Investment Analysis for Submarine Power Cable Project Between Belakang Padang Island and Sambu Island

Agus Wibowo and Erman Sumirat

ABSTRACT

PT Pertamina (Persero) Riau Islands proposed the installation of electrical power for the fuel storage tank terminal on Sambu Island with a capacity of 7 MVA. Currently, Sambu Island is still receiving electricity by operating a Diesel Power Plant (PLTD) with diesel fuel.

Seeing that the nearest electricity supply from Sambu Island is Pulau Belakang Padang Electricity, then as a business solution to be able to meet the demand of PT Pertamina (Persero), PT PLN Batam will build a submarine cable between Sambu Island – Pulau Belakang Padang to distribute electricity from the Power Plant in Batam to Sambu Island through the Belakang Padang Island.

PT PLN Batam must obtain a reference regarding the feasibility of investing in the construction of a submarine cable between Belakang Padang – Sambu Island. To get this reference, an investment analysis must be carried out to determine the business feasibility of this submarine cable development.

The business feasibility parameters to be analyzed are NPV (Net Present Value), IRR (Internal Rate of Return), BCR (Benefit to Cost Ratio) and PBP (Payback Period). To further refine the business feasibility analysis, a sensitivity analysis was carried out to see the effect of changes in investment parameters.

After conducting investment analysis, it was found that the Capital was carried out with a portion of 30% from equity and 70% loans from domestic financial institutions after comparing with foreign financial institutions, and the construction of this submarine cable was declared feasible because it met all the feasibility parameters. business, where $NPV > 0$, $BCR > 1$, $IRR > \text{Discount Rate}$ and $PBP < \text{Loan Tenor}$.

With the construction of the submarine cable, PT PLN Batam will get a potential profit of Rp. 12.358.560.473, - in the first year after the operation of the submarine cable with an electricity tariff of Rp. 2,054 /Kwh. This electricity tariff is cheaper than the electricity tariff using PLTD of Rp 3,000/Kwh.

Keywords: Feasibility Analysis, Risk Mitigation, Submarine Cable, Toll Fee Tariff.

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I. INTRODUCTION

PT. PLN Batam is an agency that holds a General Electricity Business License (PIUKU) with a working area of Batam, Rempang and Galang. In 2017, PT Pertamina (Persero) Riau Islands proposed the installation of electrical power for the fuel storage tank terminal on Sambu Island with a capacity of 7 MVA. Sambu Island is in the business area of PT PLN Persero Riau and Riau Islands Region (PLN WRKR). The closest electricity network to Sambu Island is Belakang Padang Island (PLN WRKR business area) and Sekupang – Batam (PLN Batam Business Area).

The electricity for Belakang Padang Island itself is supplied from Batam electricity through a 20 KV Type Cu marine Cable with a size of 150 mm² from GD KTM Resort Tanjung Pinggir – Sekupang. By looking at the nearest

electricity supply, as a business solution to meet PT Pertamina's demand is to build a submarine cable between Sambu Island – Belakang Padang Island to distribute electricity to Sambu Island from Belakang Padang Island.

Currently, Sambu Island still gets electricity from the operation of a diesel-fueled diesel generator, where the operation of this diesel-fueled plant is very expensive in terms of operating and maintenance costs.

In Batam itself, many shipbuilding industries, factories and other types of businesses have suffered losses, reduced their production capacity and even closed their activities. This affects electricity sales by PT PLN Batam as the electricity provider in Batam. Currently, PT PLN Batam is in a state of electricity surplus due to reduced electricity absorption by customers.

This research is intended to evaluate the

economic/financial feasibility of constructing a submarine cable to replace the operation of a Diesel power plant (PLTD) as one of the new business development opportunities for PT PLN Batam.

II. LITERATURE REVIEW

To obtain data that will be used in investment analysis, what must be obtained first is data on the costs of CAPEX and OPEX for the construction and operation of submarine cables.

CAPEX and OPEX costs are obtained by calculating costs based on bathymetry survey results and technical studies of submarine cable construction.

WACC (Weighted Average Cost of Capital)

Related to business feasibility, capital composition is an important element. This project is planned to be funded through 30% equity (equity) and 70% loan from financial institutions with a term of 7 years.

This composition will affect the value of the cost of capital or cost of capital in this feasibility calculation. In general, the cost of capital or cost of capital is the real cost that has been used by the company to obtain funding sources from debt, preferred stock, common stock or retained earnings to fund investments. In addition, this cost of capital also reflects the minimum rate of return of an investment that is worth obtaining in relation to its risk; with the aim of optimizing the value of the company and its shareholders.

The concept of cost of capital is related to long-term decisions related to fixed assets or capital budgeting issues. Calculation of the cost of capital is also related to taxes. The cost of capital is not only the cost of debt or the cost of equity but is calculated through the weighted weight of all components in the capital structure and will ultimately be used as a discount rate in the project feasibility assessment using the formula [6]:

$$WACC = CoD \frac{D}{(D + E)} + CoE \frac{E}{(D + E)}$$

Because this research focuses more on the feasibility of sea cable development, the research will focus more on investment analysis using business feasibility parameters.

The business feasibility parameters used in this study are:

1. PBP (Payback Period)

Payback period (PBP) is a certain period of time that shows the occurrence of cash inflows cumulatively equal to the amount of investment in the form of present value (Ibrahim, 2009). The payback period shows the period required to be able to cover investment expenditures using the proceeds generated from the investment. If the annual proceeds are the same, the payback from an investment can be calculated by dividing the investment amount by the annual proceeds.

2. NPV (Net Present Value)

This method takes into account the time value of money. This method calculates the present value of cash inflows and outlays of an investment using a certain interest rate. This method pays attention to the proceeds and time value of money.

3. IRR (Internal Rate of Return)

IRR is a method that already takes into account the time value of money. This method is used to determine the interest rate that will make the total present value of the proceeds expected to be received equal to the total present value of capital expenditures. By using the Goal Seek function in the Microsoft Excel application, IRR calculations become easier and faster.

4. BCR (Benefit To Cost Ratio)

B/C Ratio is a measure of the comparison between income and total production costs. B means a benefit, while C means cost. The calculation of this b/c ratio is calculated from the interest rate.

Within the limits of the amount of the B/C value, it is used as a tool to find out whether a business is profitable or not.

III. METHODOLOGY

This study, which was carried out to conduct a business feasibility analysis was to use the data from the Bathymetry Survey and the results of the Technical Study that had been carried out by PT PLN Batam previously.

Below is a flow chart of the research methods carried out.

Fig. 1. Research Methods.

From the results of the Bathymetry survey, it is known that the required submarine cable length is 1,194 m.

Below is a flow chart of the investment analysis methods carried out.

Fig. 2. Shortest Route.

Fig. 3. Flow Chart of Investment Analysis Method.

IV. FINDINGS AND ARGUMENT

The total project investment cost for this calculation is obtained from a similar study conducted by a consultant hired by PLN Batam. In estimating the Investment Cost, the reference and benchmark data used are based on reference data for similar submarine cable work projects that have the same or close to capacity. If the reference to similar marine works projects is used using data within a certain period of time, adjustments will be made to take into account inflation and/or exchange rate differences.

The calculation of investment costs includes the following scopes:

- Raw material procurement;
- Preparation work and mobilization-demobilization;
- Installation work;
- As built drawing and international map registration.

From the results of the analysis carried out, the following results are obtained:

A. Cost of Capital

TABLE I: COST OF CAPITAL

Component	Value
Monthly Return	1.2%
% Debt	70%
% Equity	30%
Yearly Return	15.03%
Risk Free Rate 20 year	7.4%
Risk Premium	7.58%
Tax	25.0%
Unlevered Beta	0.52
Leverage (D/E)	233.3%
Levered Beta	1.42
Cost of Equity	18.2%
Cost of Debt	8.00%
Cost of Debt After Tax	6.00%
WACC	9.67%

B. Initial Investment Cost (CAPEX)

TABLE II: CAPEX

No	Description	Quantity	Unit	Unit Price (Rp)	Amount (Rp)
1	Material	1	Lot	8.244.316.568	8.244.316.568
2	Preparation Work	1	Lot	3.367.893.245	3.367.893.245
3	Installation Work	1	Lot	13.051.123.102	13.051.123.102
4	As Build Drawing	1	Lot	500.000.000	500.000.000
Total					25.163.332.917

C. OPEX Cost

TABLE III: OPEX

No	Component	Cost (Rp)	Cost/Year (Rp)
1	Minor Maintenance Scope (6 Months)	200,000,000	400,000,000
2	Major Maintenance Scope (12 Months)	616,731,990	616,731,990
3	Major Maintenance Scope (5 Years)	2,000,000,000	400,000,000
4	Employee Fees and Others	632,000,000	632,000,000
5	Variable Operating Cost	48.482.057	48.482.057
Total			2,097,314,048

D. Toll Fee Tarif

TABLE IV: TOLL FEE TARIF

Components	Value
Component A (Capital Recovery)	111
Component B (O&M Fix)	42
Component C (Fuel)	0
Component D (O&M Variable)	1
Total	154

E. Business Feasibility Parameters

TABLE V: FEASIBILITY VALUE

Components	Value
Net Present Value	2,479,587,713
IRR	11.02%
Payback Period	7 Year 11 Month
Benefit Cost Ratio	2.51

F. Risk Mitigation Plan

There are 4 (four) Risk Mitigation Plans need more attention because they have a fairly high level of risk (Table VI).

TABLE VI: RISK MITIGATION

No.	Risk	Risk Mitigation Plan
1	Construction Work Delay	<ol style="list-style-type: none"> 1. Preparation of a work contract by including a penalty clause in the event of a delay 2. Make a more detailed Work Planning to avoid the risk of disputes occurring during the implementation of development 3. Selection of a more stringent workmanship vendor by looking at the track record or performance of the contractor as the main requirement for appointing the winner of the auction
2	Decrease in the amount of electricity demand	<ol style="list-style-type: none"> 1. Preparation of long-term contracts with a minimum purchase of electricity and fluctuating toll fee rates in accordance with the distribution power range. 2. If the minimum amount of electricity distributed to the channel decreases to 6.862 MWh per year at a tariff, then the toll fee rate is Rp. 1.100/Kwh. 3. If the electricity demand is less than 6.862 MWh per year, then the toll fee tariff amendment must be carried out by re-activating the Business Feasibility Analysis. 4. Toll fee rates will apply normally even though there is a decrease in distribution power of -3% or 1,471
3	Risk of State Loss	Preparation of long-term contracts in accordance with the age of the project with clear legal consequences if there is a change in the mechanism of cooperation between parties during the project.
4	PJBTL risk ends prematurely	<p>Preparation of long-term contracts according to the age of the project with a statement of commitment from Pertamina regarding the minimum purchase of electricity with the amount and length of the period in accordance with the age of the project that was agreed at the beginning.</p> <p>In the event that PJBTL ends prematurely, the party who terminates the contract must provide compensation for the amount agreed in the contract.</p>

It is necessary to calculate the effect of decreasing electricity power on toll fees and electricity tariffs as described in the graph below.

Fig. 4. The Effect of Decreasing Electricity Power on Toll Fees and Electricity Tariffs.

The data presented in the graphs above are useful for management in making decisions when discussing electricity rates and toll fees with PT PLN WRKR, where electricity rates are made progressive depending on the electrical power supplied to the submarine cable line.

V. CONCLUSIONS

The conclusions obtained from this research are as follows:

1. From the results of the technical study, the plan to deploy a 20 KV medium-voltage submarine cable line from Belakang Padang to Pulau Sambu can be continued for the construction phase.
2. The results of the investment analysis state that the capital is obtained by using 30% equity and 70% loans from domestic financial institutions with a loan period of 7 years
3. From the results of the Economic Study, the electricity tariff using this submarine cable channel is Rp. 2,054/Kwh with a toll fee rate of Rp. 154/Kwh.
4. With an electricity tariff of Rp. 2,054/Kwh, then it can be stated from the point of view of economic studies:

TABLE VII: FEASIBILITY RESULT

Components	Value	Remarks	Status
Net Present Value	2,479,587,713	> 0	Feasible
IRR	11.02%	> WACC	Feasible
Payback Period	7 Year 11 Month	≤ Asset live	Feasible
Benefit Cost Ratio	2.51	> 1	Feasible

5. The payback period for the medium-voltage submarine cable line construction project from Belakang Padang to Pulau Sambu is 7 years and 11 months.
6. The electricity tariff using this submarine cable line (Rp. 2,054/Kwh) is cheaper than the electricity tariff using PLTD (Rp. 3,000/Kwh).
7. By using medium-voltage submarine cables to distribute electricity from Batam to Sambu Island, the company gets a double benefit, namely :

- a. The operating profit of the power plant in Batam is 16% from BPP Batam.
 - b. Advantages of imposing a toll fee for the use of medium-voltage submarine cable lines from Belakang Padang –Sambu Island.
8. With electricity tariffs equal to PLTD rates (Rp. 3,000/Kwh), if there is a decrease in electricity distribution capacity, the minimum power supplied is 6.862 MWh per year. The normal power capacity that should be distributed by this submarine cable line is 49.056 MWh per year.
 9. If the power supplied turns out to be less than the minimum power, a contract review must be carried out with PT PLN WRKR to negotiate the toll fee rate.
 10. In order to minimize risk, it is important for management to pay attention to the steps contained in risk mitigation plan.
 11. The potential profit from the operation of a medium-voltage submarine cable with a tariff of Rp. 2,054/Kwh is:
 - a. Potential profit of the Batam Power Plant: $16\% \times \text{Rp } 1,341,60/\text{Kwh} \times 7,000 \text{ Kwh} \times 24 \text{ hour} \times 365 \text{ days} \times 0.8 = \text{Rp } 10,530,164,736 / \text{year}$.
 - b. Potential benefits of Toll Fee Tariff for using submarine cable line = IDR Rp1,828,395,737 in the first year.
 - c. So, the total potential profit obtained is $\text{Rp. } 10,530,164,736 + \text{Rp } 1,828,395,737 = \text{Rp } 12,358,560,473,-$ in the first year.

VI. RECOMMENDATION

By looking at the results of this project analysis, it can be recommended to be able to immediately carry out the construction of a submarine cable segment from Belakang Padang island to Sambu island, in order to provide benefits for all parties involved.

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