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## Investment Analysis of Public Road Relocation Project within The Mining Concession Area at Pit Gurimbang, Job Site Gurimbang Mine Operation - PT. BC

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### ABSTRACT:

Gurimbang Mine Operation (GMO) is one of the mining concession sites under a Coal Contract of Work (CCOW) licence granted by the government to PT.BC. Mining at this location started in 2021 with 52 million MT of coal reserves that are expected to be depleted within 12 years (2021-2033). However, there are external challenges in the form of provincial roads crossing the GMO mining area, especially in Pit West and Pit South, resulting in approximately 3.5 million MT of coal reserves that cannot be mined. To support energy conservation on marginal coal reserves and maximise production, government support is required in allowing the relocation of the provincial road, enabling the entire coal reserves at the site to be exploited. This research aims to analyse the economic aspects and external factors affecting PT.BC's business environment related to the road relocation project. The research methods used include PESTEL analysis to measure the external impact on the business environment, as well as analysis of the company's tangible and intangible resources to evaluate PT.BC's ability to implement the project. In addition, Capital Budgeting was used to assess the financial feasibility of the project, and sensitivity analysis was conducted to identify economic parameters that have a significant impact on the feasibility of the project. The results show that the road relocation is financially feasible and necessary to maximise the coal reserves at the site. The implications of this study emphasise the importance of government support and effective resource management in overcoming operational challenges and ensuring the sustainability of mining operations.

**Keywords:** Investment Analysis, Coal Reserves, Road Relocation, Capital Budgeting, Financial Feasibility.

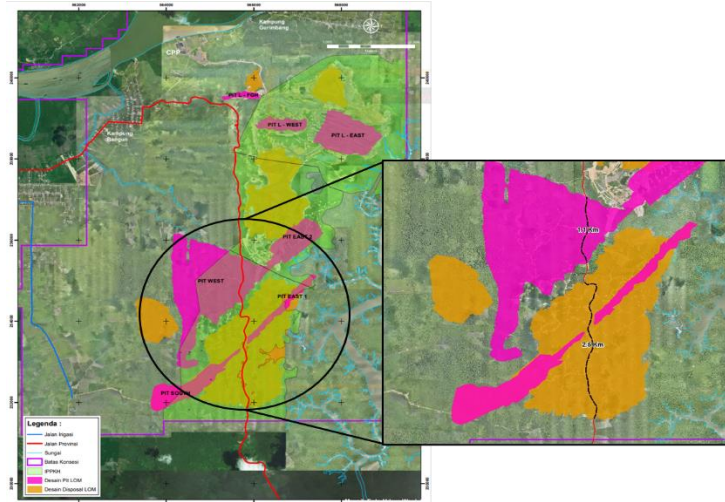
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### INTRODUCTION

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The Gurimbang Mine Operation area is part of the PT.BC's mining concession is located in Gurimbang, Sambaliung District, Berau Regency, East Kalimantan. The Gurimbang Job Site is the new project area in the coal mining operation that started in 2021. It requires many supporting infrastructure facilities: mining roads and coal haul roads, coal processing plants, jetties, and other facilities in the mining operation area (Nainggolan et al., 2021).

The Gurimbang Mine Operation is one of the active mining areas owned by PT. Berau Coal has 7 pits, namely: Pit L-FGH, Pit L-West, Pit L-East, Pit East-1, Pit East-2, Pit West and Pit South. Of the 7 pits, there are 2 pits (West Pit and South Pit), which are traversed by existing public roads. The current condition of the Gurimbang concession area is shown in the map below (Figure 1.3):



**Figure 1. The layout of the Mine Plan Area overlays with the existing public road within PT.BC (concession area)**

In the Gurimbang mining operations area, particularly at the South Gurimbang job site of PT.BC is faced with a challenge. A public road (about 5 km) cuts through the mining concession area, making it difficult for mining activities to continue efficiently. Particularly, this public road hinders access to the potential coal deposits in the South Gurimbang area, which have been identified as key mining zones. The continuation of mining activities without relocating this road may lead to logistical, safety, environmental, and productivity issues.

The primary concern lies in the constraints imposed by the presence of public roads within the mining concession area of the Gurimbang site, which restrict the operation area for mining activities. In the mining concession area located at site Gurimbang, there exists a public road (provincial road) that traverses the mining concession area belonging to PT.BC. As a result, certain coal reserves within the concession area, particularly those located in Pit West and Pit South of Gurimbang, are unable to be extracted optimally. Within the Gurimbang mining concession area there are currently 8 KM of public roads, of which 5 KM of public roads are included in the mine pit planning area at the Gurimbang location. Failure to relocate public roads could lead to a reduction in coal extraction, which in turn impacts company revenues.

The following is the Life of Mine (LOM) plan, base on 2 scenario mine plan in Gurimbang. Based on coal reserve data at the Gurimbang site, the coal production schedule with a detailed mining plan as follows

**Table 1. Life of Mine (LOM) base on coal reserve at Block Gurimbang (2022-2033)**

Descr iption	Unit	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Waste	bcm	21,35 8,000	21,17 8,500	21,74 3,000	26,39 9,000	20,67 1,600	15,57 9,400	17,50 0,000	17,50 0,000	22,00 0,000	37,50 0,000	37,50 0,000	37,50 0,000	296,4 29,500
Coal Gett ing	ton	4,128 ,100	3,844 ,000	3,689 ,300	4,514 ,431	4,356 ,187	3,132 ,841	2,700 ,000	2,700 ,000	3,362 ,000	6,500 ,000	6,500 ,000	6,500 ,000	51,92 6,859
Contr act Strip Ratio	bcm /to n	5.17	5.51	5.89	5.85	4.75	4.97	6.48	6.48	6.54	5.77	5.77	5.77	5.71
Waste Dista nce	m	2,290	2,480	1,980	2,222	1,789	1,694	1,359	1,973	2,198	1,581	1,974	1,965	
Coal Dista nce	m	4,990	5,160	5,840	6,035	5,637	6,008	6,684	7,002	7,762	7,404	7,845	7,206	

There is a challenge in the South Gurimbang mine plan area due to the presence of a public road within the mining concession. If the road is not relocated, certain coal reserves will be inaccessible for mining. Consequently, the Life of Mine (LOM) plan will be adjusted as detailed in Table 2 as follow:

**Table 2. Revised Life of Mine (LOM) plan for Gurimbang (2022-2033)  
without public Road Relocation Implementation.**

Descr iption	Unit	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Waste	bcm	21,35 8,000	21,17 8,500	21,74 3,000	26,19 9,000	18,37 1,600	12,67 9,400	13,80 0,000	14,90 0,000	18,30 0,000	33,60 0,000	33,60 0,000	33,60 0,000	269,3 29,500
Coal Gett ing	ton	4,128 ,100	3,844 ,000	3,689 ,300	4,299 ,431	3,964 ,187	2,740 ,841	2,288 ,000	2,288 ,000	2,900 ,000	6,108 ,000	6,108 ,000	6,065 ,000	48,42 2,859
Minin g Strip Ratio	bcm /to n	5.17	5.51	5.89	6.09	4.63	4.63	6.03	6.51	6.31	5.50	5.50	5.54	5.56
Contr act Strip Ratio	bcm /to n	5.17	5.51	5.89	6.09	4.63	4.63	6.03	6.51	6.31	5.50	5.50	5.54	5.56

Descr iption	Unit	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
Waste		2,290	2,480	2,113	1,951	2,505	2,270	2,633	2,668	2,116	2,116	2,680	1,320	
Distance														
Coal	m													
Distance		4,990	5,160	8,136	7,874	7,118	7,330	7,540	7,660	7,700	7,700	7,900	7,970	

Comparison of mine plans options (without diverting public roads vs diverting public roads), shown as follows:

**Table 3. LOM Option at Gurimbang Mine Operations**

Parameter	Unit	Without Public Road Diversion	With Public Road Diversion	Diff.
➤ Waste	Mbcm	<b>269</b>	<b>296</b>	<b>27</b>
➤ Coal Getting	Mt	<b>48.42</b>	<b>51.93</b>	<b>3.5</b>
➤ Stripping Ratio	Bcm/t	<b>5.5</b>	<b>5.7</b>	

From Table 3 above, if "public road diversion" is not carried out, there are unrecoverable coal reserves of 3.5 million tons from the Gurimbang Mine Operation. The problem is crucial because it impedes the optimal extraction of valuable coal deposits, leading to potential revenue losses. Moreover, mining near or around public infrastructure can pose safety risks to both mine workers and the public. Resolving this issue is urgent since the Strategic Team has identified that the road relocation should be done before 2025. Solving this problem will ensure smooth operations, increased revenue, and reduced safety risks, therefore the relocation of the provincial road is vital to ensure that PT.BC can optimize its mining volumes as per the LOM Gurimbang. An efficient solution not only ensures operational consistency but also has significant economic implications.

The challenges faced by GMO are not unique. Previous studies have documented similar issues in mining projects, where public infrastructure hinders resource extraction and operational efficiency. For example, research by (Jones, A. & Brown, 2018) highlights how infrastructure, particularly roads, can become barriers to mining operations, resulting in lost economic opportunities. Furthermore, studies by (O'Callaghan & Graetz, 2017) and (Jeong et al., 2021) have emphasized the importance of infrastructure relocation or adaptation to maximize resource extraction in mining operations. Despite this, there is a scarcity of research focusing on the financial implications and strategic planning needed to address such challenges in the context of Indonesia's coal mining sector, particularly in remote areas like East Kalimantan.

This study aims to analyse the economic aspects and external factors affecting PT.BC's business environment related to the road relocation project. This study seeks to fill this gap by

providing a comprehensive analysis of the economic and strategic considerations involved in relocating a public road within a mining concession area. Specifically, the study uses the PESTEL framework to analyse the external factors affecting PT.BC's business environment and capital budgeting techniques to assess the financial viability of the relocation project. As such, this research contributes to the existing body of knowledge regarding the intersection of infrastructure management and resource extraction in mining operations, with a particular focus on addressing infrastructure-related challenges to ensure sustainable and profitable operations.

## RESEARCH METHODS

### Research Design

The initial phase of this research involves identifying a business problem and performing an investment project analysis for the Gurimbang mine project. Given this context, it is crucial to optimize each coal reserve based on primary data to create an effective mining schedule. This scheduling process will yield the capital and operational expenditures needed for economic evaluations. The valuation techniques applied include DCF, incorporating NPV, IRR, and PBP. The Research Methodology is illustrated in Figure 2.

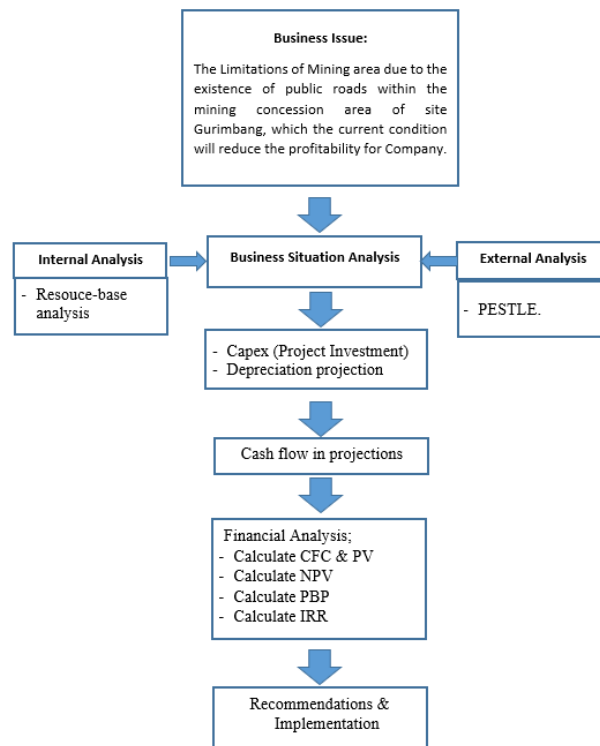


Figure 2. Research Methodology

### Data Collection Method

This research primarily utilized primary data from PT. Berau Coal, with the data presented and used being specifically limited to what was necessary and permitted for this study. The data

collection was divided into two categories: primary data and secondary data, both of which included quantitative and qualitative information to support the research.

### **1. Primary Data**

The author collected primary data through interviews with relevant personnel (PIC) within the company. The key person is the Mine Planning Engineering team which is heavily involved in data, assumptions, and decision-making for mining development, especially in the South Gurimbang Pit, and the Infrastructure Planning and Design Section team. In addition, the primary data related to the technical design of construction for public road relocation from consultants hired by PT.BC. This primary data includes the permit and its legal requirements, the general product supply chain in the current business process, and the company's current condition related to the Gurimbang mining operation.

### **2. Secondary Data**

Secondary data refers to information that already exists and was collected for purposes other than this study (Kotler et al., 2016). The author obtained this data from various sources, including books, journal articles, national regulations and laws, publications, websites, and internal records. The internal records included data on coal resources and Life of Mine (LOM), historical investment costs, operational costs and rates, and existing infrastructure specifications and data for the mining concession area

### **3. Data Analysis Method**

A Business Situation Analysis is a comprehensive assessment of the internal and external factors that affect an organization's ability to achieve its objectives. It involves evaluating the company's current situation, identifying opportunities and threats, and developing strategies to capitalize on strengths and mitigate weaknesses. This analysis typically includes tools like PESTEL (Political, Economic, Social, Technological, Environmental, Legal) analysis and competitive advantages analysis.

### **4. Capital Budgeting Analysis**

Capital budgeting involves evaluating and selecting long-term investments that align with company goals to maximize profits (Gitman et al., 2015). According to (Gitman et al., 2015), the capital budgeting process consists of five distinct yet interconnected steps:

1. Making proposals,
2. Developing proposals,
3. Reviewing and analyzing,
4. Making decisions,
5. Executing the plan, and
6. Conducting follow-up actions.

At PT.BC, capital budgeting can be used to evaluate the proposed project. This research is used to evaluate the public road relocation project within the Gurimbang concession area financially. The recommendations derived from this research address the problem of

accessing coal reserves that can be mined once the public road crossing the planned mining in South Gurimbang is relocated outside the mining area. To mine in the southern Gurimbang, the existing 8 KM public road must first be relocated. In addition to the budget for constructing the new public road infrastructure, funds are needed to relocate affected settlements and public facilities for local residents. The evaluation of the public road relocation project will use the discounted cash flow method to assess its financial feasibility. This project's scope is limited to financially evaluating the relocation scenarios of the public road within the mining operation area for PT.BC and proposing an implementation strategy for the project.

Evaluating whether the public road relocation strategy aligns with shareholder expectations involves applying investment appraisal techniques:

### Cost of Equity

The cost of equity is the rate of return that companies expect from an equity investment to be deemed worth the associated risk. Several models are used to calculate the cost of equity, the most common being the Capital Asset Pricing Model (CAPM) and the Dividend Discount Model (DDM).

#### a. Capital Asset Pricing Model (CAPM)

The CAPM formula is:

$$K_e = R_f + \beta (R_m - R_f) \rightarrow \text{Formula (1)}$$

where :

$K_e$	: Cost of equity
$R_f$	: Risk free rate
$\beta$	: Beta of the security
$R_m$	: Market rate of return
$(R_m - R_f)$	: Market Risk Premium

#### b. Dividend Discount Model (DDM)

The DDM formula is:

$$(K_e) = \frac{D_1}{P_0} + g \rightarrow \text{Formula (2)}$$

where:

$K_e$	: Cost of equity
$D_1$	: Expected Dividend per Share Next Year
$P_0$	: Current Stock Price
$g$	: Growth Rate of Dividends

In this research, the cost of equity is calculated using the Capital Asset Pricing Model (CAPM), which is commonly used in long-term projects. According to the CAPM approach, the cost of equity is equal to the risk-free rate plus the country risk premium and the risk premium. The risk premium is determined by multiplying the security's beta by the difference between the market rate of return and the firm's risk-free rate.

### c. Weighted Average Cost of Capital (WACC)

Weighted average cost of capital (WACC) is the average cost of a company's capital, weighted to reflect different sources such as common stock, bonds, and other debt forms. It represents the average rate a firm expects to pay for asset financing (Hargrave, 2022). The formula for WACC is given as follows:

$$WACC = \left(\frac{E}{E+D}\right) \times Ke + \left(\frac{D}{E+D}\right) \times Kd \times (1-T) \rightarrow \text{Formula (3)}$$

where:

$E$  : Market value of the firm's equity

$D$  : Market value of the firm's debt.

$Ke$  : Cost of equity.

$Kd$  : Cost of debt.

$T$  : Corporate tax rate.

As PT. BC's capital structure is entirely equity-financed, the Weighted Average Cost of Capital (WACC) is equivalent to the cost of equity ( $Ke$ ). Based on various investment analyses for infrastructure projects, the hurdle rate typically ranges from 10% to 11%.

### d. Net Present Value (NPV)

NPV is a key financial metric used to evaluate the profitability of an investment by calculating the difference between the present value of cash inflows and outflows over a project's lifespan. It provides a measure of the value added to the firm by undertaking the project (Brealey et al., 2014).

NPV represents the net present value of cumulative cash inflows and outflows. It is based on the concept of opportunity cost, which refers to the required return that makes an investment more attractive than alternative options (Benninga, 2014). To compute NPV, a projection of cash flows, including initial capital expenditure and future net cash flows, is necessary. The present value of these cash flows is determined by discounting them at a specific rate, which in this study is the WACC (weighted average cost of capital). For investment decisions, a project is considered acceptable if the NPV is greater than zero.

The formula for calculating NPV is expressed as follows:

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - CF_0 \rightarrow \text{Formula (4)}$$

where:

NPV= Net present value

$CF_t$ = Cash flow at a specific time  $t$

$CF_0$ = Initial investment amount

r = Discount rate or the company's cost of capital

t = Specific time period of the cash flow

#### e. Internal Rate of Return (IRR)

IRR is the discount rate that makes the NPV of an investment zero. It is used to assess the efficiency of an investment and to compare the profitability of different projects. A project is considered favorable if its IRR exceeds the required rate of return (Ross et al., 2019).

The internal rate of return (IRR) is the discount rate at which the net present value (NPV) of the investment equals 0

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1 + IRR)^t} - CF_0 = 0 \quad \rightarrow \text{Formula (5)}$$

Using the formula for NPV, it can be expressed as follows:

$$\sum_{t=1}^n \frac{CF_t}{(1 + IRR)^t} = CF_0 \quad \rightarrow \text{Formula (6)}$$

where:

NPV is the Net Present Value, which is set to zero when calculating the IRR.

CF<sub>t</sub> denotes the cash inflow during period t.

IRR refers to the internal rate of return.

t indicates the time period.

CF<sub>0</sub> represents the initial investment at time t=0.

A company generates value for its shareholders if its investments in projects or strategies yield returns that exceed the cost of capital (Young et al., 2000). In other words, an investment is deemed acceptable if the IRR surpasses the WACC. IRR is often considered more straightforward than NPV because it is expressed as a percentage.

#### f. Pay Back Period

The Payback Period is a financial metric that calculates the time required to recover the initial investment from the cash inflows generated by a project. It is one of the simplest investment appraisal methods and is widely used in practice due to its straightforward nature (Brigham et al., 2021).

The payback period refers to the time needed to recoup the project's initial investment. The acceptable payback period is determined by the company's policy. A project is considered acceptable if its payback period is shorter than the company's maximum acceptable payback period. A shorter payback period is preferable, as it indicates quicker recovery of the initial investment and lowers the investor's risk.

Formula:

$$\text{Payback Period} = \frac{\text{Initial Investment}}{\text{Annual Cash Inflow}} \rightarrow \text{Equation (7)}$$

To calculate the payback period for an investment that produces variable cash inflows over time, follow these steps:

- 1) Begin with the total initial investment amount.
- 2) Deduct the cash inflows each year until the initial investment is fully recovered.
- 3) Maintain a running total of the cumulative cash inflows to determine when the initial investment has been recouped.

#### **g. Discounted Pay Back Period**

The Discounted Payback Period is an improvement on the traditional Payback Period method. It accounts for the time value of money by discounting future cash inflows before calculating the payback period. This approach offers a more accurate measure of how long it takes to recoup the initial investment, considering the diminishing value of future cash flows (Brigham et al., 2021).

Strengths of the Discounted Payback Period:

- 1) **Time Value of Money:** By discounting future cash flows, the DPP provides a more realistic assessment of investment recovery times, reflecting the present value of future cash inflows (Reilly, 2018).
- 2) **Improved Risk Assessment:** The DPP incorporates the time value of money into the payback analysis, which can offer better insights into the risk and profitability of an investment (Alan C Shapiro, 2020).

## **RESULTS AND DISCUSSION**

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### **Capital Expenditure (CAPEX)**

Capital expenditure (CAPEX) or initial investment estimate with total amount of USD 16.285.257, it's includes the construction budget for the relocation of a public road with a length of 8 KM and its supporting infrastructure and investment for the construction of 86 residential units in resettlement of local communities and the required public facilities.

### **Cost of Equity**

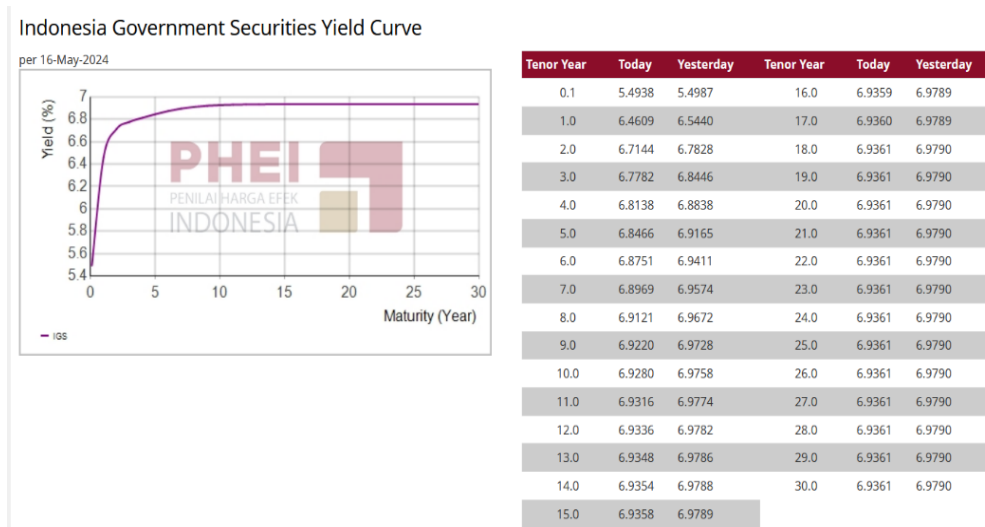
Cost of Equity represents the return a company must provide to its shareholders for the risk they undertake by investing in the company. It is a critical component in evaluating the financial viability of investment projects, including capital expenditures (Capex). Understanding the cost of equity helps firms make informed decisions about funding projects and assessing whether expected returns meet investor expectations.

The following are some assumptions used in calculating the cost of equity. In this research, the cost of equity is calculated using the Capital Asset Pricing Model (CAPM), which is commonly used in long-term projects, with formula:

$$\text{Cost of Equity } (Ke) = Rf + \beta (Rm - Rf)$$

**Table 4. Calculation of Cost of Equity for Public Road Relocation Project**

Calculation		Remarks
Rf = Risk Free Rate	4.85%	Source: Indonesia Government Bond Yield: <a href="https://www.phei.co.id/en-us/Data/Fair-Prices-and-Yield(-Default-Spread)">https://www.phei.co.id/en-us/Data/Fair-Prices-and-Yield (- Default Spread)</a>
β = Beta of the security	0.96	Source: Damodaran's Beta Index (Industry: Metal & Mining) <a href="https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html">https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html</a>
(Rm - Rf) = Equity Risk Premium	7.38%	according to: <a href="http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html">http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html</a>
<b>Ke = Cost of Equity</b>	<b>11.93%</b>	



**Figure 3. Indonesia Government Bond Yield (Mei 2024)**

Sources: PHEI (PHEI, 2024)

### 1. Weighted Average Cost of Capital (WACC)

The weighted average cost of capital (WACC) represents the required return for projects with average risk, which are similar in risk to the company as a whole. It is used to discount the project's cash flows, excluding financing costs such as interest and dividends (A. C Shapiro, 2005). As mentioned earlier, this project is assumed to be fully financed with the company's equity, so the WACC calculation is shown as follows:

$$WACC = \left(\frac{E}{E + D}\right) \times Ke + \left(\frac{D}{E + D}\right) \times Kd \times (1 - T)$$

Where:

Equity Composition (*E*) : PT.BC uses its own capital 100% to financing this project.

Debt Composition (*D*) : 0%

Cost of Equity (*Ke*) : 11.93%

Corporate Tax Rate (*T*) : for first-generation PKP2B, is set at 45%

Long Term Debt Interest Rate (assumption) : 10%

Cost of Debt (*Kd*) : *Lokg Term Debt Interest Rate x (1 - T) = 5.5%*

$$WACC = \left( \frac{100\%}{100\% + 0} \right) \times 11.93\% + \left( \frac{0}{100\% + 0} \right) \times 5.5\% \times (1 - 45\%)$$

$$WACC = 11.93\%$$

## 2. Project Investment Analysis

Project Investment Analysis is a systematic process used to evaluate the potential financial outcomes and viability of a proposed project. This analysis involves examining various financial metrics, such as cash flow projections, Net Present Value (NPV), Internal Rate of Return (IRR), and payback period, to determine the project's profitability and risk. By assessing these factors, decision-makers can identify whether the project aligns with their strategic goals and make informed choices about resource allocation.

## 3. Incremental of Revenue Projection

The estimated income obtained over a ten-year period was calculated by comparing two scenarios: a scenario without public road relocation (OPSI-1) and a scenario with the implementation of a public road relocation project (OPSI-2). A comparison of the results of the two scenarios and the additional EBITDA of mining production as a result of the project investment is presented in figure 4 as follows:

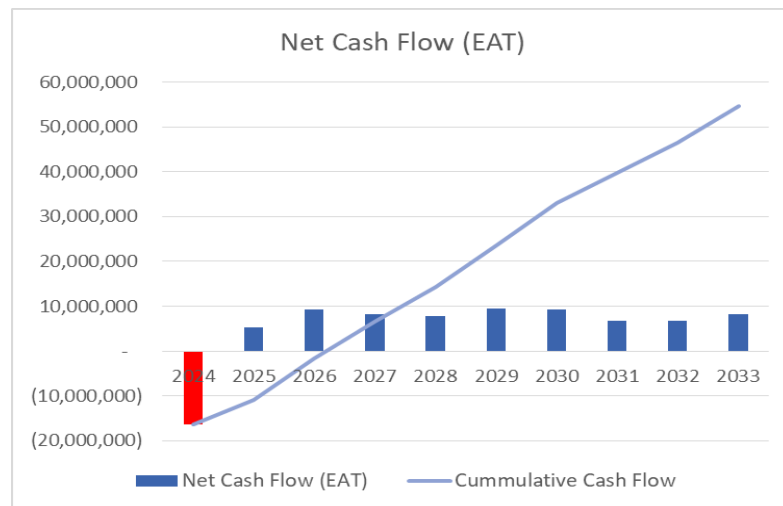
Parameter	Unit	Year										
		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
OPSI-1	Sales Revenue	USD	206,600,800	240,768,136	221,994,472	153,487,096	128,128,000	128,128,000	162,400,000	342,048,000	342,048,000	339,640,000
	COGS	USD	(67,522,001)	(80,372,316)	(62,783,206)	(43,363,845)	(42,492,977)	(44,646,015)	(55,442,060)	(107,096,335)	(107,096,335)	(106,805,368)
Forecast (Without Relocation)	Gross Profit	USD	139,078,799	160,395,820	159,211,266	110,123,251	85,635,023	83,481,985	106,957,940	234,951,665	234,951,665	232,834,632
	G&A and Selling Expenses	USD	(7,533,203)	(8,779,033)	(8,094,497)	(5,596,539)	(4,671,881)	(4,671,881)	(5,921,527)	(12,471,961)	(12,471,961)	(12,384,159)
	Royalty	USD	(25,493,838)	(29,709,972)	(27,393,365)	(18,939,787)	(15,810,561)	(15,810,561)	(20,039,609)	(42,207,564)	(42,207,564)	(41,910,425)
	EBITDA	USD	106,051,758	121,906,815	123,723,404	85,586,925	65,152,582	62,999,544	80,996,803	180,272,141	180,272,141	178,540,049
	OPSI-2	Sales Revenue	USD	206,600,800	252,808,136	243,946,472	175,439,096	151,200,000	151,200,000	188,272,000	364,000,000	364,000,000
Forecast (With Relocation)	COGS	USD	(67,522,001)	(82,218,611)	(69,937,547)	(51,692,570)	(52,522,881)	(52,522,881)	(65,810,298)	(117,382,366)	(117,382,366)	(117,382,366)
	Gross Profit	USD	139,078,799	170,589,525	174,008,925	123,746,526	98,677,119	98,677,119	122,461,702	246,617,634	246,617,634	246,617,634
	G&A and Selling Expenses	USD	(7,533,203)	(9,218,043)	(8,894,924)	(6,396,966)	(5,513,146)	(5,513,146)	(6,864,887)	(13,272,388)	(13,272,388)	(13,272,388)
	Royalty	USD	(25,493,838)	(31,195,667)	(30,102,168)	(21,648,590)	(18,657,567)	(18,657,567)	(23,232,127)	(44,916,366)	(44,916,366)	(44,916,366)
	EBITDA	USD	106,051,758	130,175,815	135,011,834	95,700,970	74,506,406	74,506,406	92,364,688	188,428,880	188,428,880	188,428,880
<b>Incremental EBITDA</b>	<b>USD</b>	<b>-</b>	<b>8,269,000</b>	<b>11,288,430</b>	<b>10,114,046</b>	<b>9,353,825</b>	<b>11,506,862</b>	<b>11,367,885</b>	<b>8,156,739</b>	<b>8,156,739</b>	<b>9,888,831</b>	

Figure 4. Incremental Revenue Projection

The public road relocation had a positive initial impact, evidenced by substantial EBITDA growth in the early years. This indicates enhanced logistics and operational efficiencies within the mining concession area.

#### 4. Cash Flow Analysis

Table 4. shows the calculation of operating income generated by the project. The cash flow projections from 2024 to 2033 illustrate a transition from an initial investment phase to a profitable and sustainable business operation. The increase in cash flow shows improvements in logistics and operations, especially after road relocation within mining concession areas, as shown in the graph at Figure-4 below:



**Figure 5. The Graph of Net Cash Flow (in USD) from 2024 – 2033**  
(Sources: *Base on Author's Calculations*)

The graph illustrates the Net Cash Flow (EAT) and Cumulative Cash Flow from 2024 to 2033 for a project investment. It begins with a significant negative cash flow due to the initial capital expenditure (CAPEX), but the project quickly recovers, demonstrating strong positive cash flows in the following years, which indicates effective project implementation and operational efficiency. The cumulative cash flow swiftly rebounds from the initial deficit in 2024, turning positive by 2027, signifying the project has recovered its initial costs and is generating net positive returns. This upward trend continues steadily, with the cumulative cash flow reaching approximately \$54,531,646 by 2033

Parameter	YEAR									
	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Incremental EBITDA	-	8,269,000	11,288,430	10,114,046	9,353,825	11,506,862	11,367,885	8,156,739	8,156,739	9,888,831
Depreciation	-	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)
Taxable Income	-	6,459,527	9,478,957	8,304,573	7,544,352	9,697,389	9,558,412	6,347,266	6,347,266	8,079,358
Tax Expense	-	(2,906,787)	(2,085,371)	(1,827,006)	(1,659,757)	(2,133,426)	(2,102,851)	(1,396,399)	(1,396,399)	(1,777,459)
Net Income	-	3,552,740	7,393,586	6,477,567	5,884,594	7,563,964	7,455,562	4,950,867	4,950,867	6,301,899
Depreciation	-	1,809,473	1,809,473	1,809,473	1,809,473	1,809,473	1,809,473	1,809,473	1,809,473	1,809,473
CF Operation	-	5,362,213	9,203,059	8,287,040	7,694,067	9,373,436	9,265,035	6,760,340	6,760,340	8,111,372
CF Investment (CAPEX)	(16,285,257)	-	-	-	-	-	-	-	-	-
Net Cash Flow (EAT)	(16,285,257)	5,362,213	9,203,059	8,287,040	7,694,067	9,373,436	9,265,035	6,760,340	6,760,340	8,111,372
Cumulative Cash Flow	(16,285,257)	(10,923,044)	(1,719,985)	6,567,055	14,261,122	23,634,559	32,899,593	39,659,934	46,420,274	54,531,646
Beginning Remaining Asset Value	16,285,257	16,285,257	14,475,784	12,666,311	10,856,838	9,047,365	7,237,892	5,428,419	3,618,946	1,809,473
CAPEX	16,285,257	-	-	-	-	-	-	-	-	-
Depreciation	-	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)	(1,809,473)
End Remaining Asset Value	16,285,257	14,475,784	12,666,311	10,856,838	9,047,365	7,237,892	5,428,419	3,618,946	1,809,473	-

**Figure 6. Cash Flow Analysis**

Significant outflows: The project starts with considerable negative cash flow, totaling \$16,285,257 in 2024, this is typical for projects that require upfront investments. Beginning of recovery: In 2025, there is a positive cash flow of \$5,362,213, indicating the start of financial recovery.

### Capital Budgeting Analysis

The Capital Budgeting Analysis of this investment project assesses its financial viability by examining various cash flows and evaluating their effect on the overall return on investment. The analysis starts with an initial capital expenditure (CAPEX), leading to a substantial negative cash flow at the project's onset in 2024. Despite this initial setback, the project shows strong recovery, with positive net cash flows beginning in 2025, driven by effective operational management and revenue generation strategies. By 2027, the project achieves a positive cumulative cash flow, surpassing its break-even point and delivering profitable returns. The steady increase in cumulative cash flow, reaching an impressive total of approximately \$54,531,646 by 2033, underscores the project's long-term viability and financial success. This positive trend reflects sound capital budgeting practices, demonstrating the project's ability to create value and provide substantial returns throughout its lifecycle, affirming its appeal to investors and stakeholders.

To analyze cash flows, including cash outflows and inflows, to determine the financial viability of the project and its return on investment over a ten-year period, it is necessary to analyze them by considering nominal cash flows and their present value (PV), discounted at the Weighted Average Cost of Capital (WACC). The discount rate or WACC, is set at 11.93%, reflecting the project's required rate of return to justify the risks involved.

The Capital Budgeting Analysis for PT. BC reveals a promising investment opportunity, with an initial cash outflow of US\$ (16,285,256.54) matching the actual expenditure at time zero. Future cash inflows are discounted to their present values to reflect the time value of money, resulting in an accumulated present value of \$25,459,086.06 by 2033. This figure highlights the

project's potential to generate value beyond the initial and ongoing costs. The project quickly transitions from a significant initial outlay to strong positive cash flows and cumulative gains, surpassing its weighted average cost of capital (WACC) and providing positive returns. This performance positions the project as an attractive proposition for stakeholders, ensuring sustained financial health and value creation throughout its lifespan.

**Table 5. Capital Budgeting Analysis**

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Cash Outflow	(16,285,256.54)									
Cash Inflow		5,362,212.56	9,020,059.35	8,287,039.73	7,694,067.18	9,373,436.47	9,265,084.90	6,760,340.37	6,760,340.37	8,111,372.27
Total Cashflow	(16,285,256.54)	5,362,212.56	9,020,059.35	8,287,039.73	7,694,067.18	9,373,436.47	9,265,084.90	6,760,340.37	6,760,340.37	8,111,372.27
Accumulated Cash Flow	(16,285,256.54)	(10,923,043.97)	(1,719,984.62)	6,567,055.11	14,261,122.29	23,634,558.76	32,899,643.66	39,659,983.33	46,420,323.99	54,531,696.26
Cash Flow (In Million)	(16.29)	(10.92)	(1.72)	6.57	14.26	23.63	32.90	39.66	46.42	54.53
WACC	11.93%									
PV of Cash Flow	(16,285,256.54)	4,790,478.63	7,345,171.96	5,908,564.04	4,901,211.44	5,334,247.99	4,710,383.59	3,070,252.72	2,743,137.25	2,940,411.99
Accumulated PV of Cash Flow	(16,285,256.54)	(11,494,778.01)	(4,148,606.05)	1,759,958.55	6,660,379.99	11,994,627.98	16,705,011.57	19,775,535.72	22,518,672.46	25,459,086.06

As shown in Table-7, the Capital Budgeting Analysis presents a financial assessment of project investments from 2024 to 2033, starting with a significant initial cash outflow of \$16,285,256.54 in 2024 due to capital expenditures. Nonetheless, the project is rapidly transitioning to positive cash inflow from 2025 onwards, highlighting the effectiveness of project implementation and operational efficiency. In 2027, the accumulated cash flow becomes positive, indicating the project's breakeven point and subsequent profitability. Accumulated cash flow reaches \$54,531,696.26 in 2033, indicating strong financial sustainability. With a WACC of 11.93%, the current cash flow value shows a positive trend, confirming the project's ability to exceed capital costs and generate substantial returns, making it a financially attractive investment opportunity.

This research uses five criteria to assess the feasibility of a project: Payback Period (PBP), Discounted Payback Period (DPBP), Net Present Value (NPV), Profitability Index, and Internal Rate of Return (IRR), with the results of the calculation analysis as shown in Table-8 :

**Table 6. Financial Feasibility Analysis of a Public Road Relocation Project**

<b>Payback Period</b>	<b>2.21</b>	<b>years</b>
Discounted Payback Period	2.70	years
Net Present Value	25,459,086.06	USD
Profitability Index	2.56	
IRR	44.54%	

(Sources: *Base on Author's Calculations*)

In this calculation, 2024 is considered year 0, with 2025 as the first year, continuing through to 2033 as the ninth year. The results show a payback period of 2.21 years and a discounted payback period of 2.70 years. The project has a positive NPV of USD 25,459,086.06, a profitability index of 2.56, and an IRR of 44.54%, which exceeds the WACC of 11.93%.

## **CONCLUSION**

The financial feasibility analysis of the public road relocation project within the mining concession area at Pit Gurimbang demonstrates that the project is highly viable and profitable. The payback period of 2.21 years and a discounted payback period of 2.70 years indicate a swift recovery of the initial investment, reflecting efficient cash flow management. Additionally, the project yields a positive Net Present Value (NPV) of \$25,459,086.06 USD, confirming substantial profitability. With a Profitability Index (PI) of 2.56, the project is expected to generate significant returns, and the Internal Rate of Return (IRR) of 44.54% far exceeds typical capital costs, underscoring its attractiveness to investors. These findings affirm that the relocation of the public road will not only unlock considerable coal reserves, increasing production, but also enhance PT. BC's operational efficiency and competitive edge in the market. Therefore, the project presents a financially sound investment with significant long-term benefits for the company.

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