETT’s primary target market—as well as emerging prospects in Japan, and South Korea. Utilizing a combination of market research, scenario forecasting, and strategic risk analysis, the thesis evaluates ETT’s product quality, logistical advantages, competitive positioning, and long-term sustainability.

The findings indicate that while global demand for coking coal is expected to peak in the mid-2021s and gradually decline, Asian markets will continue to provide short- to medium-term export opportunities. ETT’s coke blend complies with China’s Class II specifications and benefits from low-cost overland transport to inland steel hubs. Strategic analysis shows that ETT can strengthen its market position by leveraging infrastructure advantages, enhancing risk management practices, and diversifying exports to maintain competitiveness. The study concludes that the planned coke plant is economically viable and can support Mongolia’s broader goals of industrial diversification and value-added export development.

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# 1 Introduction

## 1.1 Background and Rationale

Coking coal, also known as metallurgical coal, is a vital raw material used in steelmaking. As countries expand their industrial capacity, the demand for high-quality coking coal remains resilient despite ongoing global energy transitions. The international coking coal market is shaped by dynamic consumption patterns, infrastructure constraints, and regional price fluctuations—particularly in the Asia-Pacific region, where China, India, and emerging economies dominate steel production.

Mongolia, endowed with significant reserves of high-grade coking coal, is geographically positioned to serve China's growing steel industry. The Tavantolgoi deposit—one of the largest undeveloped coking coal sources globally—is operated by Erdenes TavanTolgoi JSC (ETT), a state-owned enterprise. While Mongolia has traditionally exported raw coal to China, recent government policy has shifted toward promoting value-added processing. In alignment with this policy, ETT plans to establish a coking coal plant to vertically integrate its operations and capture greater economic value from downstream activities.

This thesis aims to evaluate the market feasibility and competitiveness of ETT's proposed coke plant within a rapidly evolving regional market. Given increasing import diversification in China, competition from countries like Australia and Russia, and tightening environmental regulations, a comprehensive market analysis is critical. The study applies economic modeling, demand forecasting, and strategic risk assessment to support accurate evaluation and provide actionable insights.

## 1.2 Research Objectives

The main objective of this thesis is to assess the market feasibility of the planned Erdenes TavanTolgoi coking coal plant. The sub-objectives include:

- To analyze global and regional trends in coking coal supply and demand, with emphasis on the Chinese market.
- To evaluate the competitiveness of ETT's coking coal product in terms of quality, cost structure, and logistics.
- To identify strategic opportunities and risks associated with penetrating key northern Chinese industrial regions.
- To conduct a demand and supply forecast using economic modeling and scenario-based approaches.

## 1.3 Research Questions

This study addresses the following research questions:

Main Question:

- How feasible and competitive is the Erdenes TavanTolgoi coke plant project in the context of regional coking coal demand, infrastructure advantages, and long-term strategic risks?

Sub-Questions:

- What are the key market trends influencing coking coal demand in China and other Asian countries?
- How does ETT's coke product perform in terms of quality, pricing, and logistics compared to competitors?
- What strategic opportunities and risks shape the long-term viability of the project?
- How can ETT leverage its geographical and infrastructural strengths to ensure market access and export diversification?

## 1.4 Methodology and Data Sources

### 1. Market Research and Data Collection

The study begins with an extensive desk-based review of relevant market reports, industry statistics, and government feasibility studies. Primary data was drawn from ETT's 2022 feasibility study, while secondary sources included:

- Fenwei Energy Reports (2024)
- BP Energy Outlook
- IEA coal market reports
- Chinese trade and import statistics
- Government policy documents from Mongolia and China

These sources provide a solid foundation for evaluating demand, pricing trends, infrastructure constraints, and policy impacts.

### 2. Comparative Analysis

A comparative framework was applied to assess the technical and economic characteristics of ETT's coke product versus major Chinese and regional producers. Factors analyzed include:

- Coke quality indicators (ash, sulfur, fixed carbon)

- Transportation costs and logistics efficiency
- Market access routes and distance to end users
- Pricing benchmarks and competitive positioning

Tables and figures are used to present this analysis in a clear, data-driven format.

- **3. Forecasting Models**

To analyze future demand and price trends for coking coal, the thesis applies a multi-model forecasting approach, including:

- **Trend Extrapolation:** Historical data (2015–2024) is used to identify patterns in consumption and pricing, particularly in China and global markets.
- **Elasticity-Based Modeling:** Demand elasticity assumptions are adapted from similar industry studies to estimate future demand under different price and policy scenarios.
- **Scenario Analysis:** Multiple demand and supply scenarios are constructed to assess project feasibility under varying geopolitical, regulatory, and trade conditions.

These models provide short- to medium-term forecasts (2025–2035) and help identify strategic risks and opportunities for ETT’s plant.

- **4. Theoretical Framework**

The analysis is grounded in the supply and demand model under partial market equilibrium, assuming that coal prices and volumes adjust in response to cost, policy, and infrastructure shifts. Strategic behavior among major exporters (e.g., Australia, Russia) is considered through game-theoretical insights from Cournot and Stackelberg models to reflect non-competitive market structures.

- **5. Limitations**

While the analysis draws on extensive data sources, some limitations include:

- Restricted access to Chinese buyer contracts
- Limited long-term data for some regional markets
- Uncertainty in future policy changes

To address these, the study uses scenario modeling and triangulation of multiple reputable sources.

## **1.5 Scope and Limitations**

This study is focused on the economic feasibility and market positioning of ETT's coke plant. It does not cover technical engineering aspects, environmental impact assessments, or financing mechanisms. Geographically, the analysis is centered on Mongolia-China trade corridors and target buyers in northern China. Due to limited access to proprietary buyer contracts, assumptions are made based on historical trade flows and regional infrastructure data.

Forecasting is constrained by the quality and availability of forward-looking data, especially from non-public Chinese sources. However, these gaps are addressed through scenario modeling and the triangulation of multiple reputable market reports. While the study is specific to ETT's project, its structure and methodology offer applicability for other Mongolian value-added resource development initiatives.

## 2 Literature Review

### 2.1 Introduction

Coking coal, also known as metallurgical coal, is a critical raw material used in the production of coke, which is essential for traditional blast furnace steelmaking. When heated in the absence of air, coking coal undergoes pyrolysis to form coke—a porous, high-carbon product capable of supporting the intense temperatures and chemical reactions inside steel furnaces. Its properties—such as caking ability, fluidity, and volatile matter content—make it irreplaceable in primary steel production. In 2024, China's consumption of coking coal alone was projected to reach 582 million tonnes, showing its vast industrial significance (1).

This literature review synthesizes current academic models and industrial reports to assess global coking coal market dynamics, supply-demand trends, strategic behaviors among major exporters, and the growing role of Mongolia. It sets the foundation for evaluating the market entry potential of Erdenes TavanTolgoi's proposed coking coal plant.

### 2.2 Global Coking Coal Market Structure

The international coking coal market is shaped by a few dominant players. Major exporters—Australia, Canada, Russia, and the U.S.—exert substantial influence, with Australia being the largest seaborne supplier. These countries serve key consumers such as China, India, and Japan. Trüby and Paulus (2012) explain how market dynamics are driven not by perfect competition but by strategic behavior within an oligopolistic structure, with major producers influencing prices through quantity setting in Cournot or Stackelberg frameworks (2) (3).

The transition from long-term contracts to spot and quarterly pricing in recent years further underscores the power shift toward producers. This evolution, while enabling greater market responsiveness, also contributes to price volatility and complicates long-term planning for emerging suppliers.

### 2.3 Supply and Demand Trends

Demand for coking coal is intrinsically linked to pig iron and crude steel output. In 2024, global steel demand slowed due to high debt pressures and weak investment across China's real estate sector, leading to a 1.6% drop in China's coking coal demand (to 582 Mt) (1). The outlook for 2025 forecasts an additional 2.1% decline, signaling a trend of

stagnation or contraction, especially in traditional markets reliant on blast furnace steelmaking.

On the supply side, while output from top producers remained stable or contracted slightly, imports surged, leading to an oversupplied market. China's imports of coking coal rose 18% year-on-year to over 120 Mt in 2024, driven by weakened domestic production and infrastructure improvements at border crossings. Prices responded accordingly, with the average price of Shanxi low-sulfur coking coal dropping by 257 yuan to 1,898 yuan/t in 2024, with forecasts showing a further decline to 1,488 yuan/t in 2025 (1).

## 2.4 China's Strategic Role

China remains the linchpin of global coking coal demand, accounting for more than half of global consumption. Domestic production is substantial but insufficient in quality and consistency to meet the needs of its steel sector. Hence, it heavily relies on imports from Mongolia, Russia, and Australia. In 2024, Mongolian coal made up 47% of China's imports, though its share slightly declined due to weather-related border delays and rising imports from Australia.

The geopolitical reorientation since 2020—especially the temporary ban on Australian coal—highlighted China's vulnerability and prompted diversification. With improving transport logistics and zero import tariffs for key partners, China is poised to continue leveraging multiple sources, though the trend favors nearby and cost-effective suppliers like Mongolia (4).

## 2.5 Mongolia in the Global Market

Mongolia has emerged as a critical supplier to China, thanks to its geographic advantage and high-grade coal. The 2022 feasibility report by Erdenes TavanTolgoi highlights the nation's ambition to move from raw coal exports to value-added coke production (4). This shift aligns with both domestic industrial policy and the opportunity created by China's long-term demand.

However, dependency on a single market presents risks. In 2024, logistical constraints—especially weather disruptions and limited warehousing at border posts—caused volatility in Mongolian coal exports. While total volume increased, the relative share dropped as Chinese buyers diversified. Addressing these issues requires better transport infrastructure and capacity utilization on routes like Gashuunsukhait and Ceke (4).

## **2.6 Theoretical and Modeling Approaches**

Strategic behavior in the coking coal market has been extensively modeled using game-theoretic frameworks. Trüby (2013) and Graham et al. (1999) examined producer output decisions under Cournot and Stackelberg models to capture how dominant players adjust volumes in response to competitors, thereby influencing market prices. These models have shown that export concentration among the Big Four distorts pricing away from competitive equilibrium (2).

Such frameworks are valuable for understanding how a new entrant like ETT might face pricing constraints, even if it holds a cost advantage. However, they typically exclude regional land-based markets like Mongolia-China, indicating a gap in applicability.

## **2.7 Literature Gaps**

Despite the detailed global models and extensive reporting on major exporters, gaps persist:

Mongolia-specific models are rare, with little integration of infrastructure, logistics, or border constraints.

Supply-chain vulnerability from over-reliance on a single buyer is under-analyzed.

The volatility of regional demand, such as China's real estate-linked steel demand, is often not considered in long-term forecasts.

This thesis addresses these issues by applying regional trade dynamics and infrastructure considerations to the feasibility analysis of the ETT project (5).

## **2.8 Summary**

Coking coal remains indispensable for global steelmaking, though facing demand pressures from economic shifts and environmental targets. Major producers continue to shape the market through strategic behavior and infrastructure advantages. As China transitions toward higher import diversity, Mongolia's role becomes increasingly vital but vulnerable. The proposed ETT coking coal plant is positioned at the center of these changes. Understanding these market forces and addressing literature gaps in regional dynamics, logistics, and buyer dependency will be essential to assessing the plant's long-term viability.

## 3 Global Coking Coal Market Outlook

### 3.1 Overview of Global Coal Reserves and Supply Structure (Global coal reserves)

The global coking coal market (excluding China) contracted by 3% in 2020 to 1,100 million tonnes due to the negative impact of the pandemic, but is expected to recover in 2021 to a preliminary estimate of 1,106 million tonnes, according to the IEA. The largest increases in consumption were recorded in the PRC (+17%/+9 million tonnes), the European Union (+9%/+5 million tonnes), Russia (+2.4%/+2 million tonnes) and Japan (+10%/+4 million tonnes). China currently accounts for 68% of the world's coal consumption in steelmaking, followed by Russia (6%), the European Union (5%), and the PRC (5%) (6), (7), (8).

13% of the world's coal is used to produce steel, while 52% of the total steel is used in buildings, 16% in machinery, 17% in vehicles such as cars and ships, and the remaining 15% is used in household appliances, electrical appliances, and other metal products. Therefore, when the economy expands, steel production increases, and demand for coke, the main raw material used in steel production, arises. Although the urbanization rate in China, the largest steel producer, has reached 60%, market analysts believe that India's steel demand will be comparable to that of China. Following this, demand from Southeast Asian countries is expected to continue to increase demand for steel and coking coal for the next half century. According to a study by British Petroleum, the world's proven coal reserves reached 1,055 billion tons as of 2018. Hard coal accounts for 70 percent of total coal, while lignite account for 30 percent.

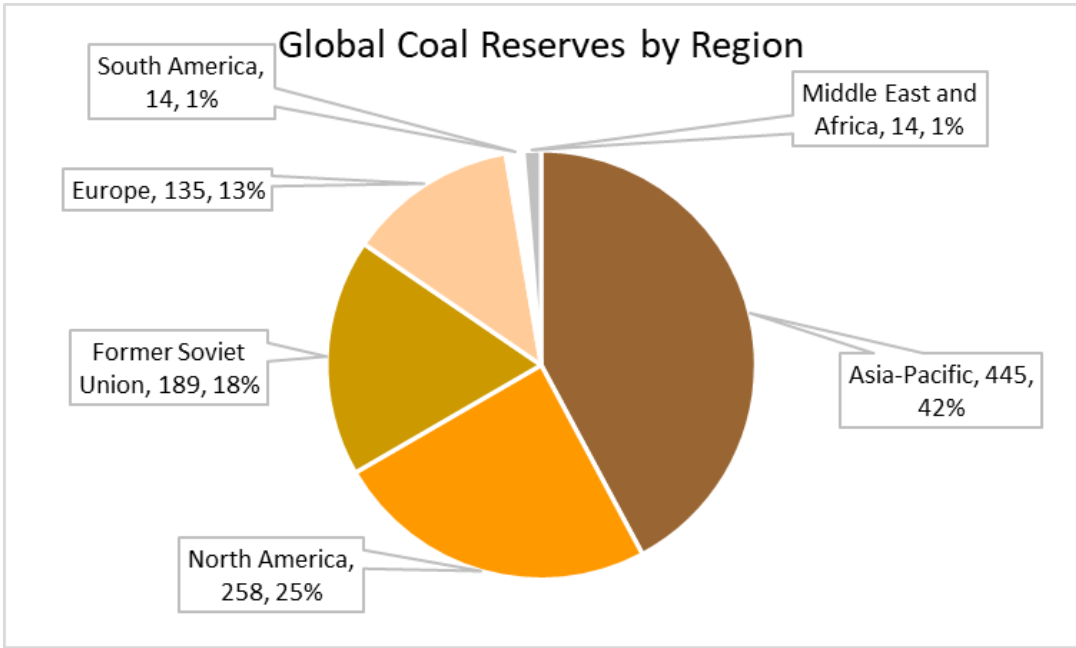


Figure 1: Global Coal Reserves by Region

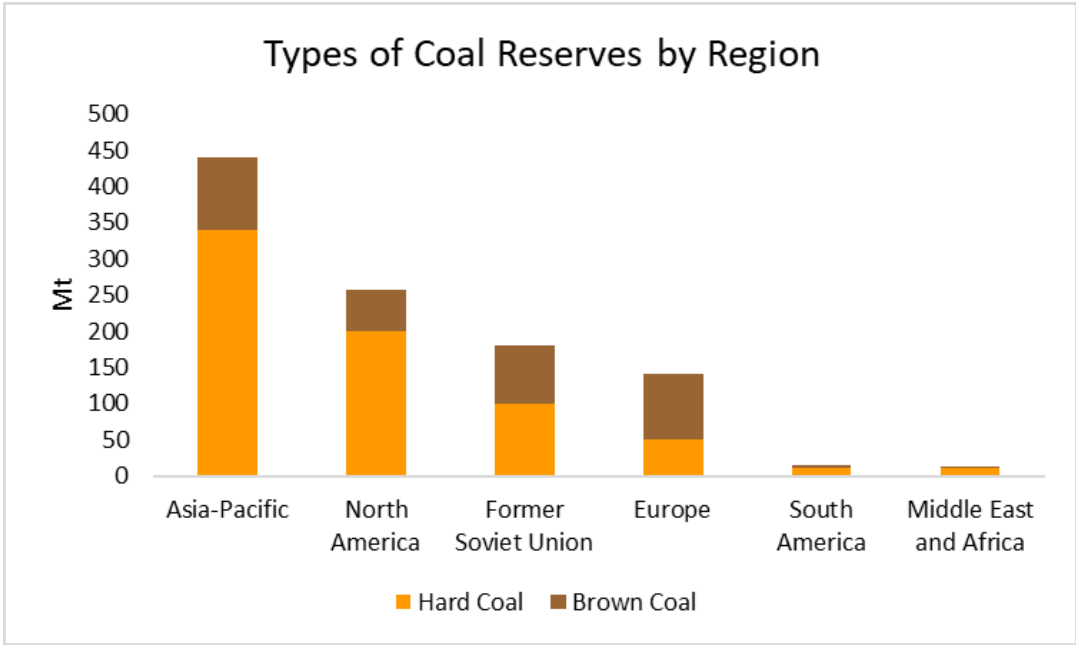


Figure 2: Types of Coal Reserves by Region

The United States (250 billion tons) leads the world in terms of coal reserves, followed by Russia (160 billion tons), Australia (148 billion tons), and China (138 billion tons). Our country leads the world in terms of coal reserves per capita, but rank 7th in terms of total reserves.

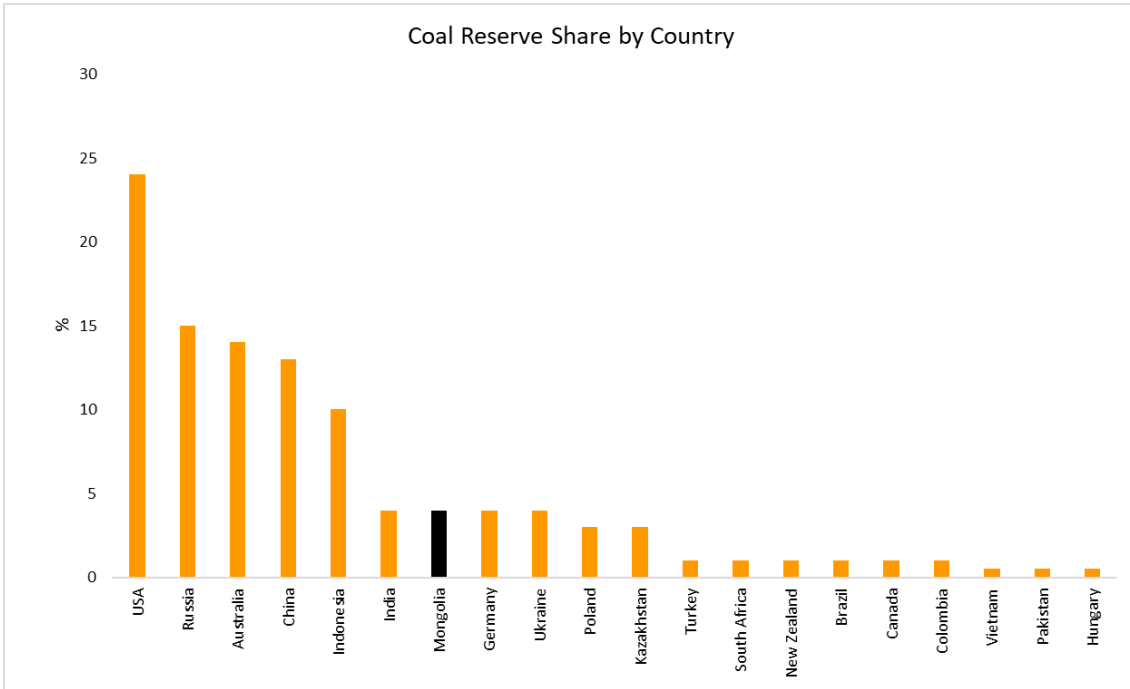


Figure 3: Coal Reserve by Country

These reserves form the basis for long-term coal supply and directly influence international trade dynamics and pricing power among producing countries.

The structure of global supply has historically been shaped by resource endowment, infrastructure, and cost competitiveness. Australia and Indonesia dominate the seaborne export market due to their favorable geographic access to Asia and established mining sectors. However, with increasing environmental regulations and policy shifts in traditional markets like Europe, future growth in coking coal supply is expected to be centered in Asia, particularly Mongolia and Russia.

### 3.2 Global Demand Trends and Major Consumers

The global demand for coking coal is fundamentally anchored in steel production, particularly through blast furnace technology, which remains the dominant method in both industrialized and emerging economies. Unlike thermal coal, metallurgical coal has very limited substitutability in steelmaking, resulting in relatively inelastic short-term demand. Consequently, shifts in coking coal consumption patterns are closely tied to deeper structural changes in industrial policy, urbanization trends, and infrastructure investment across major economies.

During the early 2000s, global coking coal demand experienced steady growth at an average annual rate of approximately 5%, driven by rapid industrialization in East and South Asia. China and India emerged as primary growth engines, supported by large-scale infrastructure expansion, urban development, and export-oriented steel

production. A pivotal moment occurred in 2008, when China transitioned from being a net exporter to becoming the world's largest importer of coking coal—a position it has maintained since 2011. This transformation fundamentally reshaped global trade flows and elevated the strategic importance of regional suppliers with logistical advantages.

India has firmly established itself as one of the fastest-growing coking coal importers globally. With a rapidly expanding steel sector and major infrastructure initiatives, India's reliance on imported metallurgical coal continues to intensify. Although the country is making significant efforts to increase domestic coal production, nearly all of this output consists of thermal coal, necessitating substantial imports of high-quality coking coal to meet industrial requirements (6) (7).

In Southeast Asia, nations such as Vietnam and Indonesia are steadily expanding their steel production capacity. ASEAN's coal demand grew by 10% in 2023 and is projected to rise by an additional 5% annually through 2027 (7). Indonesia and Vietnam together account for a significant portion of this growth, further consolidating Asia's role as the center of global metallurgical coal consumption.

Despite regional growth, forecasts suggest that global coking coal demand will gradually decline through to 2027. Several factors are driving this trend:

- **China's Real Estate Slowdown:** The ongoing real estate crisis has weakened steel demand, with new construction activity and related steel consumption continuing to decline (8) (7).
- **Environmental and Regulatory Pressures:** Both China and India are promoting steel industry decarbonization. In China, the share of Electric Arc Furnace (EAF) steel production, which relies on scrap rather than coke, is projected to rise, albeit constrained by scrap availability (7).
- **Steel Industry Rationalization Policies:** Chinese authorities are shifting steel production inland and limiting new blast furnace installations to control overcapacity and meet carbon reduction targets (7).

According to industry forecasts by Fenwei (2024), China's coking coal demand is expected to decline modestly in 2025, from 582 million tonnes in 2024 to approximately 570 million tonnes. This decline is attributed to tightening environmental regulations and slower downstream consumption in the steel sector (1) However, imports are projected to remain relatively stable due to persistent gaps in quality and blending requirements between domestic and foreign coal.

The medium- to long-term outlook shows that while demand growth may soften in volume terms, Asia will continue to dominate the global coking coal consumption landscape. Infrastructure expansion under large-scale regional initiatives such as China's Belt and Road Initiative (BRI), India's National Infrastructure Pipeline, and ASEAN's connectivity frameworks will sustain metallurgical coal usage across borders.

Global coking coal consumption fell by about 3 percent in 2020 to 970 million tons, from 1 billion tons in 2019.

Looking ahead, Fenwei Energy, a major research organization in the coal industry in China, estimates that global coking coal demand will grow by about 2 percent per year, peaking at 1,065.2 million tons in 2025, before gradually declining to 1,000 million tons in the long term (1).

Figures 4 and 5 were generated by using Microsoft Excel, based on coal market forecast data compiled from Fenwei Energy reports. The dataset includes projected global coal consumption volumes and regional consumption shares for the period 2015 to 2035. For Figure 4, a vertical column chart was employed to represent total coal consumption by year, allowing for a clear visual analysis of overall market trends. Figure 5 was produced using a 100% stacked area chart to illustrate the relative distribution of consumption among major regions, including China, India, Southeast Asia, Japan, and others. This approach was selected to highlight changes in regional demand patterns over time, and to support comparative interpretation of long-term coal consumption dynamics in a transparent and visually accessible format.

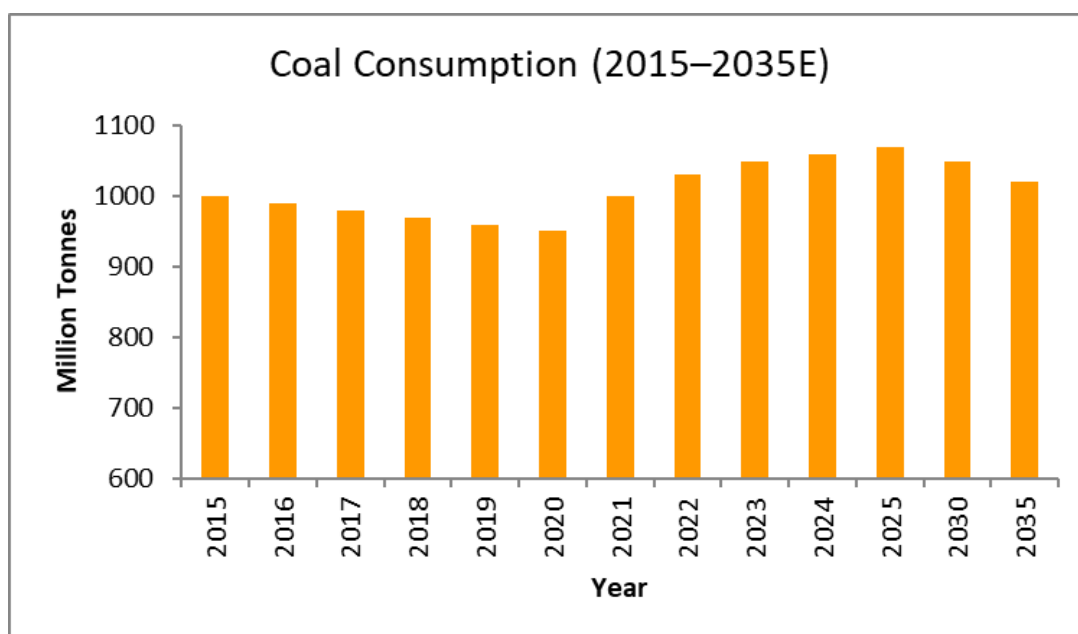


Figure 4: Global Coal Consumption Forecast (2015-2035)

This figure presents the historical and forecasted coal consumption levels from 2015 to 2035, measured in million tonnes. From 2015 to 2020, coal consumption shows a slight decline, reaching its lowest point in 2020, likely due to global economic disruptions caused by the COVID-19 pandemic. However, starting from 2021, there is a strong recovery, with consumption gradually increasing and peaking around 2025. After 2025, a slow decline in total consumption is projected, which corresponds with the global trend of energy transition and the rise of alternative, low-emission technologies in heavy industries.

The trend indicates a maturing coal market. While short-term demand is resilient due to ongoing industrial development and energy security concerns, long-term projections anticipate moderate declines as countries adopt greener energy sources and decarbonization strategies.

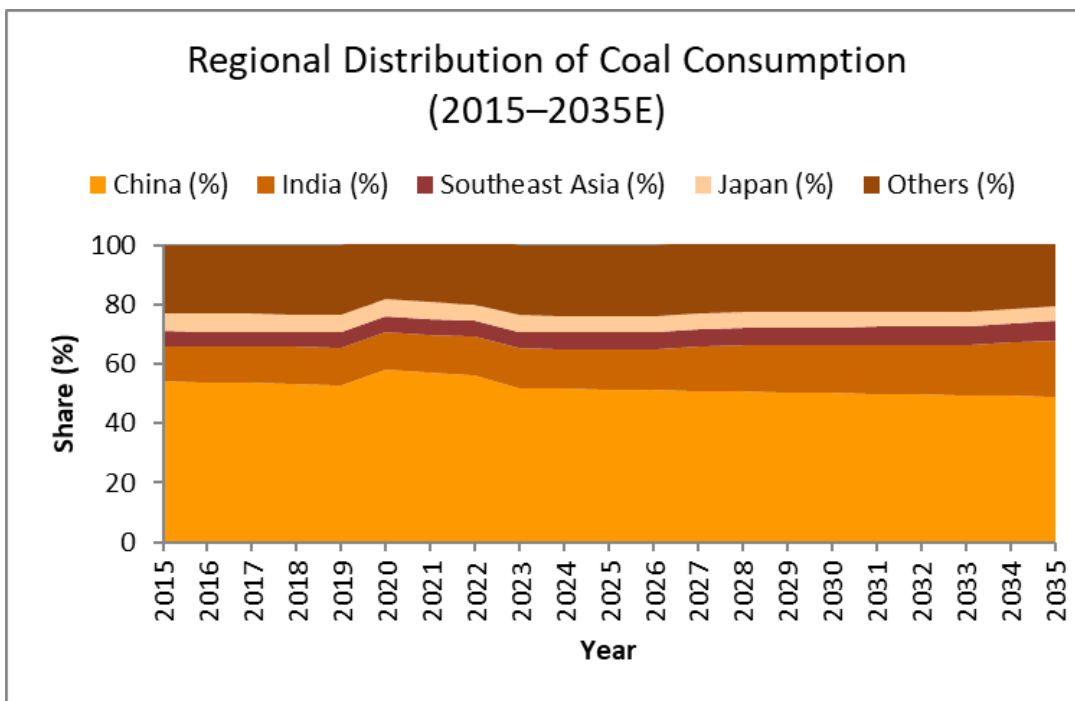


Figure 5: Regional Distribution of Coal Consumption (2015-2035E)

The above table shows that the demand for coking coal in the Republic of Korea is increasing, while that of countries such as China, the Republic of Korea, and Japan is decreasing.

Table 1: Coal supply and demand balance

	2019	2020	2021	2022	2023	2024	2025
<b>SUPPLY</b>	1024.6	1024.1	1061.1	1066.7	1065.6	1071.5	1076.5
<b>DEMAND</b>	999.8	970.1	1024.8	1047.9	1057.2	1059	1065.2
<b>BALANCE</b>	24.8	54	36.2	18.8	8.4	12.5	11.3

From the table above, it can be seen that while the supply and demand balance for coking coal differed significantly in 2020, the difference is expected to narrow from 2021. In other words, the supply and demand balance for coking coal will remain at a similar level.

These dynamics imply a maturing global market with slower but more geographically diversified demand growth. For Mongolian producers like Erdenes TavanTolgoi, this opens both opportunities and challenges. On one hand, stable demand from northern Chinese provinces provides an target market. On the other, long-term viability will depend on building new market access to India and Southeast Asia, as Chinese import volumes become increasingly sensitive to domestic policy changes.

In conclusion, global coking coal demand remains closely tied to steel sector dynamics in Asia. While growth rates are slowing, regional industrial expansion ensures sustained, if moderated, demand through at least 2035. Exporters positioned near these demand hubs, with flexible logistics and competitive costs, stand to benefit most from these evolving patterns.

### **3.3 Trade Dynamics and International Prices, and Long-Term price forecast (2025-2035)**

The global coking coal trade operates within a complex framework shaped by cost efficiency, infrastructure access, political alignments, and geographic proximity. Traditionally, Australia has been the world's largest exporter of high-grade metallurgical coal, serving markets including China, India, and Japan. However, geopolitical tensions during 2020–2022, notably the diplomatic freeze between China and Australia, disrupted trade flows significantly.

In response to restricted Australian supply, China increased its reliance on land-based imports from Mongolia and Russia. Mongolia's market share in China rose sharply, benefitting from cost-effective overland transportation. However, as relations normalized, Australian coking coal regained access to the Chinese market. From January to

November 2024, Australian coking coal imports into China surged 283% year-on-year, reaching 8.76 Mt. Factors driving this recovery included zero-tariff access, high-grade specifications, and competitive pricing compared to alternatives (9).

Nonetheless, Australian supply growth was constrained by labor strikes and railway bottlenecks, limiting its full market rebound. Meanwhile, Mongolia remained China's largest coking coal supplier by volume, although its market share declined from 52.6% in 2023 to 47.1% in January–November 2024 (7), largely due to seasonal transport bottlenecks and intensified seaborne competition. Russia also retained a stable share, despite facing international sanctions. Russian coal benefitted from flexible export tariffs and reoriented trade flows into China, helping it maintain competitiveness.

Infrastructure continues to play a crucial role in shaping trade dynamics. Overland routes from Mongolia, notably via the Gashuunsukhait–Ganqimaodu and Ceke border crossings, offer low-cost and fast delivery to steel production hubs in northern China. However, logistical challenges such as border capacity limits, weather-related delays, and peak season congestion reduce overall reliability. In contrast, Australian coal arrives via deepwater ports, ensuring year-round stability but at higher base shipping costs. This supply configuration has fostered market segmentation within China: inland provinces increasingly rely on Mongolian and Russian overland supply, while coastal provinces prioritize Australian and Canadian seaborne coking coal for blending and purity requirements.

### **Long-Term Coking Coal Price Forecast (2025–2035)**

Building on the current trade dynamics, a coking coal price forecast extending to 2035 was developed to better understand future market trends. The forecast suggests a gradual downward trend in prices, falling from approximately 1,488 yuan/t (forecasted for 2025) to around 1,050–1,100 yuan/t by 2035 (equivalent to approximately 156.5 USD/tonne in international markets).

This forecast was created using a combination of methods:

**Trend Extrapolation:** Historical data from 2015–2025 was analyzed to identify underlying patterns of price behavior, particularly the post-pandemic normalization and decarbonization-driven demand shifts.

**Demand-Supply Modelling:** Expected steel production trends, including the growing adoption of electric arc furnaces (EAF) that consume less coking coal, were factored into the demand side. On the supply side, continued investments in Australian, Mongolian, and Russian export infrastructure were considered.

**Scenario Analysis:** Multiple scenarios were constructed, assuming variations in geopolitical stability, technological advancements in steel recycling, and environmental policy tightening.

**Expert Market Insights:** Reports from credible institutions such as S&P Global, the International Energy Agency (IEA), and the Australian Department of Industry were consulted to align the baseline scenario with professional industry expectations.

The gradual price decline reflects anticipated changes in the global steel industry's structure, ongoing shifts toward green steel production, and expanding steel scrap recycling, especially in developed markets. However, regional differences, particularly India's growing blast furnace production capacity, are expected to support a floor price and prevent a sharper collapse.

Thus, while coking coal remains an essential material for traditional steelmaking, its role is forecasted to steadily decline in favor of more sustainable and circular production methods over the next decade, influencing both trade patterns and price levels.

Table 2: Coking coal price forecast for 2035

YEAR	2024	2025	2026	2027	2028	2029
ANNUAL AVERAGE	204.2	220.8	205.6	201.5	190.1	185.3

YEAR	2030	2031	2032	2033	2034	2035
ANNUAL AVERAGE	180.7	175.4	170.1	165.2	161.9	156.5

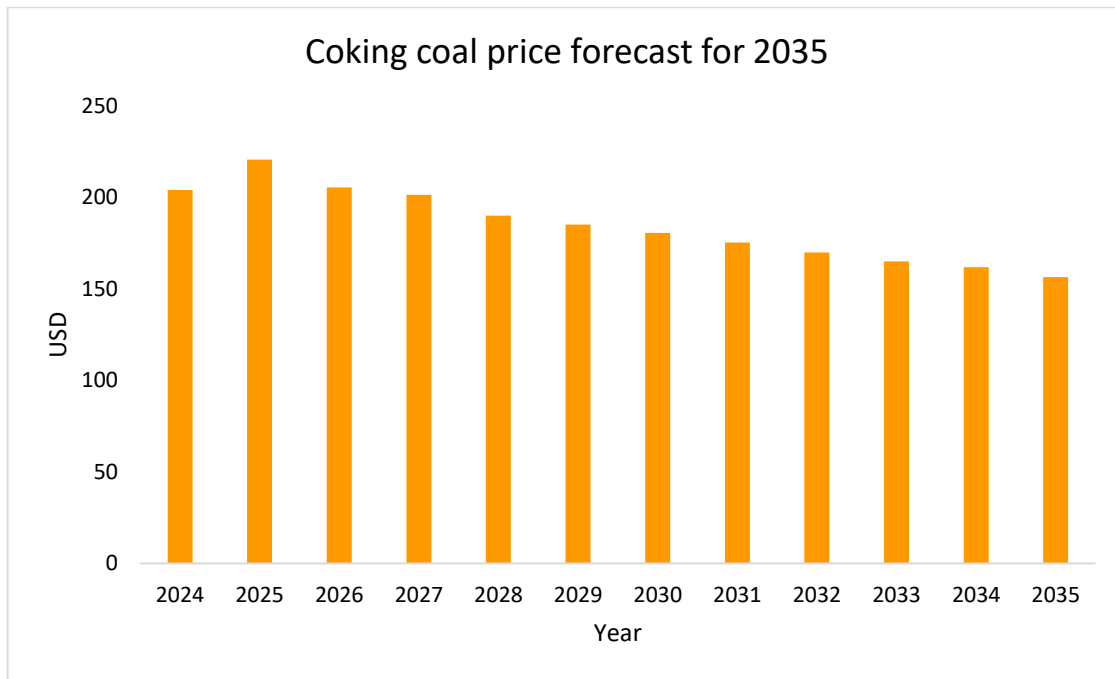


Figure 6: Coking Coal Price Forecast for 2035

### 3.4 Summary and Implications for Mongolian Exporters

The global coking coal market is evolving. While demand remains concentrated in Asia, pricing remains unstable and competition is increasing. For Mongolian exporters such as Erdenes TavanTolgoi, the key implications are:

- Take advantage of overland transport routes to northern China to offer more flexible and cost-effective supply.
- Monitor Australia-China relations, as renewed competition from seaborne coal could compress margins.
- Leverage geographic and logistical advantages to secure long-term contracts with steel mills in Inner Mongolia and Hebei.

The next chapter will focus specifically on China's coking coal market outlook, building on the global analysis and narrowing the scope to ETT's most critical export destination (10).

## 4 China's Coking Coal Market Outlook

This chapter evaluates the structure and direction of China's coking coal market from the standpoint of Mongolia's export potential, with particular relevance to Erdenes TavanTolgoi (ETT). The analysis covers four key components: recent import trends and consumption forecasts, domestic production capacity and regulatory developments, trade policy and geopolitical factors, and regional demand concentration in Hebei, Shandong and Jiangsu. These elements are critical for identifying demand risks, pricing flexibility, and regional buyer behavior relevant to ETT's project feasibility.

Market outlook assessments rely not only on present data but also on an understanding of how policy, infrastructure, and buyer preferences evolve over time. Coking coal demand is strongly tied to the steel industry, but also to broader macroeconomic conditions, industrial policy, and China's climate objectives. For any new player, particularly a land-based exporter like ETT, these interdependencies require careful consideration.

### **4.1 Import Trends, Supply and Demand Forecast (2025-2030)**

China remains the single most important market for coking coal, both as the world's largest steel producer and the dominant consumer of imported metallurgical coal. In 2024, the country's total coking coal consumption was estimated at 582 million tonnes, with demand projected to fall slightly to 570 Mt in 2025, reflecting weakening domestic steel production and stricter environmental policies (11) .

China's raw coal production has grown continuously for three years since it increased its supply in 2016, reaching 3,850 million tons in 2019. The average annual growth rate from 2015 to 2019 was 0.6%.

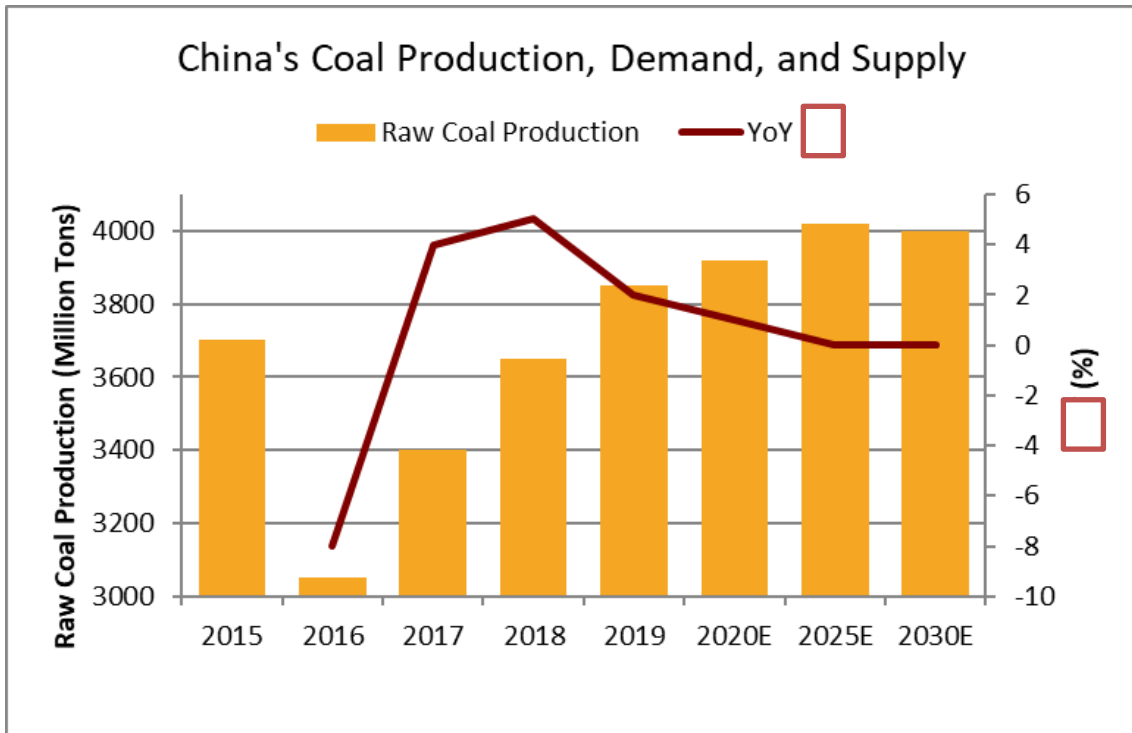


Figure 7: China's Coal Production, Supply, and Demand Forecast for 2030

Figure 7 illustrates China's historical and forecasted raw coal output (in million tonnes) from 2015 through 2030, alongside the year-on-year (YoY) growth rate expressed as a percentage. The bar chart represents total raw coal production, while the line graph indicates the annual change rate in production.

Between 2015 and 2020, China's coal production showed noticeable fluctuations, with a significant drop around 2016, followed by a sharp recovery in subsequent years. From 2020 to 2025, production volumes are projected to peak, reaching over 4,000 million tonnes. However, beyond 2025, the chart shows a plateauing trend where coal output stabilizes, with minimal year-on-year changes projected between 2025 and 2030.

As China's coal policy continues to expand, domestic coal capacity will continue to expand through 2025 as new mines come into operation.

Meanwhile, domestic coal consumption for power generation will account for some of the growth, driven by rising energy demand. China's coal production is expected to reach 4,042 million tons in 2025, up 5% from 2019.

Coking coal supply decreased from 493 million tons to 480 million tons in 2015-2019, a decrease of 2.5 percent compared to 2015, and an average annual decrease of 0.5 percent.

As a result of the policy of keeping capacity low and reducing production, coking coal supply fell sharply in 2016, and has gradually recovered since 2017, but has not returned to the level of 2015.

Looking ahead, coking coal supply is expected to increase from 478 million tons in 2019 to 487 million tons in 2025, due to the increase in China's steel production.

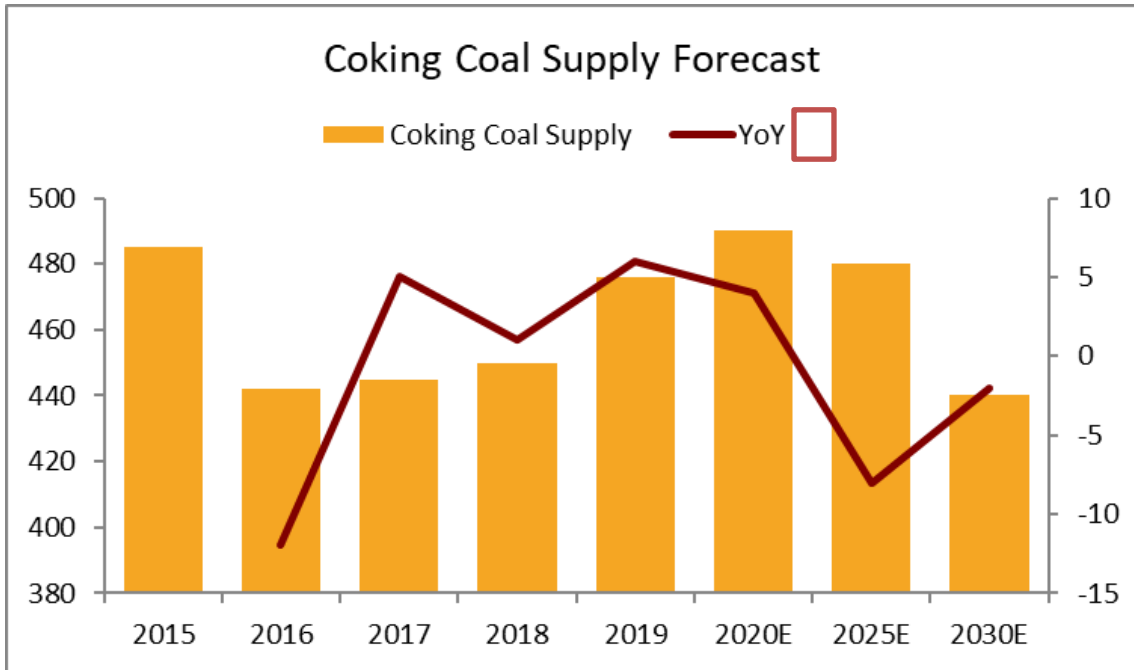


Figure 8: Coking Coal Supply Forecast for 2030

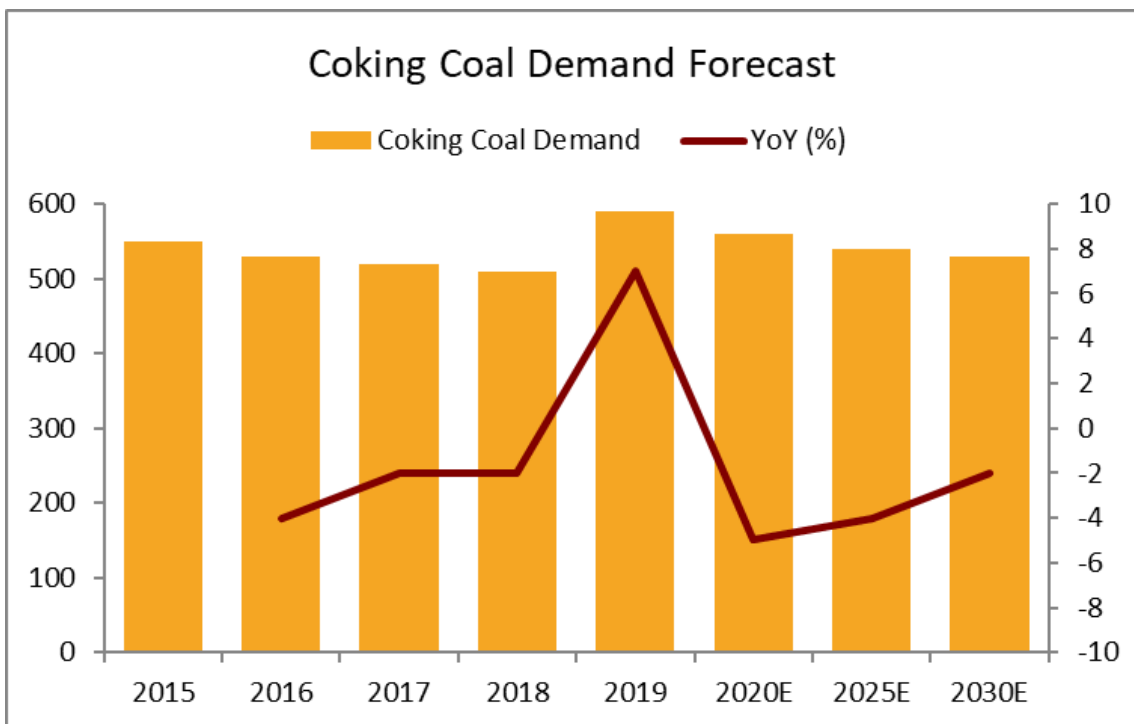


Figure 9: Coking Coal Demand Forecast for 2030

Coking coal demand increased by 3.6 percent from 534 million tons to 553 million tons between 2015 and 2019. Looking ahead, demand is expected to gradually weaken and reach 544 million tons by 2025, a decrease of 1.6 percent compared to 2019, and an average annual decrease of 0.3 percent.

## **4.2 Domestic Production and Policy Landscape**

Erdenes TavanTolgoi JSC (ETT) is planning the development of a large-scale metallurgical coke and power plant based at the Tavantolgoi deposit in Tsogttsetsii soum, Umnugovi province. According to the official feasibility study, the proposed facility will have an annual processing capacity of 2 million tonnes of raw coal, with a designed coke production output of 1.5 million tonnes per year. The project is based on modern, heat recovery-type coke oven technology and aims to meet international quality standards with competitive specifications for fixed carbon, sulfur, and ash content (4).

The feasibility study emphasizes that this plant will incorporate environmentally advanced, low-emission technologies to reduce the environmental footprint and promote energy efficiency. It will be equipped with stamp-charged coke ovens, by-product recovery systems, and waste heat recovery units—technologies that align with current trends in sustainable industrial development (4).

While the project has not yet begun construction, it is seen as a key step toward Mongolia's industrial diversification. The plant supports national economic goals such as increasing value-added exports, reducing dependency on raw coal exports, and stimulating domestic industries. Notably, the by-products of the coking process—such as tar, benzene, ammonia, and light oil—could be used as raw materials in chemical, fertilizer, and construction material production, laying the groundwork for future downstream industrial growth.

Logistically, the Tavantolgoi site is strategically located with proximity to the Tavantolgoi–Gashuunsukhait railway and highway network, enabling efficient overland transportation to China—the primary target export market—as well as potential access to other Asian buyers. This proximity reduces logistical costs and increases the feasibility of regional distribution.

Table 3: Technical Parameters of the Proposed ETT Coking Coal Plant

Parameter	Specification
Raw Coal Input Capacity	2 million tonnes/year
Coke Output Capacity	1.5 million tonnes/year
Coke Oven Technology	Heat recovery, stamp-charged
Fixed Carbon	≥86%
Ash Content	~10.46%
Sulfur Content	<0.8%
Moisture Content	<5%
By-products (Projected)	Tar, ammonia, benzene, oils

The feasibility study concludes that the proposed coking coal plant is technically and economically viable and would allow Mongolia to produce internationally competitive metallurgical coke products using domestic raw coal. If successfully implemented, the project would mark a transformative milestone in Mongolia’s move toward industrial self-reliance and long-term economic value retention. (4).

### 4.3 Political and Trade Considerations

Trade policy plays a crucial role in shaping the market conditions for coking coal exporters to China. In 2024, coal imports continued to benefit from favorable tariffs under most-favored-nation (MFN) and free trade agreement (FTA) frameworks. Table 3 outlines the applicable import duty rates (12).

Table 4: 2024 coal import policies

TIME	DOCUMENT NAME	IMPORT DUTIES	APPLICABLE COUNTRIES	MAIN IMPORTING COUNTRIES	MAIN EXPORTING COUNTRIES
		Most-favored-nation (MFN) tariff rate: 3% for anthracite and coking coal; 6% for	(1) Countries that have joined the WTO (2) Countries or regions that have signed most-favored nation trade	Mongolia, Russia, Canada, the United States	Japan, India, the United Arab Emirates

<b>DEC,2024</b>	Announcement on the Tariff Adjustment for 2025	thermal coal; 5% for peat	agreements with China		
		Agreement tariff rate: 0%	Countries that have signed separate agreements with China	Indonesia, Australia	Indonesia, Malaysia, South Korea
		Preferential tariff rate: 0%	Countries that have signed preferential agreements with China	-	-
		Ordinary tariff rate: 20%	Countries that have neither joined the WTO nor signed separate agreements with China	-	-

This uniform zero-tariff environment means that Mongolian coal competes with Australian and Russian coal primarily on transport reliability, sulfur content, and blending suitability rather than tax advantage. However, political normalization between China and Australia in 2024 led to a sharp increase in Australian coking coal imports, which reintroduced downward price pressure across inland markets.

Additionally, environmental and safety compliance regulations continue to affect the flow of coal from smaller trading partners. These non-tariff barriers include stricter customs inspections and transparency requirements, especially relevant for trucked coal shipments from Mongolia. Importers may also require third-party lab certification for quality parameters, increasing documentation costs for land-based exporters.

Further trade risks include shifts in bilateral political relations, temporary border closures, and quota enforcement. While tariffs remain stable, the operational environment for trade is subject to administrative unpredictability, especially in times of domestic oversupply.

#### **4.4 Target Market Analysis: Shandong, Jiangsu and Hebei Provinces**

In addition to the fact that Mongolian products can reach the Chinese market through the shortest route, in recent years, Mongolian coal exports have reached the markets of Eastern Hebei and Shandong in addition to consumers in the Inner Mongolia Autonomous Region and Gansu Province. In particular, the tendency of Chinese steel mills to meet seasonal supply disruptions with imports has increased, and in 2020, 2.5 million tons of coke with a value of 611 million US dollars (OEC) were purchased from abroad, but in 2024, exports are expected to decrease to 4.63 million tons, and 3.6 million tons of coke will be imported (1).

Therefore, the coke produced from high-quality coking coal in Mongolia is expected to be in demand in the Chinese market, which is the main consumer in the world. China's Hebei, Shandong and Jiangsu provinces are seen as potential target markets, and the country's low-ash and low-sulfur coking coal reserves are expected to remain in demand for imported coking coal for a long time. Coal for steelmaking requires low sulfur content (<1%), low ash content (<7%), volatile matter (15-40%), and low phosphorus, chlorine and alkalinity (KGS), and Mongolian coal is characterized by low volatile matter, ash and sulfur content compared to its main competitor, Australian coking coal.

China's coke plants are mainly concentrated in Shanxi, Hebei, Shandong and the Inner Mongolia Autonomous Region. These provinces have a combined coke production capacity of 433.3 million tons, accounting for 57.7% of the country's total. According to a study by the macro-economic research organization CEIC, between 1980 and 2019, China used an average of 437.16 million tons of coke per year, and in 2014, coke consumption by factories reached a record high of 468.85 million tons.

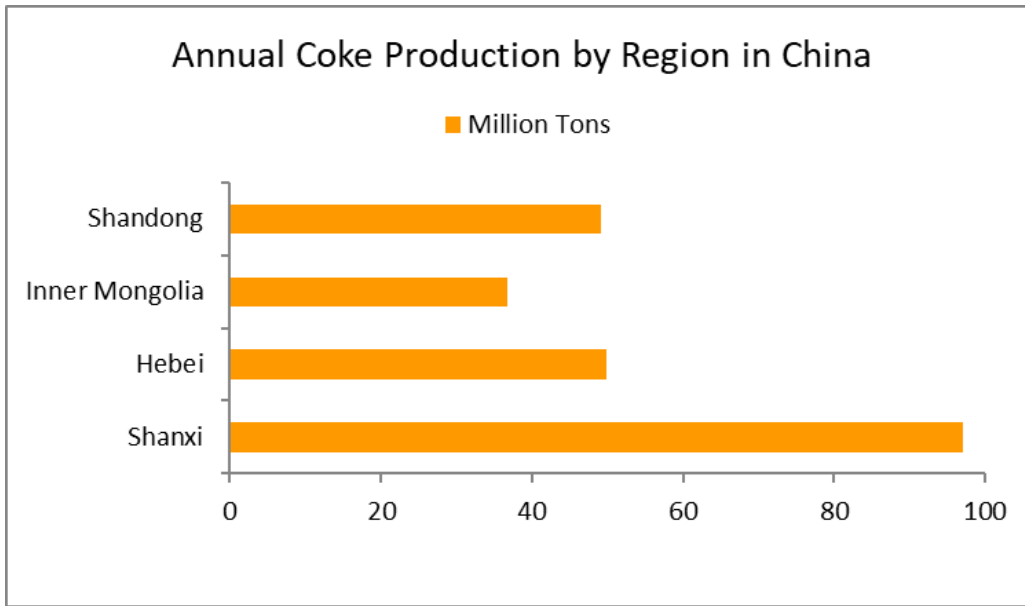


Figure 10: Annual Coke Production By Region in China

China's steel and coke production is concentrated along the coast, so the demand for coking coal in this region is large. Although Hebei and Shandong provinces are the main coking coal producing regions, they cannot meet the demand for coke. Coking coal produced in the region has a high volatile matter content, mainly oily coal, gas coal, and 1/3 coking coal, and the low-volatile primary coking coal resources are scarce, so it is heavily dependent on other provinces and imported coal. Because domestic coking coal has high ash and sulfur content, coal from the TavanTolgoi deposit can fully compete in the coastal market. The demand for coke in Northeast China is mainly concentrated in Liaoning Province, and the major consumers in the region are steel mills such as Benxi Iron Steel and Anshan Iron and Steel. Although Heilongjiang Province is a coking coal producing province, the supply is much lower than the demand, so there is a high demand for imported coal from other domestic provinces such as Shanxi. End users attach great importance to the quality and stable supply of coal. Coking plants in the northwest of China mainly use coal from domestic enterprises in Ningxia and Shanxi Province. Ningxia is one of the main centers of China's ferrosilicon, silicon-manganese, calcium-silicon alloy, steel and metal production, accounting for more than 20% of China's total production. Steel mills in the northeast of China mainly use coal from Shanxi Province and Russia. Steel mills in the east, on the other hand, use coal from Shanxi Province and imported coal from sea freight. In conclusion, in terms of market potential, Hebei, Shandong, and Jiangsu are potential target markets, which are provinces with large coke production and net inward flow of coking coal. At the same time, ETT coal can reach the markets of Inner Mongolia, Gansu, and Xinjiang in the northwest and Heilongjiang, Jilin, and Liaoning in the northeast due to its geographical advantages.

## 5 Market Opportunities for Erdenes TavanTolgoi

This chapter evaluates the strategic opportunities available to Erdenes TavanTolgoi (ETT) within the context of the regional coking coal market, based on the company's product qualities, cost structure, infrastructure access, and potential customers. Drawing from the feasibility study and market research included in the ETT coke plant development documents, four core dimensions are examined: quality and competitiveness of ETT's coal, logistics and export infrastructure, comparative cost and locational advantages, and buyer segmentation and penetration strategies.

### 5.1 Quality and Competitiveness of ETT Coking Coal

Coke is used in metallurgy, equipment, and chemical technology industries, and its quality and type indicators vary depending on the direction of use. Generally, it is classified into metallurgical, foundry, chemical, calcium, and carbide coke by use. The lower the ash and sulfur content of coke, the higher the adhesion and hardness, the better the quality. For metallurgical coke, which accounts for about 80% of coke, the quality indicators directly affect the economics and technological indicators of steel plants. The products of four major coke production regions are supplied to China, and the quality indicators are as follows.

Table 5: China's Major Coke Brands and Quality Indicators

REGION	COKE BRAND	ASH, %	SULFUR, %	CSR
SHANXI	Xiaoyi quasi grade I coke	13	0.7	63
HEBEI	Handan quasi grade I coke	12.5	0.65	60
INNER MONGOLIA	Wuhai grade II coke	13.5	0.8	55
SHANDONG	Jining grade II coke	12.5	0.8	55

The quality of ETT's planned coke product compares favorably with several of China's prominent producers. Based on the feasibility data, ETT's coke blend contains 10.46% ash, less than 1.8% volatile matter, 86% fixed carbon, 0.8% sulfur, and 5% moisture. While the sulfur content is slightly higher than preferred levels, the low ash content and

high fixed carbon compensate for this, placing the product within China’s Class II coke category but at a more competitive price point.

Table 6: Coke characteristics of major Chinese coke producers and Tavantolgoi JSC

BRAND		ASH (%)	VOLATILE (%)	CARBON (%)	SULFUR (%)	MOISTURE (%)
Ningxia Carbon Co., Ltd	Baiyun	13	1.5	85	0.7	7
Shanxi Ocean Links Trading Co., Ltd		13.5	1.5	86	0.3	5
Inner Mongolia pushing Iron & Steel Co., Ltd		13	1.5	85	0.7	7
Shandong Huashiyuan Material Co., Ltd	New	12	1.5	86	0.6	8
ETT coke blend		10.46	<1.8	86	0.8	5

Despite not qualifying for Class I due to sulfur levels, ETT’s product benefits from favorable comparisons in ash and carbon content. As a result, its competitive edge is likely to stem from quality-to-price alignment, especially among inland Chinese buyers who prioritize affordability over marginal purity differences. These parameters reflect a strategic positioning where ETT's coke can be marketed as an efficient and consistent Class II blend that fits well into China's diversified coke sourcing and blending systems.

## 5.2 Logistics and Export Infrastructure

ETT’s logistical positioning is supported by several operational and planned infrastructure components. The coke plant will receive coking coal feedstock from ETT’s enrichment plant and dispatch finished product via road or rail through three border points: Gashuunsukhait, Ceke, and Shiveekhuren. In 2024, overland truck flows at these borders showed increased clearance rates, signaling efficiency improvements in customs management.



Figure 11: Tavantolgoi Coal Transportation Route

Coal from the TavanTolgoi deposit is transported by road to the Gandimaodu-Gashuunsukhait port and then processed at nearby coal processing plants. From the Gandimaodu-Gashuunsuhait port, it is transported by Shenhua Ganwang Railway or by road to Bugat city. About 40% of the coking coal consumption of the Bugat steel plant is supplied by ETT coal, which is 5-6 million tons of raw coking coal per year. The Bugat steel plant, which consumes a total of 10 million tons of washed coking coal, is the closest major consumer of ETT coal. The remaining part is supplied by coal imported from domestic sources and Australia. In the future, there is a possibility to increase the supply of coal from the TavanTolgoi deposit to the Bugat steel plant to 70-80%.

Currently, supplies are being supplied to the Wuhai region of Inner Mongolia, Gansu province, and the Xinjiang Uygur Autonomous Region in the west, and to the Bugatti city of Inner Mongolia and the Tangshan region of Hebei province in the east, and in the future, supplies can be extended to the provinces of Shandong and Jiangsu in the southeast.

In addition, after reaching Jining via the Jinbao Railway, the ETT coal can be loaded onto the Jitong Railway and transported to the markets of Heilongjiang, Jilin and Liaoning provinces in northeastern China.

Table 7: Distance from Gashuunsukhait (Gantsmod) Border to End Users /Unit: km/

DEPARTURE POINT	DESTINATION	BY RAILWAY (KM)	BY TRUCK (KM)
GANTSMOD	Wuhai, Inner Mongolia	433	427
GANTSMOD	Baotou, Inner Mongolia	367	355
GANTSMOD	Jiayuguan, Gansu	1862	1300
GANTSMOD	Ürümqi, Xinjiang	3040	2196
GANTSMOD	Tangshan, Hebei	1340	1318
GANTSMOD	Jinan, Shandong	1703	1435
GANTSMOD	Suzhou, Jiangsu	Railway 1340km + Sea 1100km	-
GANTSMOD	Harbin, Heilongjiang	2242	-
GANTSMOD	Changchun, Jilin	1996	-
GANTSMOD	Anshan, Liaoning	1758	-

‘Based on the above analysis of transportation distance and market potential, ETT can select target markets for coal as Inner Mongolia, Gansu and Xinjiang in the northwest, Hebei, Shandong and Jiangsu in the coastal area, and Heilongjiang, Jilin and Liaoning in the northeast.’

By product type, coking coal can be sold in all nine provinces, while the markets in Heilongjiang and Jilin provinces are relatively limited.

“The target markets for coking coal are more likely to be coastal markets such as Hebei, Shandong, and Jiangsu.”

China's steel and coke production is concentrated on the coast, so the demand for coking coal in this region is large. Hebei and Shandong provinces are the main coking coal producing regions, but they cannot meet the total demand for coking coal. In addition, the coking coal mined in the region has a high volatile content, mainly oily coal, gas coal, 1/3 coking coal, and there is no low-volatile primary coking coal. It is heavily dependent on other provinces such as Shanxi and other imported coal. Domestic primary coking coal is high in ash and sulfur, so ETC coal is widely used in the coastal market. Northeast China's demand is mainly concentrated in Liaoning, and Benxi Iron Steel and Anshan Iron Steel are major users in the region. Heilongjiang is a major coking coal producing

province, but its output is relatively low. Therefore, it needs to supply coking coal from other provinces such as Shanxi and imported coking coal.

“To summarize the results of the above study, if ETT can reduce the transportation and logistics costs of delivering coking coal to Hebei, Shandong, and Jiangsu provinces within the scope of selling coking coal to the northwest provinces such as Inner Mongolia, Gansu, and Xinjiang and delivering it to coastal markets, it will be possible to increase competitiveness and capture the market, and gradually expand to the markets of Heilongjiang and Liaoning provinces in the northeast.”

ETT benefits from its location near Mongolia’s southern border with China. The proximity to the Gashuunsukhait–Ganqimaodu border port offers a direct logistical corridor to Inner Mongolia, where several steel production clusters are located. Road improvements and the partial completion of rail infrastructure (Tavan Tolgoi–Gashuunsukhait line) reduce transport bottlenecks and lower per-ton export costs.

Figure 10 presents the truck clearance capacities of Mongolia’s three primary coal border ports. Gashuunsukhait-Ganqimaodu leads with the highest daily truck throughput, followed by Mandal-Mandula and Shiveekhuren-Ceke.

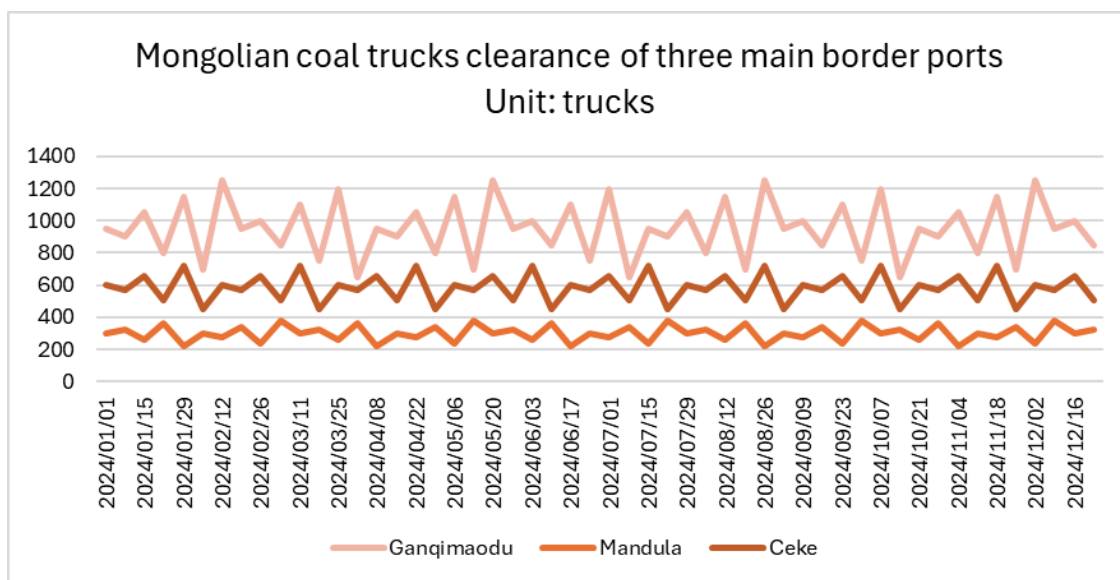


Figure 12: Mongolian coal trucks clearance of three main border ports Unit: Trucks

This export infrastructure provides ETT with a structural advantage in logistics, especially for supplying short-haul coke customers in Ordos, Baotou, and other Inner Mongolian cities. As railway connectivity improves, logistics costs are expected to fall by up to 30%, improving the plant’s netback margins.

Moreover, transportation costs play a critical role in determining the international competitiveness of coking coal exporters. For Erdenes TavanTolgoi JSC, the total transportation and logistics expenditure amounts to 354,988.4 million MNT for the delivery of 10,296.6 thousand tons of coke, resulting in an average transportation cost of approximately **34,500 MNT/ton**, or **~USD 10/ton** at current exchange rates.

To contextualize this figure, Table 8 provides a comparative overview of estimated transportation costs incurred by major coking coal exporting countries shipping to China:

Table 8: Comparative Transportation Costs of Coking Coal Exported to China by Major Supplier Countries (USD/ton)

COUNTRY	ESTIMATED TRANSPORT COST (USD/TON)	KEY CHARACTERISTICS
MONGOLIA	~10	Road-based haulage to Chinese border via Gashuunsukhait
AUSTRALIA	14–15	Rail to port + maritime shipping to China
RUSSIA	20–40	Long rail distances to border crossings
UNITED STATES	30–50*	Rail to East Coast ports + maritime to China

\*Approximate based on route-specific logistics and shipping conditions.

Mongolia benefits from low-cost overland transport due to geographic proximity and cross-border infrastructure, giving it a notable freight advantage compared to seaborne exporters. However, the advantage is partially offset by infrastructure bottlenecks and limited rail capacity, highlighting the need for improved multimodal connectivity such as the expansion of the TavanTolgoi–Gashuunsukhait railway line.

This comparative analysis underscores the strategic importance of investing in integrated export infrastructure to maintain and strengthen Mongolia’s cost advantage in the Chinese metallurgical coal market.

### 5.3 Opportunity for further expansion by building a coke plant

The development of a coking coal plant not only enables the vertical integration of Mongolia’s raw coal exports but also creates the foundation for a broader industrial ecosystem through the extraction and utilization of valuable by-products. The coking process yields a range of secondary compounds—such as ammonia-rich liquids, crude benzol, carbol (medium oil), coal tar, and heavy oils—that can be refined into industrial

inputs for chemical manufacturing, pharmaceuticals, agriculture, and materials engineering.

For example, ammonia-derived compounds can be used in domestic fertilizer and chemical production, reducing dependency on imports. Crude benzol derivatives like toluene, xylene, and refined kerosene are vital for producing paints, solvents, and synthetic materials. Meanwhile, coal tar derivatives such as creosote and carbon black serve as feedstocks for producing cable coatings, ceramics, printer toner, and tires—products that are currently imported but could be domestically manufactured with the proper downstream infrastructure.

By enabling the local extraction of these by-products, a coking plant would open up significant opportunities for Mongolia to diversify its industrial base beyond raw materials. This could stimulate the development of domestic sectors such as rubber manufacturing, dye and pigment processing, electrode fabrication, and environmental purification technologies. Over time, these downstream industries could reduce Mongolia’s trade deficit, create skilled employment, and support broader economic diversification aligned with national development goals.

Table 9: By-Product from Coking Coal

SOURCE	EXTRACTED COMPOUND	FINAL PRODUCT/APPLICATION
AMMONIA-RICH LIQUID	Ammonium Sulfate	Glass clarifier, Fertilizer, Insecticide
	Liquefied Ammonia	Dye, Various fertilizers, Household cleaning agents, Medicines, Refrigerants, Neutralizers
CRUDE BENZOL (RAW GASOLINE & LIGHT OILS)	Refined Kerosene	Industrial solvents, Phenol-based solvents, Chemicals, Automotive dyes, Wax, Furniture polish, Gas cleaners, Wood polish, Paint ingredients
	Gasoline from light oils	Various dyes, Motor oil additives, Synthetic fibers, Nylon, Plastic products, Synthetic rubber
	Toluene from light oils	Disinfectants, Powdered medicines, Aromatics, Organic solvents
	Xylene from light oils	Gasoline additives, Herbicides, Paint and lacquer materials
CARBOL (MEDIUM OIL FROM COAL TAR)	Naphthalene	Dyes, Naphthalene balls, Phthalic anhydride
	Phthalic Anhydride	Agrochemicals, Dyes, Insecticides, Medicines, Polyurethane rubbers, Leather softeners
	Carbolic Acid	Dyes, Deodorants, Plasticizers, Rubber additives, Phenolic derivatives

	Acidic Polymers	Automotive parts, Fire retardants, Plastics, Rubber
	Naphthalene Polymers	Film materials, Photo films, Rubber
<b>WASHED HEAVY OIL &amp; ANTHRACITE OIL</b>	Carbon Black	Ceramics, Lacquers, Paints, Printer toner, Cable rubbers, Conveyor belts, Tires, etc.
	Creosote	Railroad and utility pole preservatives
<b>COAL TAR</b>	Activated Carbon	Absorbents, Air/water purifiers, Catalysts, Gas/liquid purifiers, Metal absorbers
	Carbon Composite Mass	Airplane parts, Filters, Lithium battery electrodes, Supercapacitors
	Binders and Fillers	Used in metallurgical production, Carbon anodes, Graphite electrodes

In addition to generating industrial by-products, establishing a domestic coking plant presents a valuable opportunity to supply high-quality coking coal and coke to Mongolia's own emerging industries. As Mongolia continues to urbanize and invest in infrastructure, demand for construction materials—particularly steel—is expected to rise. Supplying domestically processed coke to future steelworks, foundries, or metallurgical facilities would enhance national self-sufficiency and reduce reliance on imported steel and coke products.

This internal supply capability could serve as a catalyst for developing a vertically integrated metallurgical cluster within the country. By ensuring a stable and competitively priced source of coke, the plant could support future investments in domestic steel production, pipe manufacturing, and heavy equipment fabrication. It would also encourage knowledge and technology transfer, foster job creation in engineering and industrial operations, and establish Mongolia not only as a raw material exporter but as a value-added producer within the regional supply chain.

Ultimately, such expansion aligns with Mongolia's long-term economic goals of industrial diversification and economic resilience. It represents a strategic pivot from extractive dependence toward industrial capability, positioning the country to benefit more fully from its natural resource endowments.

## 5.4 Third Market Analysis

International coal trade in 2020 was 1,483 million tons, with imports from countries such as India, Japan, and the Republic of Korea accounting for more than 40 percent. The demand, supply, and future outlook for coal in each country are shown below.

**JAPAN:**

Japan's domestic coal production is limited, at around 1 million tons, mainly thermal coal. In other words, the country's domestic coal consumption is almost entirely dependent on imports. Japan's coal imports were 186.2 million tons in 2020 and 166.8 million tons as of November 2021.

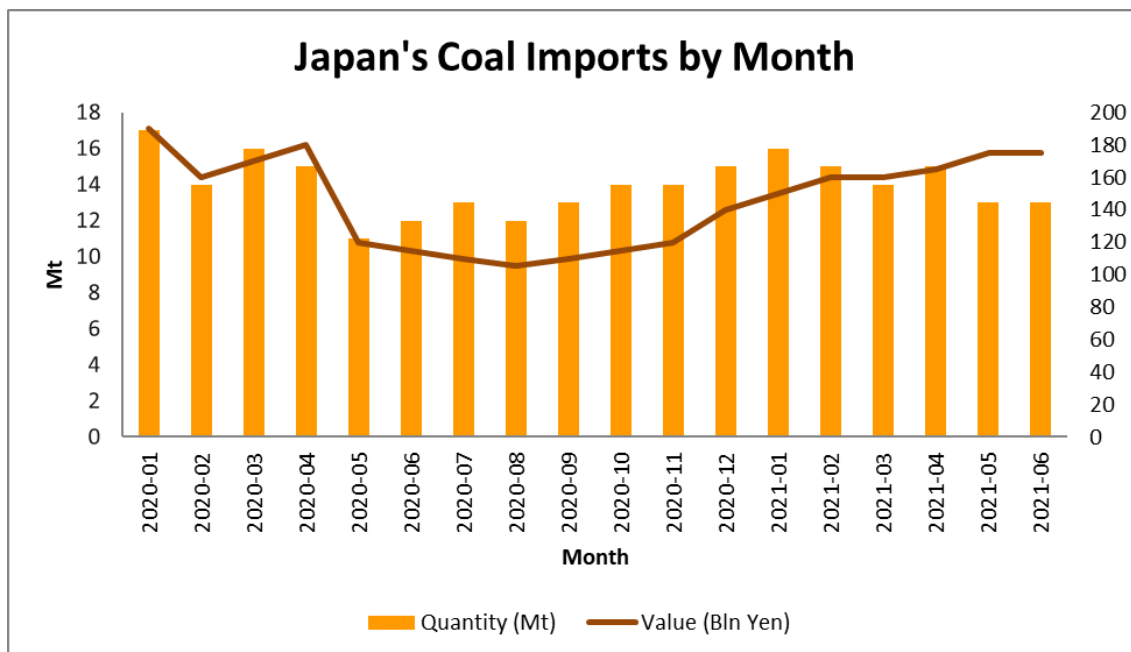


Figure 13: Japan's Coal Imports by Month

By type of coal, coking coal imports amounted to 41.6 million tons and thermal coal imports amounted to 144.6 million tons. In terms of import structure, 109.3 million tons of coal were imported from Australia, accounting for 58.7 percent.

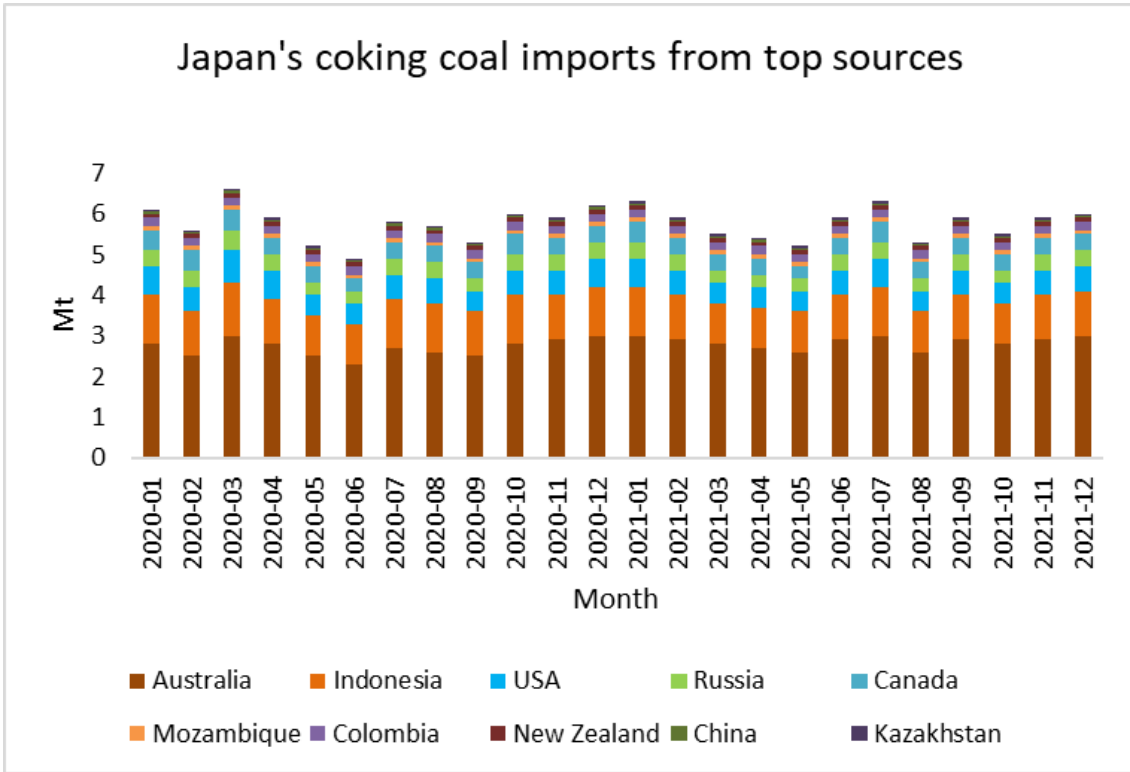


Figure 14: Japan's Coking Coal Imports from Top Sources

As costs continue to fall due to continuous technological progress, the expansion of renewable energy is accelerating. Nuclear power plants have slowed down due to rising costs following the Fukushima nuclear accident, and the growth potential of coal-fired power generation is limited by excessive heat emissions.

Based on the above conclusions, Japan plans to establish a diversified energy supply and demand system to achieve its goal of transitioning from “low carbon” to “decarbonization.” Preliminary estimates show that Japan’s coal imports are on a downward trend, falling by about 2 percent per year to 100 million tons by 2050.

**SOUTH KOREA:**

South Korea also has limited coal production, around 1 million tons, mostly thermal coal. In other words, similar to Japan, domestic coal consumption is almost entirely dependent on imports.

In 2020, South Korea's coal imports were 141.4 million tons, an average decrease of about 6 percent from 2015.

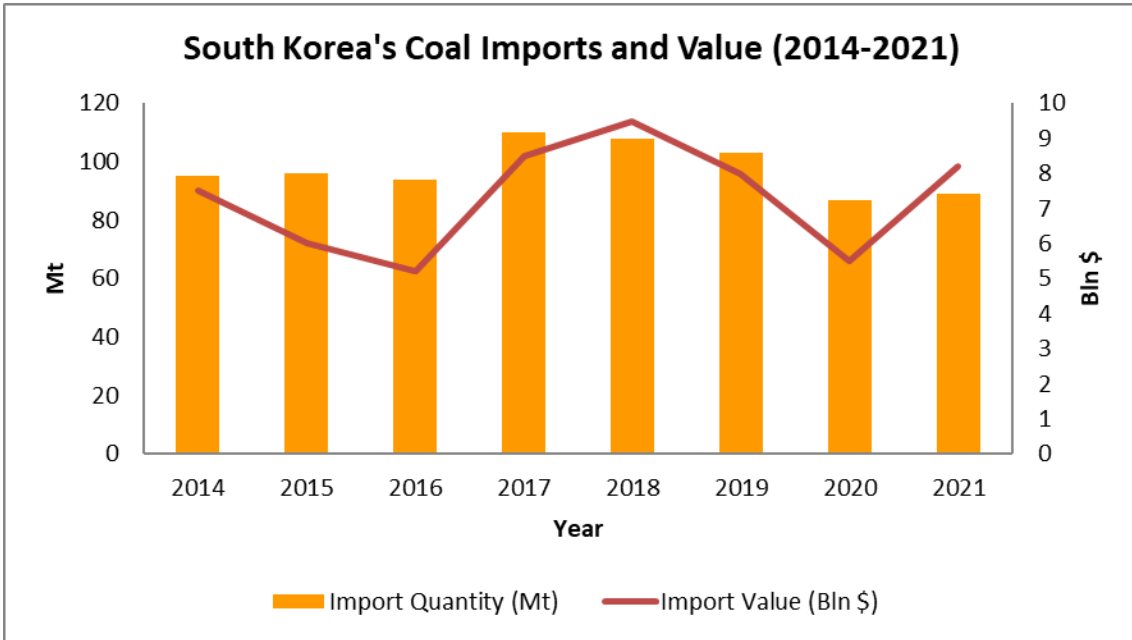


Figure 15: South Korea's Coal Imports and Value (2014-2021)

By type of coal, coking coal imports amounted to 22.6 million tons and thermal coal imports amounted to 118.8 million tons. In terms of import structure, 51.8 million tons of coal were imported from Australia, accounting for 36.6 percent.

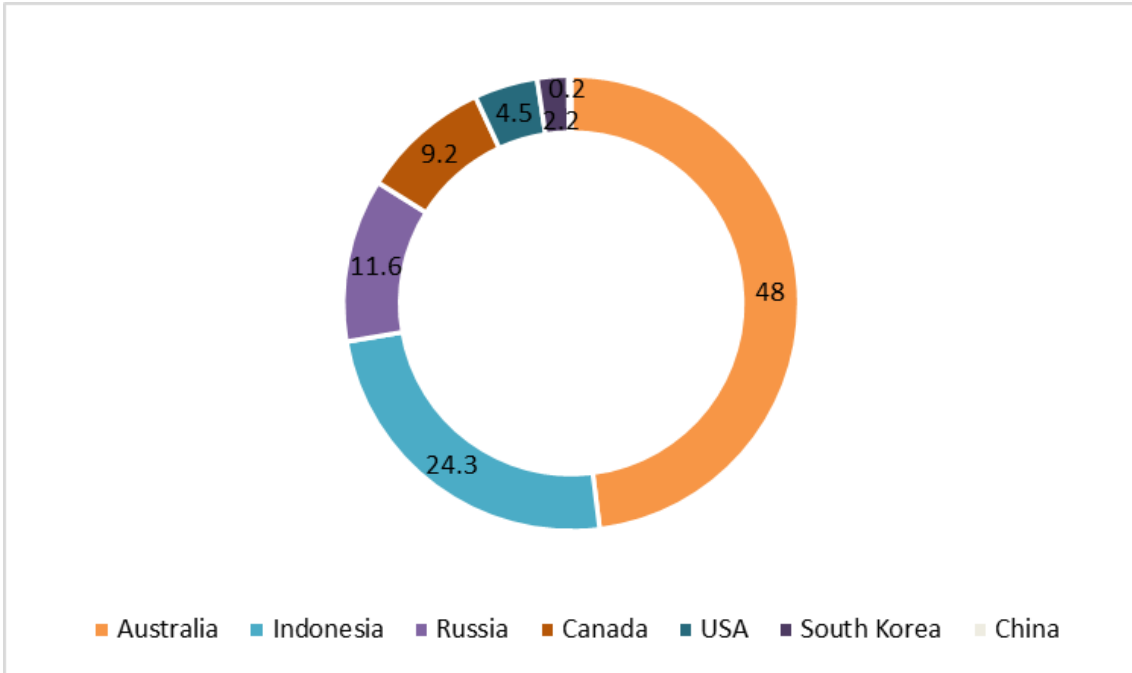


Figure 16: South Korea's Coal Import Composition by Country – Coking and Thermal Coal %

In 2019, the Republic of Korea issued the “Third Energy Master Plan (2019-2040),” proposing to increase the share of renewable energy from the current 7-8 percent to 30-35 percent by 2040. The goal is to reduce coal-fired electricity generation as quickly as possible and gradually reduce the share of nuclear energy. As a result, South

Korea's coal imports are expected to decrease by about 1.3 percent per year, reaching 85.6 million tons by 2050.

In conclusion, while both Japan and South Korea are pursuing long-term strategies to reduce overall coal consumption, their current dependence on imported coking coal remains significant. Japan imported 41.6 million tonnes of coking coal in 2021, and South Korea imported 22.6 million tonnes, with Australia as the dominant supplier in both markets. Given the high quality specifications required by steelmakers in these countries, Erdenes TavanTolgoi's planned coke product—positioned within China's Class II standards—may offer a competitive alternative, particularly if supported by cost advantages or blending strategies. Although coal demand in these countries is projected to decline gradually toward 2050, the scale of existing imports and the need for diversified supply sources suggest that Japan and South Korea can still serve as viable supplementary markets alongside China. As ETT expands its production and aims to enter regional value chains, targeting niche demand segments in these high-specification, import-reliant economies could provide strategic export diversification and brand credibility in the Asia-Pacific region.

## **5.5 Long-Term Strategic Considerations**

While near-term opportunities are strong, ETT must also consider medium- and long-term market shifts. China's coking coal demand is expected to stabilize or decline modestly over the next five years, due to a combination of improved steel recycling rates, stricter emissions caps, and the adoption of electric arc furnace (EAF) technology in major steel centers. This gradual structural change underscores the importance of diversifying market channels and focusing on value-added products like coke.

Furthermore, China's regionalization of industrial policy may lead to differentiated demand growth. Provinces like Hebei, Shandong, and Jiangsu are being tasked with upgrading emissions control systems and transitioning to lower-carbon steel inputs. In contrast, inland provinces such as Inner Mongolia and Shaanxi may continue to rely more heavily on traditional blast furnace methods for longer.

ETT's ability to adapt to these regional disparities—both in terms of product type and marketing strategy—will be critical. Additionally, exploring future coke export opportunities to Third Market could serve as a hedge against future reductions in Chinese demand.

## 6 Case Study: Project Risk Assessment

### 6.1 General Information

Risk refers to the probability of potential loss or damage resulting from the failure to achieve a defined goal within a specific period. Risk signifies possible dangers, difficulties, or threats that may arise in the future.

Although risks are not fully known or may be unpredictable, they can be managed. Risks are typically associated with three main aspects of interaction: performance, cost, and time.

Risk management is a process that spans all stages of a project—from design and research to sales. Its main purpose is to make risks visible and measurable, aiding managers in their decision-making.

Risk management research involves identifying the risks an enterprise may face, analyzing and assessing these risks, and taking actions to eliminate or minimize their impacts.

In 2009, the International Organization for Standardization (ISO) introduced the ISO 31000 standard, which sets out general principles and a framework for enterprise risk management.

Companies that implement and comply with ISO 31000 gain several advantages. For example:

- Risks can be identified in advance, including when and how to manage them.
- Events that may pose a risk to the business are detected early.
- Potential losses or damages in case a risk occurs are estimated beforehand.
- Preventive measures are taken to mitigate potential risks.
- Acceptable levels of foreseeable risks are pre-identified.
- Clear procedures are in place for how to respond if a risk occurs.
- Appropriate resources to eliminate the effects of risk are identified.
- The risk management process and implementation guidelines are pre-prepared.
- All employees are informed about how to manage relevant risks.

It is recommended by the project developers to implement ISO 31000 standards in the operations of the coking coal plant.

## 6.2 Risks that may arise in a coke plant

The following tables show the risks that may arise in a coke plant project by risk stage and type.

Table 10: General Risks

<i>General Risks</i>	<i>Type</i>	<i>Form of Occurrence</i>	<i>Involved Parties</i>	<i>Mitigation Measures</i>
<i>Political Risks</i>	Legal and regulatory risk	Water Law, Tax Law	Parliament, Government	
	Political risk	Changes in Parliament, Government	Government, Insurance	Implement decision-making mechanisms
	Regulation and permit risk	Changes in related permits and regulations	Government, Insurance	Risk insurance
	Government support risk	Government programs not being implemented	Government, Insurance	
	Project implementation capacity risk	Risk in project implementation capacity	Government, Company	
<i>Economic Risks</i>	Price risk	Inflation, Deflation	Company	Adjusting coke prices
	Interest rate risk	Interest rate fluctuations	Company, Lender	Interest rate swap
	Foreign exchange risk	Exchange rate changes	Company, Lender	Currency hedging contract
	Financial risk	Ownership, debt, guarantee, bonds, etc.	Company, Investor, Lender	Use of ECA, IFI, ODA
<i>Social risks</i>	Resettlement risk	Civil protest, legal complaints	Government, Company	Government regulation
	Environmental risk	Air pollution, water shortage, legal complaints	Government, Company	Government regulation
<i>Operational Risks</i>	Partnership and cooperation risk	Management reliability, ability to fulfill contractual obligations	Company, Investor, Lender	Establish clear contract terms

<i>Force Majeure</i>	Natural disasters, pandemics, etc.	Operational disruption	Government, Company, Lender, Insurer	Covered by insurance
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Table 11: Risks at the planning stage

<i>Type</i>	<i>Manifestation</i>	<i>Stakeholders</i>	<i>Measures to be taken and related agreements</i>
<i>Research risk</i>	Geological survey not adequately conducted before construction work	Company, contractor	Contract made with the contractor is an EPC contract
<i>Design risk</i>	Design plan modified	Company, contractor	Changes must be discussed before construction work begins
<i>Risk of plan changes and delays</i>	Environmental assessment and public consultation delayed, resulting in changes to the plan	Company, local government	Cost monitoring

## Risks in the construction phase

Infrastructure risks are the main risks that the Government bears. In the case of the Coke project, delays in the construction of road links and transport terminal facilities to the plant pose a risk to the company's profitability.

Table 12: Construction stage risks

<i>Stage of Development</i>	<i>Type</i>	<i>Form of Occurrence</i>	<i>Stakeholders Involved</i>	<i>Mitigation Measures/ Relevant Contracts</i>
<i>Construction Phase Risk</i>	Border closure risk	Delay in import time for equipment	Government, Company	

Infrastructure development-related risk	Delay in railway construction work	Government	Government guarantee
Delay in completion time	Project schedule overrun	Company, Insurer, Contractor	Key deliverables under EPC contract
Cost overrun risk	Increase in construction costs	Company, Insurer, Contractor	Compensation for damages
Contractor risk	Failure to meet required conditions	Company, Contractor	Compensation for damages
Infrastructure damage risk	Accidents occurring during construction	Company, Insurer, Contractor	Relevant insurance

Table 13: Operational risk

<i>Operation Phase Risk</i>	<i>Type</i>	<i>Form of Occurrence</i>	<i>Stakeholders Involved</i>	<i>Mitigation Measures / Relevant Agreements</i>
<i>Market Risk</i>	Long-term border closure risk	Suspension of sales	Government, Company	—
	Coking coal price drop	Increase in Chinese coking coal production	Company, Private sector buyers	Increase steel production
	Operational cost risk	Increase in cost of raw materials and other inputs	Company	Cost monitoring
<i>Disaster Risk</i>	Risk of damage to facilities	Accidents	Company, Insurer	Insurance
<i>Risk Related to Government Agencies</i>	Poor local government regulation	Lack of proper local governance	Government	Government guarantee

<i>Contractual Obligation Risk</i>	Failure to fulfill contractual obligations	Operational disruptions	Government, Company, Insurer, Buyers	Resolve contract-related violations
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From the above analysis, it can be seen that the risk of political and government decisions is likely to have the greatest impact on the coke plant project.

Table 14: Market Risks

<i>Type</i>	<i>Manifestation</i>	<i>Stakeholders</i>	<i>Measures to be Taken and Related Agreements</i>
<i>Market Risk</i>	Fluctuation in global coking coal prices reduces profitability	Company, buyers, Ministry of Mining and Heavy Industry	Establish long-term supply agreements; adopt price hedging strategies
	Decreasing demand from major buyers such as China due to energy transition or policy shifts	Company, Ministry of Foreign Affairs, buyers	Diversify export markets (e.g., Japan, South Korea); maintain ongoing market intelligence
	Entry of new low-cost competitors (e.g., from Russia or Indonesia) weakens ETT's competitive position	Company, investors, Ministry of Economic Development	Emphasize value-added coke production; invest in brand positioning and cost optimization
	Logistic bottlenecks or border policy changes impact timely delivery to customers	Company, customs authorities, transport providers	Strengthen cross-border transport agreements; develop buffer inventory and alternate routes
	Exchange rate volatility affecting export revenue	Company, Ministry of Finance, international buyers	Use multi-currency pricing terms in contracts; monitor FX exposure and use currency hedging

Based on the table above, it is clear that the market risks associated with Erdenes TavanTolgoi's planned coking coal plant are not limited to price volatility alone. Demand uncertainty, geopolitical influences, competition from emerging suppliers, logistical disruptions, and exchange rate fluctuations all pose significant risks that could affect the plant's long-term commercial viability. However, these risks can be managed through proactive strategies such as diversifying export destinations, securing long-term supply contracts, optimizing cost structures, and closely monitoring market trends. By identifying and preparing for these risks in advance, ETT can strengthen its market resilience and increase its competitiveness in a rapidly changing regional and global coal market. This

analysis reinforces the importance of integrating risk management into the company's overall market strategy.

### **6.3 Affecting the viability of the project /viability gap/**

The coke production project is a project that will bring great economic benefits to the region where it is implemented. The project's economic internal rate of return (IRR) is approximately 20%. It takes a lot of investment, but the rewards are just as great. The basic conditions for the successful implementation of the project are to reduce, eliminate and prevent the following risks. It includes:

**Income risk.** Income risk arises when sales prices cannot be increased when costs rise due to inflation. This situation can be resolved by including such conditions in the contract and insurance policy. Since the coke plant will have a continuous production cycle that is characterized by non stop operation, it is advisable to seek a long-term contract with a reliable buyer.

**Exchange rate risk.** For the Cox project, depending on the currency of the loan agreement, there is an exchange rate risk at its repayment. In order to hedge against fluctuations, methods such as financing in MNT, receiving foreign currency loans from the Bank of Mongolia and transferring them to MNT loans, obtaining exchange rate risk insurance such as NEXI, and taking MNT loans from the Development Bank of Mongolia can be taken.

**Raw material supply risk.** The coal washing plant will not be able to supply concentrated coal, so there will be a risk of shortage of raw materials. The raw material warehouse of the coke plant is planned to be stocked in an amount sufficient to meet the plant's needs for 4 months, so it will protect against the risk of shortage of raw materials for a certain period of time. Insurance is also another tool to reduce losses.

**Water supply risk.** This plant uses 38.25 L/s of water, even with advanced dry coke quenching technology. There is a risk of interruption of water supply if the project of using the underground water deposits of Tsagatsav and in a scenario the "Blue Horse" project to utilize surface water is not implemented as planned. The establishment of the plant after the implementation of the water supply project by the government is a way of minimizing the risk.

Risk during transportation. The most economical way to transport coke without compromising its quality is by rail. The government's implementation of the Tavantolgoi-Gashuunsukhait railway project will be a key factor in reducing the risk of coke plant

transportation. The risk can be eliminated by having a contracted motor carrier perform the transport work.

**Risk of industrial accidents.** The CHS 2020 stove is reliable, and regular maintenance will ensure that accidents do not occur. However, it is very important to develop a maintenance plan and follow maintenance rules, regulations, and instructions.

**Competitive analysis.** We conducted a study on competitors in Mongolia's coke-production market using the method of weighting factor corresponding points /1-10/, among the projects included in the evaluation, COAL LLC has a high score due to the fact that it has its own coal mine, sells to the Chinese market, and has a permanent partner. However, due to the small capacity of the factory and supply to only one customer, it may not be considered a competition.

Table 15:Competitive analysis of Mongolian coke producers

ENTERPRISE	SPECIFICATIONS						
	Supply of raw materials	Product quality and category	Scope of action	Product price	Market for sale	Foreign market experience	Total score
ERDENES TAVANTOLGOI JSC	10	6	9	8	9	10	52
ENERGY RESOURCES LLC	10	6	10	9	10	10	55
TAVANTOLGOI FUEL LLC	9	6	8	8	8	2	49
C.O.A.L. LLC	10	7	9	9	10	9	54
BAYAN COKE ENERGY LLC	9	6	7	10	10	5	47
YAN SARDAG ORGIL LLC	8	6	9	9	10	9	52

As seen in the table above, the coke plant of Chinese-invested Yan Sardag Orgil Co., Ltd. is the main competitor of our project. Bu in the sense that Erdenes Tavantolgoi JSC is owned by the state and the people, there is an opportunity to raise the sales at a high level. In the future, the demand for coke will continue to grow and the fact that China has started to close its coke plants with a capacity of less than 1 million tons and with outdated techniques and technologies as part of the "Blue Sky" program is expected to have a positive effect on our coke sales, market demand is projected to continue rising.

## 6.4 Risk management

Risk management is an organized process that protects human life, property, and the normal operation of a business, and helps reduce the financial losses caused by damage.

To manage risk, it is necessary to measure risk. This means prioritizing the risks that may occur by the frequency of damage and the magnitude of the damage.

Table 16: Risk assessment of coke-to-power plants

Risk level	Low	Medium	High
Risk frequency			
High		Accident risk	
Medium	Forex risk		Income flow risk
Low		Transportation risk	Raw material supply risk Water supply risk

Table 17: Coke-power plant risk assessment and management

Risk	Risk assessment	Risk management
Income risk	Medium frequency, high damage	Transfer of risk
Exchange rate risk	Medium frequency, low damage	Accept the risk
Raw material supply risk	Low frequency, high damage	Transfer of risk
Water supply risk	Low frequency, high damage	Transfer of risk
Risk of transportation	Low frequency, medium damage	Accept the risk
Risk of industrial accidents	High frequency and medium damage	Reduce risk

In case of transfer of risk, the responsibility for the operation of the plant is transferred to others, who only bear the risk and pay compensation. Risk is transferred in three main ways: insurance, transfer of risk by contract, and other methods provided by law.

Insurance. The project implementer shall enter into an agreement to indemnify the damages incurred in accordance with the conditions specified in the insurance contract and pay a fixed fee to the insurer.

The scope of insurance coverage shall be included in the contract in a manner adapted to the characteristics of the coke plant. For example, provisions such as risks that cause damage, insured items, asset valuation, etc. should be considered.

Contractual transfer of risk. As with insurance, the transfer of risk is based on a contract, but the bearer of the risk is not the insurer. In this case, the risk will be transferred as a supplement to another contract. For our project, the risk of revenue can be transferred through a management contract.

According to the project risk analysis, the risk of transportation and exchange rate differences is low, the risk of raw materials supply, the risk of industrial accidents is moderate, the risk of water supply, and the risk of income are high.

It is quite possible to manage the risks of coke-energy production, to successfully implement the project and operate it efficiently.

## 7 Result

This chapter presents the key findings derived from the market analysis, technical feasibility review, competitive assessment, and risk evaluation of the proposed Erdenes TavanTolgoi (ETT) coke plant project.

### 1. Global and Regional Demand Trends

Global demand for coking coal is projected to peak around 2025, followed by a gradual decline due to decarbonization efforts, steel industry restructuring, and adoption of Electric Arc Furnace (EAF) technology, particularly in China. However, short- to medium-term demand in Asia—especially in India, Southeast Asia, and northern China—remains resilient, driven by industrial growth, infrastructure investments, and regional steel production expansion.

### 2. Product Competitiveness

ETT's coke blend contains 86% fixed carbon, 0.8% sulfur, and 10.46% ash, placing it within China's Class II category. While it does not meet Class I standards due to sulfur content, it remains competitive due to:

Low ash levels and high fixed carbon

Strategic pricing aimed at inland Chinese buyers who prioritize cost-efficiency

Potential for blending compatibility with other feedstocks in steel mills

This positioning enhances ETT's attractiveness in price-sensitive markets with flexible quality thresholds.

### 3. Logistics and Infrastructure Advantage

ETT benefits from proximity to major Chinese industrial provinces such as Inner Mongolia, Hebei, and Shandong. Integration with road and rail networks via Gashuunsukhait, Ceke, and Shiveekhuren border points significantly reduces logistics costs (approximately USD 10–15/ton, compared to USD 30–50/ton for seaborne coal). Future expansion of the Tavantolgoi–Gashuunsukhait railway is expected to further enhance export efficiency.

### 4. Demand Forecasting and Scenario Analysis

Forecasting models using trend extrapolation and elasticity-based scenario analysis suggest moderate declines in global coking coal prices through 2035. However, these declines are offset by:

Persistent regional demand in inland China and India

Price stability due to rising transportation costs for competitors

Policy support for border trade in China's northern regions

Overall, the project remains financially viable under multiple demand scenarios.

## **5. Strategic Risk and Opportunity Mapping**

The TOWS analysis highlights that ETT's large reserves, state support, and infrastructural base are key strengths. Major risks include:

Overdependence on the Chinese market

Exposure to transportation delays and border policy fluctuations

Environmental regulation pressure

Yet, external opportunities such as China's closure of small, outdated coke plants and the tariff-free export advantage from Mongolia present a strategic opening for ETT's value-added coke product.

## 8 Conclusion and Discussion

### SWOT Analysis

Internal Environment Analysis	
Strengths (+)	Weaknesses (-)
▶ Large reserves of high-quality coking coal	▶ Production of value-added products has not been developed
▶ Close proximity to China, the largest consumer of coking coal	▶ Since products are not sold directly to end users, the company relies on unstable, short-term customers
▶ The company's financial operations have begun to stabilize	▶ Operations are fully dependent on the capacity of road infrastructure, customs clearance capabilities, and the Chinese market's demand size
▶ Mining operations are conducted continuously 24 hours a day	▶ High dependency on suppliers
▶ Open-pit mining is used, resulting in relatively low extraction costs	▶ Market research is conducted only in relation to current operations, with no studies carried out on future customer needs or competitors
▶ Due to the relatively low production capacity, there is potential for long-term operations	▶ No centralized human resource information system exists
▶ Focus has been placed on improving corporate governance	▶ Implementation of human resource functions is incomplete
▶ As a state-owned company, there is an opportunity to receive government support	▶ Since mining and other essential operations are outsourced, the company has few highly specialized and experienced engineers and technical staff
▶ The company pays attention to employees' social welfare	▶ There is no long-term or mid-term human resource planning, succession planning, or career development planning, making it difficult to retain skilled and qualified employees
▶ The company has established cooperation agreements and works closely with local communities	
▶ By implementing international standards such as ISO 9001:2015, ISO 14001:2015, and ISO 45001:2015, the company focuses on improving management, occupational health and safety, environmental protection, and operational quality	

External Environment Analysis	
Opportunities (+)	Threats (-)
▶ Although the economic situation of the company's key customer (China) and coal demand are expected to gradually decline in the long term, China will remain a major influencer of global market demand	▶ The company's operations are highly dependent on fluctuations in global coal market prices
▶ Resolve port and logistics issues to enable product sales to third-party (non-China) markets	▶ Heavy reliance on a single country (China) makes the company highly sensitive to changes in China's import policies and market conditions
▶ Implement measures to achieve tariff-free coal imports into China and to increase the capacity of border customs clearance	▶ Operating in a region with limited national water resources poses a risk of challenges related to water usage
▶ Develop value-added product manufacturing to enhance the value of the core mining operations	▶ Due to political influence, there is a risk that the company's financial resources and profits could be diverted toward funding social welfare activities
▶ Benefit from state-implemented railway and road infrastructure projects, which will create cheaper and more efficient transportation channels	▶ Failure to develop value-added products could lead to depletion of high-quality coal reserves and a shortened lifespan of the deposit
▶ Introduce technical and technological solutions aimed at increasing productivity and reducing costs	▶ Delays in state-implemented railway and road infrastructure projects
▶ Develop environmentally friendly mining practices by optimizing mine closure planning and supporting local community resilience and sustainability	▶ If infrastructure issues are not resolved, environmental pollution could negatively impact the health of local communities and employees
▶ Attract financial resources through the use of financial leverage and other financial instruments	▶ Port and logistics issues may remain unresolved due to the competing interests of Russia (competitor) and China (customer)
	▶ Changes in steel production technologies could lead to a long-term decline in global demand for coking coal

TOWS Analysis	
S – Strengths (+)	W – Weaknesses (-)
<b>S1:</b> Large reserves of high-quality coking coal	<b>W1:</b> Value-added product manufacturing has not been developed
<b>S2:</b> Advantageous location near a major market (China)	<b>W2:</b> Operations are carried out in a region with limited water resources
<b>S3:</b> Relatively low core operational costs	<b>W3:</b> High dependence on contract miners
<b>S4:</b> Stabilized financial operations; net profit margin higher than industry average	<b>W4:</b> Increased overburden transport distance, leading to reduced productivity
<b>S5:</b> Implementation of an integrated management system and focus on improving corporate governance	<b>W5:</b> Technological upgrades to increase productivity and reduce costs are inconsistent
<b>S6:</b> Focus on employees' social welfare	<b>W6:</b> Dependency on road infrastructure, customs capacity, and Chinese market conditions
	<b>W7:</b> Marketing strategy is undefined; market and competitor research is irregular
	<b>W8:</b> Supporting business activities are underdeveloped
	<b>W9:</b> Sales heavily reliant on a single customer country
	<b>W10:</b> Weak demand and low sales for thermal coal
	<b>W11:</b> Lack of highly skilled, specialized engineers and technical personnel
	<b>W12:</b> No direct sales to end-users
	<b>W13:</b> No clearly defined sustainable development and corporate social responsibility (CSR) policies

## TOWS Analysis

O – Opportunities (+)	SO – Strategies (Using Strengths to Capture Opportunities)	WO – Strategies (Overcoming Weaknesses to Capture Opportunities)
<b>O1:</b> The global and Chinese economies are expected to remain relatively stable in the long term	<b>SO1:</b> Develop value-added product manufacturing based on large reserves of high-quality coking coal to increase the value of core mining operations	<b>WO1:</b> Develop value-added product manufacturing and use low-cost railway networks to reach end-users
<b>O2:</b> Implementation of railway and road infrastructure projects by the government to create low-cost transportation channels	<b>SO2:</b> Until the company builds its own beneficiation plant, collaborate with Mongolian and Chinese plants to produce value-added products	<b>WO2:</b> Gradually take over mining operations to reduce dependency on contract operators
<b>O3:</b> Government support for eliminating tariffs on Chinese coal imports and increasing border customs capacity	<b>SO3:</b> Use the advantageous proximity to a large market (China) to increase market share in China’s coal import market	<b>WO3:</b> Improve supporting operations to ensure long-term sustainable business activities
<b>O4:</b> Government support to resolve port issues and create channels for selling to third-party markets	<b>SO4:</b> Based on financial stability, invest in government railway projects to create affordable transportation channels	<b>WO4:</b> Regularize third-market research to reduce dependency on a single customer
<b>O5:</b> Develop value-added product manufacturing to enhance the value of core mining operations	<b>SO5:</b> Work towards creating channels to sell products to third-party markets	<b>WO5:</b> Contribute to the development of environmentally friendly mining by properly planning mine closure and supporting local sustainability
<b>O6:</b> Gradually internalize mining operations to reduce costs	<b>SO6:</b> Obtain government support to eliminate coal import tariffs and improve customs capacity	
<b>O7:</b> Introduce technical and technological solutions to increase productivity and reduce costs		

This thesis examined the market feasibility and strategic competitiveness of the proposed coking coal plant by Erdenes TavanTolgoi JSC (ETT) within the broader context of regional coal demand, logistics, and long-term risk. Drawing on economic modeling, market research, and infrastructure analysis, the study has produced several important findings relevant to the future development of Mongolia’s coke industry.

## 1. Feasibility and Competitive Position

ETT's coke product meets China's Class II specification standards and compares favorably with many domestic producers in terms of ash and fixed carbon content. While the sulfur level is slightly higher than top-tier products, ETT compensates through a competitive cost structure and reliable logistics.

## 2. Demand Trends in Asia

The study confirms that regional demand for coking coal will remain stable in the short to medium term, especially in China, India, and Southeast Asia. Despite a forecasted decline in global coking coal consumption post-2025 due to steel sector decarbonization and EAF expansion, China's inland steel producers are expected to continue relying on coke-based production methods. This creates a window of opportunity for ETT, particularly in target markets such as Hebei, Shandong, and Jiangsu provinces.

## 3. Infrastructure and Logistics Advantage

ETT benefits from a significant logistical advantage due to its proximity to Chinese steel hubs and well-established overland routes through the Gashuunsukhait–Ganqimaodu border. Transport costs average around USD 10/ton, substantially lower than maritime shipments from Australia or Russia. Future completion of the Tavantolgoi–Gashuunsukhait railway is expected to reduce costs further, increasing ETT's netback margins and strengthening its competitiveness.

## 4. Strategic Risks and Opportunities

A detailed risk analysis highlighted multiple threats to project viability, including price volatility, raw material supply risks, water availability, and regulatory uncertainties. However, these can be mitigated through long-term contracts, infrastructure investment, and effective risk management strategies. Additionally, the coking process opens up the potential for value-added by-product industries in chemicals, fertilizers, and metallurgy, enhancing the broader economic impact of the project.

## 5. Market Diversification Potential

While China remains the primary target market, there is scope for expanding exports to Japan and South Korea, which are highly import-reliant and quality-conscious. Although coal demand in these countries is expected to decline gradually, ETT's ability to offer competitively priced Class II coke could support entry into niche market segments, thereby enhancing export diversification and resilience.

## Conclusion

Overall, the proposed ETT coking coal plant is strategically aligned with Mongolia's national development goals and regional industrial demand. With proper execution, infrastructure investment, and market engagement, the project has the potential to become a cornerstone of Mongolia's shift toward value-added, export-oriented industrialization. The findings of this thesis not only support the viability of the plant but also highlight broader lessons for resource-based development in emerging economies.

## 9 Recommendation

Based on the findings of this thesis, several strategic and operational recommendations are proposed to enhance the feasibility, competitiveness, and long-term sustainability of the Erdenes TavanTolgoi (ETT) coking coal plant project:

### 1. Secure Long-Term Offtake Agreements

To reduce market uncertainty and income risk, ETT should prioritize long-term supply contracts with key steel producers in northern China—especially in Hebei, Shandong, and Jiangsu. These contracts can help stabilize revenues and enhance investor confidence, particularly during price downturns or demand shifts.

### 2. Strengthen Logistics and Export Infrastructure

ETT should continue to invest in logistics improvements, including:

Accelerating completion of the Tavantolgoi–Gashuunsukhait railway

Expanding rail-to-port capacity and customs coordination

Establishing buffer storage and warehousing near key Chinese markets

These upgrades will reduce transport bottlenecks, lower per-ton costs, and improve delivery reliability.

### 3. Develop By-Product Value Chains

The company should explore the commercial extraction and processing of by-products such as ammonia, tar, benzene, and carbon black. These inputs have industrial applications in:

Fertilizer and chemical manufacturing

Construction materials

Plastics, dyes, and rubber production

Developing partnerships or joint ventures in these downstream sectors can create new revenue streams and stimulate domestic industrial growth.

### 4. Diversify Export Markets

While China will remain the dominant buyer in the short term, ETT should gradually expand into Japan and South Korea, where quality-based niche markets exist. A regional diversification strategy will:

Hedge against Chinese policy risks or market saturation

Enhance brand credibility and international visibility

Support stable demand as the global market transitions

This requires establishing new trade relationships and adapting product specifications where necessary.

## **5. Implement Comprehensive Risk Management**

ETT should institutionalize a formal risk management system, aligned with ISO 31000, covering:

Currency and price hedging strategies

Raw material and water supply assurance

Political and border-related contingency plans

Regular updates to demand forecasts and market intelligence

Effective risk governance will be essential to manage external shocks and maintain long-term project viability.

## **6. Align with National Industrial Policy**

Finally, ETT's strategy should be coordinated with Mongolia's broader industrial development goals. This includes:

Advocating for supportive policies on transport infrastructure, energy, and export incentives

Collaborating with government bodies and other strategic sectors to build a metallurgical cluster

Promoting local employment, skills transfer, and technology adoption

These recommendations are designed to ensure that the ETT coke plant not only succeeds as an isolated project but contributes meaningfully to Mongolia's transition toward a diversified, value-added export economy.

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