

**BAWEAN ISLAND 5 MW POWERPLANT PROJECT INVESTMENT
ANALYSIS**

FINAL PROJECT

By:

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Master of Business Administration Program

School of Business and Management

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ABSTRACT

Bawean Island, located in East Java, has a population of 107,000 and is primarily inhabited by agriculture, fishing, and emigration. The island's natural resources, including beaches, lakes, waterfalls, mountains, and islands, have potential for tourism and economic development. The island is home to an endemic species and a rare species called Rusa bawean, which is endangered. To improve welfare, infrastructure like electricity is needed. Hence, PT PLN (Persero), an Indonesian government-owned corporation tasked with advancing electrification on Bawean Island, Gresik, East Java, intends to allocate funds towards the construction of a new power generation facility. The objective of the study is to assess and compare various investment options with respect to their PLN value in order to identify the most suitable alternative for a new power plant project in Bawean. This will be achieved through an analysis of capital budgeting and the levelized cost of electricity. The study performed a risk analysis to identify the most critical variables that impact the feasibility of the project. Among the three options assessed by PLN, Alternative 2 - build On Grid Solar PV Powerplant (5 MW) is deemed the most optimal. The outcome of the analysis is a Net Present Value (NPV) of 51.70 billion IDR, a Modified Internal Rate of Return (MIRR) of 12.41%, a Profit Index of 1.63, and a Payback Period of 8.60 years. The cost of generation, also known as the levelized cost of electricity (LCOE), is 33% less than that of the current Bawean power plant. According to the analysis evaluation scenario, Alternative 2 is not economically feasible when the project is implemented using scenario 1-3, which involves using HSD to compensate for the reduced capacity factor of PLTS. In sensitivity analysis, the exchange rate and cost of HSD are the variables that have the highest level of sensitivity. The Monte Carlo analysis indicated a 0% probability of a negative net present value (NPV), indicating that the Bawean Project is the most favourable investment option.

Keywords: On Grid Solar PV Powerplant, Reserve capacity, Levelized Cost of Electricity, Investment Analysis

ANALISA INVESTASI PROYEK PEMBANGKIT 5 MW DI PULAU

BAWEAN

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Pembimbing Thesis: Dr. Ir. Achmad Herlanto Anggono M.B.A.

ABSTRAK

Pulau Bawean, terletak di Jawa Timur, berpenduduk 107.000 jiwa dan sebagian besar dihuni oleh pertanian, perikanan, dan emigrasi. Sumber daya alam pulau ini, antara lain pantai, danau, air terjun, gunung, dan pulau-pulau, memiliki potensi untuk pengembangan pariwisata dan ekonomi. Pulau ini merupakan rumah bagi spesies endemik dan spesies langka bernama Rusa bawean yang terancam punah. Untuk meningkatkan kesejahteraan, diperlukan infrastruktur seperti listrik. Oleh karena itu, PT PLN (Persero), perusahaan milik pemerintah Indonesia yang ditugaskan untuk memajukan elektrifikasi di Pulau Bawean, Gresik, Jawa Timur, bermaksud mengalokasikan dana untuk pembangunan fasilitas pembangkit listrik baru. Tujuan studi ini adalah untuk mengevaluasi dan membandingkan berbagai pilihan investasi dalam hal nilai PLN mereka untuk mengidentifikasi alternatif yang paling cocok untuk proyek pembangkit listrik baru di Bawean. Hal ini akan dicapai melalui analisis anggaran modal dan biaya listrik yang ditingkatkan. Studi ini melakukan analisis risiko untuk mengidentifikasi variabel yang paling penting yang mempengaruhi kelayakan proyek. Di antara tiga opsi yang dinilai PLN, Alternatif 2 - Bangunan di Grid Solar PV Power Plant (5 MW) dianggap yang paling optimal. Hasil analisis adalah Nilai Sekarang Bersih (NPV) sebesar 51,70 miliar IDR, Tingkat Pengembalian Internal Modified (MIRR) sebesar 12,41%, Indeks Keuntungan sebesar 1,63, dan Periode Pembayaran 8,60 tahun. Biaya pembangkit listrik, juga dikenal sebagai biaya tingkat listrik (LCOE), 33% lebih rendah dari yang ada di Bawean Power Plant saat ini. Menurut skenario evaluasi analisis, Alternatif 2 tidak layak secara ekonomi ketika proyek diimplementasikan menggunakan skenario 1-3, yang melibatkan penggunaan HSD untuk mengkompensasi faktor kapasitas yang berkurang PLTS. Dalam analisis sensitivitas, nilai tukar dan biaya HSD adalah variabel yang memiliki tingkat kepekaan tertinggi. Analisis Monte Carlo menunjukkan probabilitas 0% dari nilai saat neto negatif (NPV), yang menunjukkan bahwa Proyek Bawean adalah pilihan investasi yang paling menguntungkan.

Kata Kunci: Pembangkit Listrik Tenaga Surya On Grid, Cadangan Daya, Biaya Listrik yang diratakan, Analisis Finansial

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Approved,

Bandung, August 14th, 2024

Final Project Advisor



Dr. Ir. Achmad Herlanto M.B.A.

FOREWORD

Praise and gratitude to God because with His grace and His blessing, I can finish my thesis with the title "Bawean Island 5 MW Powerplant Project Investment Analysis" to complete my study at MBA-ITB. I realize my study will not be finished without help from various parties. Therefore, I want to say thank you and greatest appreciation to:

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Bandung, August 14th, 2024

Luddie Wied Hardono

CHAPTER I

INTRODUCTION

1.1 Background

Bawean Island is a large, isolated island in East Java, positioned around 135 kilometers north of Gresik city, with a population of approximately 107,000. An important factor to be taken seriously on the Bawean island is the well-being of the community. The human resources on Bawean Island are generally characterized by a lack of education and mostly belong to the medium to lower economic strata. The primary occupations of the locals of Bawean Island are mostly agriculture, fishing, or emigration. Bawean Island has a variety of natural resources, including beaches, lakes, waterfalls, mountains, and tiny islands. All of these natural features have the potential to be turned into tourist destinations. Bawean often serves as a venue for international events, including the Wonderful Sail International to Indonesia Yacht Rally. In addition to having an endemic species, Bawean is home to a rare species called Rusa bawean, which has been classified as "endangered" by the International Union for Conservation of Nature. Currently, the tourism and fishing industries provide prospects for stimulating economic development in a region by creating many business possibilities and employment options that empower people. It may be regarded as a viable alternative to enhance the well-being of local people on Bawean Island. Enhancing welfare on Bawean Island necessitates the establishment of crucial infrastructure, including electricity. As a state-owned enterprise, PLN's mission is to utilize electric power as a means to enhance the standard of living and promote economic growth, including by electrifying Bawean Island. Currently, the growth of fishery commodities has driven an increase in electricity demand for ponds and cold storage. Therefore, there are potential customers waiting to be electrified.

In terms of electricity, Bawean Island is a remote island whose electricity system is isolated and supplied from diesel fired powerplant (PLTD) and gas power plants (PLTMG). Peak load growth in the last 5 years has averaged 3.84%, in line with the average economic growth of 4.29%. In 2021, the highest peak load was 5,8 MW, with a supply capacity of 6.45 MW, the

reserve power was only 0.65 MW. Scarcity of fuel supply and transportation limitations to transport fuel such as weather and fleet issues are also challenges in electrifying the island.

In addition, the performance indicators of power plants on Bawean Island for the generation cost (BPP) are higher than the Minister of Energy and Mineral Resources Regulation No. 55/2018 and the Specific Fuel Consumption (SFC) exceeds the specified standard. The relatively higher BPP above the selling price to customers and the need for a sustainable fuel supply are also considerations for finding replacement power plant that utilize energy sources that are easily available on Bawean Island.

In order to support the Indonesian government's program to achieve the target of 23% renewable energy mix by 2025, PLN has implemented several programs aimed at increasing the use of renewable energy and reducing the use of fossil energy. Realization of renewable energy mix in 2022 is 14,11%.

To expand the capacity of the electricity system, reduce the use of fuel, and increase the mix of renewable energy. PLN plans to invest in new power plants. This investment is expected to increase the availability and reliability of electricity supply, reduce BPP, and increase the use of renewable energy. This study aims to analyze investment alternatives that have been considered by PLN and determine the most optimal alternative for program projects on Bawean Island in terms of financial feasibility studies.

1.2 Company Profile

1.2.1 Company in Brief

PT PLN (Persero) is a state-owned enterprise established to provide electricity for the public interest in adequate quantity and quality as well as to generate profits and carry out Government assignments in the electricity sector in order to support development by applying the principles of a Limited Liability Company.



Figure 1.1 PLN's Logo

In providing electricity for public use, PLN has 4 main businesses: generation, transmission, distribution, and retail. Generation aims to produce electrical energy from fossil energy sources and renewable energy. Transmission aims to deliver electric power to the customer's location and reduce losses, by increasing the voltage so that electrical energy can be transmitted through extra high voltage lines (500 kV) and high voltage lines (150 & 70 kV). Then at the substation the voltage is step-down to medium voltage (20 kV) and then distributed to customers using distribution transformers. PLN's revenue comes from the sale of electrical energy measured at the point of transaction (kWh meter) which is currently served by two methods, namely postpaid and prepaid.

1.2.2 Company History

Starting at the end of the 19th century, the sugar factory and electricity factory sector in Indonesia began to improve when several Dutch companies engaged in sugar factories and tea factories set up electric power plants for their own needs.

The process of power transfer again occurred at the end of World War II in August 1945, when Japan surrendered to the Allies. This opportunity was used by the youth and electricity workers through the delegation of Electricity and Gas Workers/Employees who together with the Head of the Central KNI took the initiative to meet President Soekarno to hand over these companies to the Government of the Republic of Indonesia. On 27 October 1945, President Soekarno established the Electricity and Gas Bureau under the Ministry of Public Works and Energy with a power generation capacity of 157.5 MW.

Based on Government Regulation No. 18 of 1972, PLN changed its status to State Electricity Company (Perum) acting as the Holder of the Power of Attorney Enterprises (Pemegang Kuasa

Usaha Ketenagalistrikan-PKUK) with the task of providing electricity for public needs. Then in 1994 PLN changed to a Limited Liability Company (Persero) which remained as PKUK in providing electricity for public needs. With the issuance of Law no. 30 of 2009, then PLN was no longer a PKUK but a State-Owned Enterprise (BUMN) holding a Electricity Supply Business License (Izin Usaha Penyediaan Tenaga Listrik-IUPTL) with the task of providing electricity for public needs.

On September 22, 2022, the ministry of State-Owned Enterprises launched the PT PLN (Persero) Subholding Holding, the four subholdings are PLN Energi Primer Indonesia, PLN Nusantara Power (Generation Company 1), PLN Indonesia Power (Generation Company 2) and PLN ICON Plus. The most important thing about these four subholdings is that each will have a strategic role in managing state assets which have been the front line of PLN's operations in electrifying the archipelago. Figure 1.2 shows PLN's subholdings and subsidiaries.

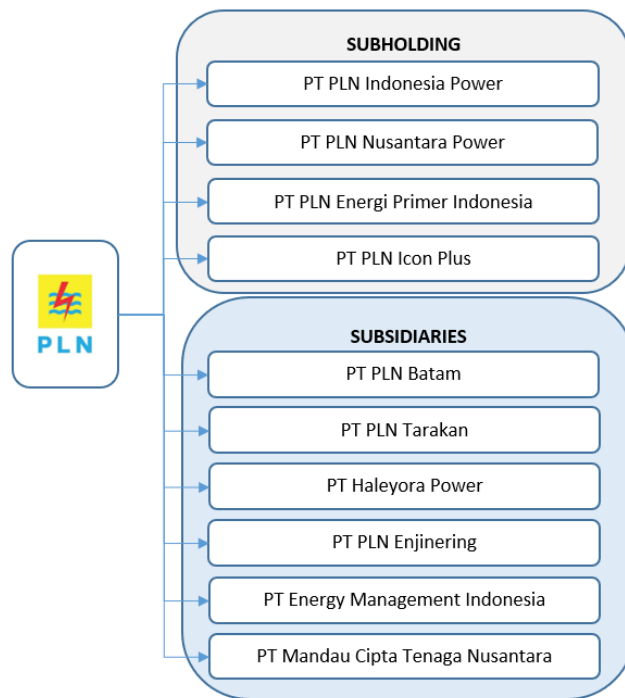


Figure 1.2 PLN Sub holdings & subsidiaries

1.2.3 Vision, Mission, Motto, and Value of the Company

Along with time, PLN faces several new challenges: technological disruption, market instability, increasingly fierce competition, and a new paradigm of customer service. This

dynamic requires the company to carry out the transformation which is currently stated in the Vision, Mission, Motto, and Corporate Values.

Vision:

“To be the Leading Electricity Company in Southeast Asia and #1 Customer Choice for Energy Solutions.”

Mission:

1. Running an electricity business and other related sectors, oriented to customer satisfaction, company members and shareholders.
2. Making electricity as a medium to improve the quality of life of the public.
3. Making every effort for electricity as an economic booster.
4. Operating an environmentally friendly business.

Motto:

Electricity for A Better Life.

Value:

AKHLAK's Core Value was set as the Company's Values core ingredients on September 28, 2020, through the President Director's Decree, No. 0073.P/DIR/2020.



Figure 1.3 AKHLAK Values

PLN is faced with challenges that may stand in the way as it is seeking to achieve the vision “To become the Leading Power-Generating Company in Southeast Asia and the # 1 Customer Choice for Energy Solutions”. On April 21, 2020, PLN affirmed its measures for transformation with the tagline "Power Beyond Generations." The meaning of the tagline is to make energy can be enjoyed beyond generations and to maintain PLN’s sustainability as a sound corporate entity.

PLN transformation is visualized in “PLN’s 2024 Aspirations” which launches 4 Initiative Programs, namely Green, Innovative, Lean and Customer Focused - which are in accordance with 4 strategic objectives of PLN Transformation as in figure 1.4.

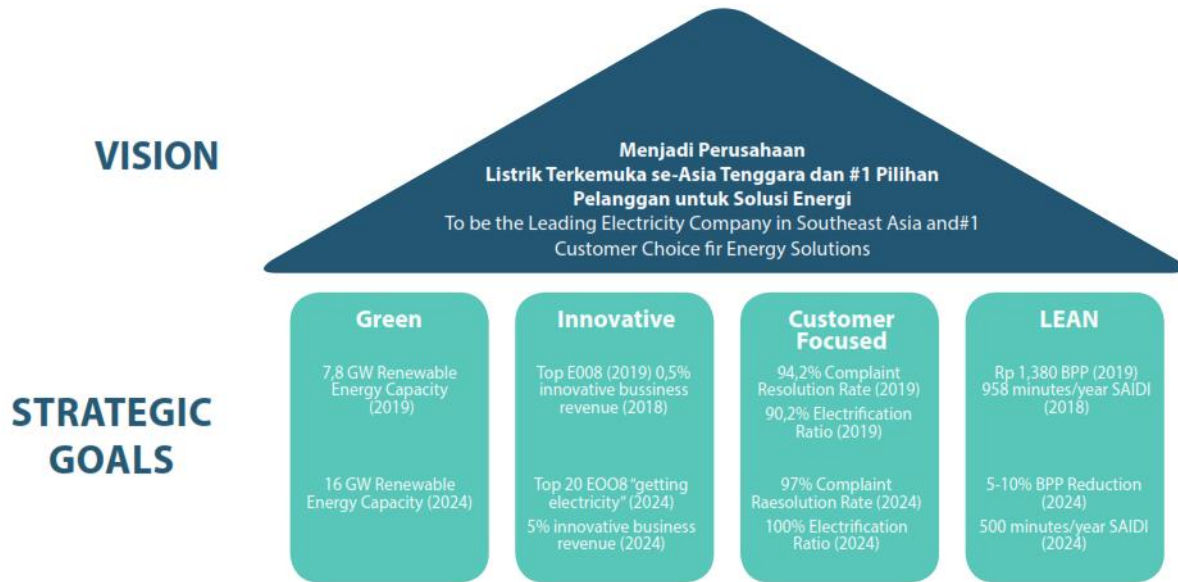


Figure 1.4 PLN Transformation

1.2.3 Organization Structure and RACI Model

In order to implement Good Corporate Governance (GCG), basically the investment plan in RUPTL needs to be supported by a Feasibility Study. In the preparation of this study, several divisions at PLN and related distribution units were involved, as illustrated in Figure 1.5.

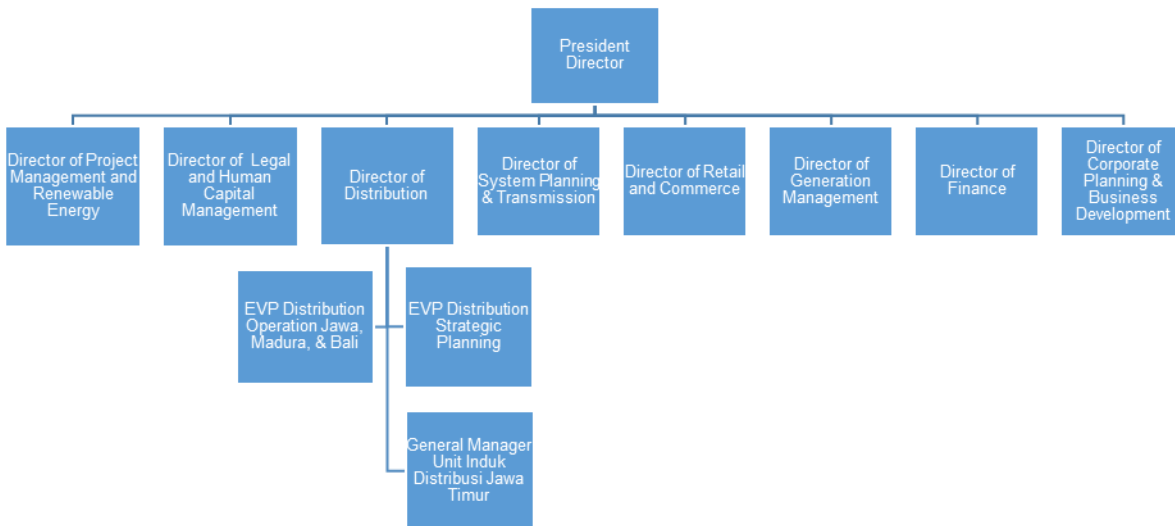


Figure 1. 5 PLN Organization Structure

Furthermore, the role in preparing a project feasibility study is defined in the RACI Model, with the following details:

1. Responsible (R): responsible for compiling data projects, background & objectives, Financial Feasibility Study (Kajian Kelayakan Finansial-KKF) and conclusions.
2. Accountable (A): as an evaluator and validator KKF.
3. Consulted (C): providing project-related information and consultation.
4. Informed (I): get information about project updates.

Table 1.1 RACI Model for Project Feasibility Study

	Headquarters				Units
	EVP Corporate Strategic Planning	EVP Distribution Strategic Planning	EVP Distribution Operation Java, Madura and Bali	EVP Project & Risk Management	GM UID Jawa Timur
Power Plant ≤ 10 MW	I	A	C	I	R

1.3 Project Unit of Analysis

The Bawean project, located in Gresik Regency, East Java Province, is a business unit within the East Java Distribution Unit. Precisely located in PLN UP3 Gresik-ULP Bawean. In 2021, this unit has 22,251 customers, with a composition where 56% of them are subsidized tariff customers, 64% are postpaid customers and the rest are prepaid. The total connected power for all customers is 18,662 kVA. As for the composition of customer tariff groups, the majority are household groups at 82.8%, business groups at 12.7%, social groups at 4%, and the rest are a combination of industrial, government and special service tariff groups. Electricity distribution on the island has been running for 24 hours.

Currently, the bawean electricity system is supplied by PLTD and PLTMG. The first PLN-owned PLTD operated in 1986 with a capacity of 135 kW, followed by subsequent machines starting in 2002 until it reached 13 machines. In the course of maintaining electricity supply, PLN also leases PLTD to private parties. However, as of March 31, 2019, the rental PLTD has

expired and was not renewed, so that until now on Bawean Island operates a PLTD owned by PLN with a capacity of around 3.4 MW (Tabel 1.2). Diesel fuel is delivered using a Landing Craft Tank (LCT) ship, with a capacity of 250 kiloliters (kL) every 1 month. Meanwhile, the capacity of the diesel stockpile tank is 440 kL. In the management of the PLTD, PLN cooperates with PT PJB regarding the maintenance operation of the PLTD.

Table 1.2 Diesel Power Plant in Bawean

No	Engine Number	Brand		Years		Installed Capacity		Operating Capacity	
		Engine	Generator	Engine	Generator	kVA	kW	kVA	kW
1	2	DEUTZ MWM	LEROY SOMER	2000	2000	660	576	444	300
2	5	MAN #5	STAMFORD	2003	2003	700	597	444	350
3	6	MAN #6	STAMFORD	2003	2003	700	597	389	300
4	7	MTU #7	LEROY SOMER	2003	2003	750	625	389	0
5	9	Cummins #9	STAMFORD	2017	2017	694	625	611	500
6	10	Cummins #10	STAMFORD	2017	2017	694	625	611	500
7	11	Cummins #11	STAMFORD	2017	2017	694	625	611	500
8	12	Cummins #12	STAMFORD	2017	2017	694	625	611	500
9	13	Cummins #13	STAMFORD	2017	2017	694	625	611	500
Total Capacity						6280	5520	4721	3450

The capacity of PLTMG Bawean is 3 x 1 MW (table 1.3), which has been in operation since 2014. Unlike large-scale gas plants, this plant uses compressed gas or natural compressed gas (CNG). The plant and its CNG transportation facilities were built and managed by PT PJB, a subsidiary of PLN, which later became a sub holding of PLN under the name PT PLN Nusantara Power (PT PLN NP). This assignment consists of CNG transportation mode facilities including Mother Station, LCT / Ship, Daughter Station, Storage, Pressure Reducing Unit and Port specifically for LCT located in Gresik and Bawean Island. Due to the unavailability of natural gas pipelines, gas delivery is carried out from PJB Gresik using a Landing Craft Tank (LCT) ship to the daughter station. The capacity of 1 LCT is 2000 MMBtu, while the CNG capacity of the daughter station is 4000 MMBtu. The average daily CNG requirement is around 650 MMBtu. Deliveries are made every 3 to 4 days.

Table 1.3 Gas Engine Power Plant in Bawean

No	Engine Number	Brand		Years		Installed Capacity		Operating Capacity	
		Engine	Generator	Engine	Generator	kVA	kW	kVA	kW
1	1	GE Jenbacher	Stamford	2013	2013	1710	1067	1520	1000
2	2	GE Jenbacher	Stamford	2013	2013	1710	1067	1520	1000
3	3	GE Jenbacher	Stamford	2013	2013	1710	1067	1520	1000
Total Capacity						5130	3201	4560	3000



Figure 1.6 Landing Craft Tank (LCT) Ship

The problem is that the fuel transportation process faces many challenges. With a distance of ± 80 nautical miles from the Gresik pier to Bawean, the journey is estimated to take 10 hours. Bad weather conditions and high waves are a challenge in themselves, causing ships not to be allowed to sail for safety reasons. In addition, the availability of transport equipment also hampers the transportation of fuel to Bawean. Delays in fuel supply are usually addressed by load management such as rolling blackouts.

In the 20 kV electricity system on Bawean Island, the electricity supplied from the power plant is then distributed using 3 feeders, namely the City, Sangkapura, and Tambak Feeder, with a peak load of 5,809 kW in May 2021. Peak load growth in the last 5 years (2017-2021) can be seen in figure 1.7.

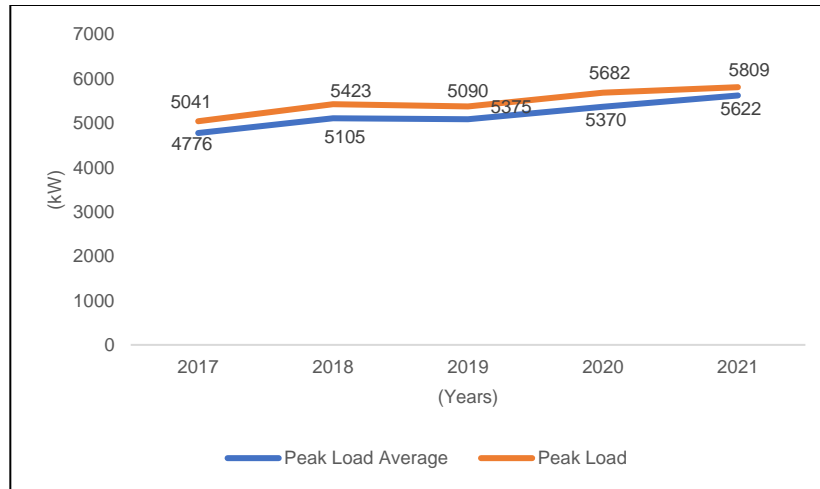


Figure 1.7 Historical Peak Load (2017-2021)

1.4 Business Issue

As previously explained, Bawean Island's electricity system is currently supplied from the Diesel Fired Powerplant and Gas Engine Powerplant. Both are power plants that use fossil fuels. Along with the growth of the load every year, the need for electrical energy will also increase. As an overview in the planning and operation of the electricity system, the power balance is used to determine system requirements, system generation capacity, supply capability, and reserve margin. The power balance of Bawean Island is shown below.

Table 1.4 Power Balance in Bawean Island 2021-2030

No	Description	Unit	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
1	Needs											
	a. Production	MWh	13,3	13,8	14,4	15	15,6	16,2	16,8	17,5	18,2	18,9
	b. Load Factor	%	25,5	25,5	25,5	25,5	25,5	25,5	25,5	25,5	25,5	25,5
	c. Peak Load	MW	5,80	6,00	6,24	6,49	6,74	7,01	7,29	7,58	7,88	8,19
2	Exist Power Capacity											
	a. Installed Capacity	MW	8,72	8,72	8,72	8,72	8,72	8,72	8,72	8,72	8,72	8,72
	b. Supply Capacity	MW	6,45	6,45	6,45	6,45	6,45	6,45	6,45	6,45	6,45	6,45
	Diesel Fired Powerplant (PLTD)	MW	3,45	3,45	3,45	3,45	3,45	3,45	3,45	3,45	3,45	3,45
	Gas Engine Powerplant (PLTMG)	MW	3	3	3	3	3	3	3	3	3	3
3	Additional Capacity Plan											
		MWp	-	-	-	-	-	-	-	-	-	-
4	Total System Capacity	MW	8,72	8,72	8,72	8,72	8,72	8,72	8,72	8,72	8,72	8,72
5	Total Supply Capacity	MW	6,45	6,45	6,45	6,45	6,45	6,45	6,45	6,45	6,45	6,45
6	Reserve Margin	%	10%	7%	3%	-1%	-4%	-9%	-13%	-18%	-22%	-27%
7	Surplus/Defisit	MW	0,65	0,45	0,21	-0,04	-0,29	-0,56	-0,84	-1,13	-1,43	-1,74

From the above power balance can be described as follows:

- a. In 2021 to 2023, the reserve margin is very low, if in the operation of the plant there is one generating machine shutdown for routine or periodic maintenance then the system will be in deficit, moreover if there is a disturbance, then certainly there will be rolling blackouts on the island of Bawean.
- b. If there is no new capacity addition by 2024, the system will face a deficit, and the gap will increase every year.

Therefore, to fulfil the electricity demand on Bawean Island, PLN plans to add generating capacity to fulfil the gap in 2024. With the addition of a 5 MW powerplant, the system conditions will return to surplus and can meet the electricity demand as in the following table:

Table 1.5 Power Balance after Capacity Addition

No	Description	Unit	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
3	Additional Capacity Plan (RUPTL 2021-2030)											
	Bawean Project	MW	-	-	-	5	-	-	-	-	-	-
4	Total System Capacity	MW	8,72	8,72	8,72	13,7	13,7	13,7	13,7	13,7	13,7	13,7
5	Total Supply Capacity	MW	6,45	6,45	6,45	11,5	11,5	11,5	11,5	11,5	11,5	11,5
6	Reserve Margin	%	10%	7%	3%	43%	41%	39%	36%	34%	31%	28%
7	Surplus/Defisit	MW	0,65	0,45	0,21	4,96	4,71	4,44	4,16	3,87	3,57	3,26

Increasing the capacity of fossil fuel power plants will increase the use of fuel oil. In addition, the cost of generation is also expensive. Table 1.2 shows that the BPP on Bawean Island is higher than the minister of energy and mineral resources regulation. In the decree of the minister of energy and mineral resources No. 169.K/HK.02/MEM.M/2021 concerning the amount of the cost of generation of PT PLN (Persero) in 2020, the amount regulated for the East Java region, the Bawean system is IDR 2805.50/kWh. This amount is lower than the previous ministerial decree in 2019 which amounted to IDR 3041/kWh.

Table 1.6 Bawean Generating Cost Comparison

Years	Comparison (%)	ESDM Ministerial Regulation (Rp/kWh)
		No. 169/2021
2018	21%	2805,5
2019	-5%	
2020	10%	
2021	22%	

Then the SFC value used to assess the efficiency level of the PLTD in Bawean is also above the standard used by PLN (SPLN 79: 1987). This is especially true for older PLTDs. Table 1.3 shows a comparison of SFC values on several engines that are higher than SPLN 79:1987. The higher the SFC value, the greater the fuel requirement to produce electrical energy per kilo watt-hour, which means additional fuel costs.

Table 1.7 SFC Comparison in Bawean

SFC (Liter/kWH)		
Engine Number	Actual SFC	Standard
2	0,3004	0,249-0,284
5	0,2852	
6	0,331	
7	0	
9	0,2752	
10	0,2752	
11	0,2752	
12	0,2758	
13	0,2754	

Therefore, PLN is considering several alternative power plants for Bawean Island to meet electricity demand and produce the lowest generation costs compared to current conditions.

1.5 Research Questions

The foundation of this research was built to answer the following questions:

1. Which alternative offers the best investment for PLN?
2. Which alternative has the lowest generation cost?
3. Is it still financially feasible for PLN to take the best alternative by considering the risk of the new power plant does not operating normally?
4. Which investment analysis variables are most sensitive to project feasibility?
5. What is the probability distribution of NPV due to changes in sensitive variable?

1.6 Research Objectives

The objectives of this research are as follows:

1. Determine the best investment alternative for PLN.
2. Determine the best alternative that provides the lowest generation cost.
3. An analysis of the project's feasibility impact in the event of the new powerplant doesn't operate normally.
4. Find out which variables are the most sensitive and affect the investment analysis.
5. Find out the probability distribution of NPV according to changes in sensitive variables.

1.7 Research Scope and limitations

This research is limited to the following matters:

1. The revenue for each alternative depends on the capacity of the power plant, not power demand.
2. This study focuses only on the business line of the generation.
3. For each alternative, this study compares only the total costs incurred during operation or over the required economic lifetime.
4. All assumptions about the primary data used in this study are based on internal documents from experts or PLN partner companies.
5. For the Monte-Carlo simulation, the Exchange Rate utilized secondary data obtained from www.bi.go.id, specifically from January 1st, 2021 to December 1st, 2022. This data was used to determine the standard deviation for the daily Exchange Rate.
6. This study encompasses the complete evaluation of investments, including the forecasting of financial statements and the implementation of Monte Carlo Simulation. However, PLN solely evaluates the investment project by examining the cash flow projection, without taking into account taxes and depreciation.

1.8 Writing Structure

The purpose of this section is to provide an overview of the steps taken in this area, ensuring that the final project is well organized. Each chapter in this report is described as systematic research in the following section.

CHAPTER 1 – INTRODUCTION

This chapter encompasses the initial identification of the Final Project, comprising the PT PLN (Persero) Company Profile, the backdrop, issue, aims, constraints of this study, and the systematic research.

CHAPTER 2 – BUSINESS ISSUE EXPLORATION

This chapter provides an overview of the work procedures involved in collecting data on project investments, including the relevant core theory, data assumptions, and investment cost computation. The objective is to get future cash flows and the Levelized Cost of Electricity (LCOE) as input data for further analysis in this research.

CHAPTER 3 – BUSINESS SOLUTION

This chapter presents solutions to the identified issues through the application of data processing techniques, in accordance with the topics discussed. For instance, the Financial Feasibility Study of the Bawean Project is conducted using the Discounted Cash Flow Model. Additionally, sensitivity analysis is employed to assess the impact of changes in certain variables that are beyond the author's control, utilizing Monte Carlo simulation.

CHAPTER 4 – CONCLUSION AND IMPLEMENTATION

The chapter concludes with the study findings and a proposed plan of action, which will serve as the resolution and recommendations to the initial inquiry.

CHAPTER II

BUSINESS ISSUE EXPLORATION

2.1 Conceptual Framework

This study aims to find the best alternative to PLN to meet the growing demand, increase reliability and produce the lowest production cost in the Bawean Island new power plant project. The following table presents the conceptual framework used in this study.

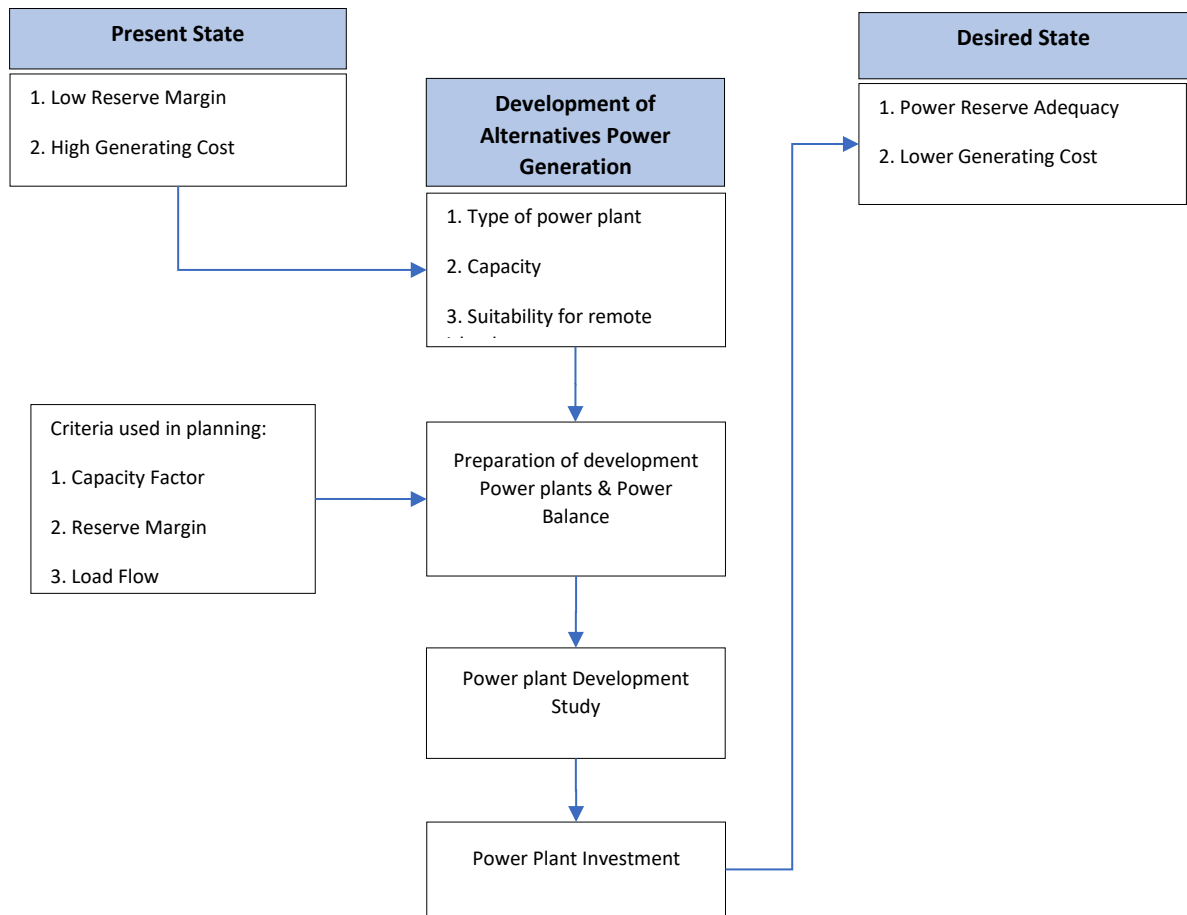


Figure 2.1 Conceptual Framework

The first step in this research is to conduct an environmental scan to obtain the business situation described in the following section after determining the existence of a business problem. In the meantime, it's important to learn more about this research's theories and subjects. In the end, the financial feasibility study is done to figure out which option is best for PLN to use in the Bawean Island project and solve the business problems.

2.2 Research Methodology

2.2.1 Research Design

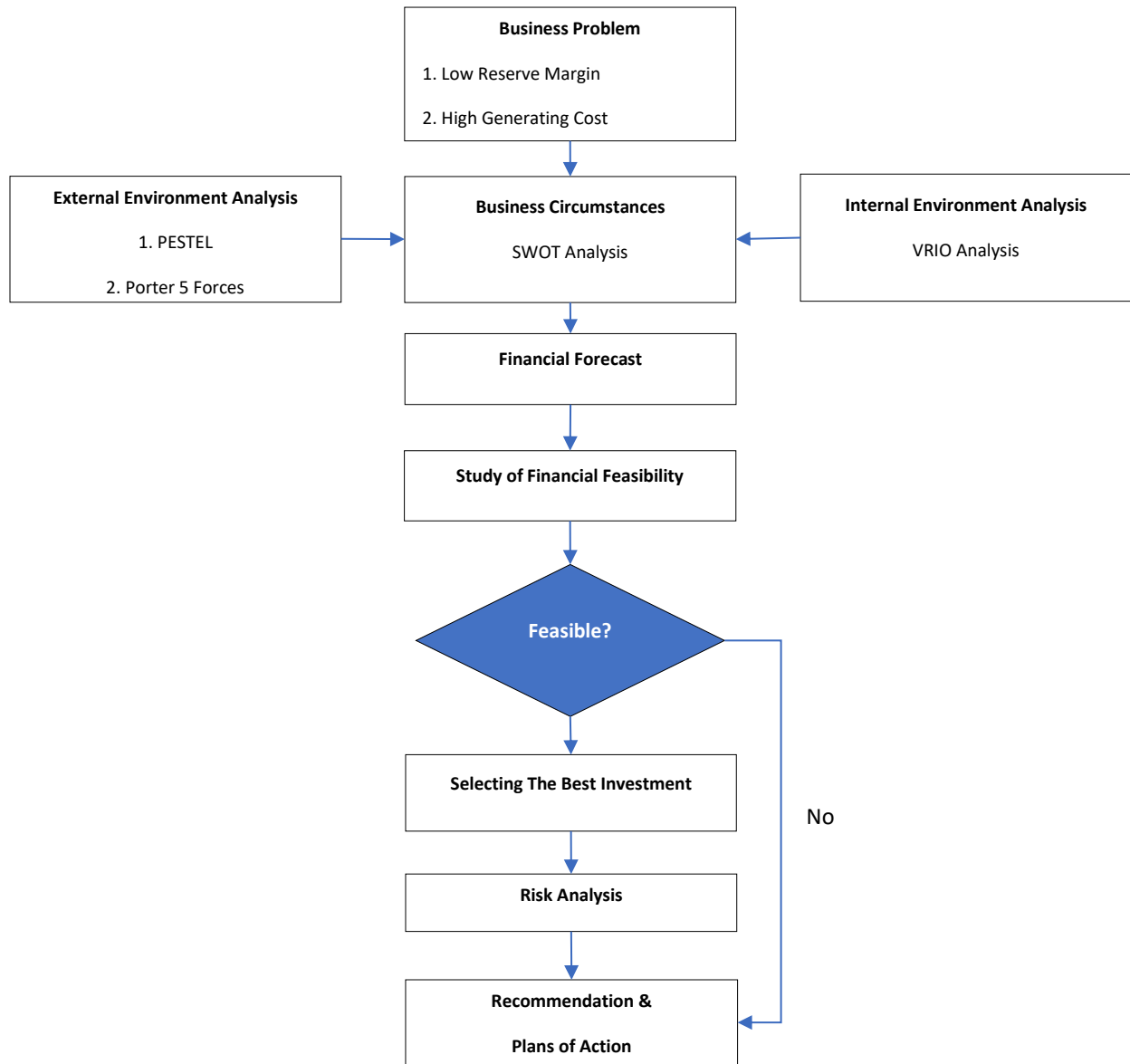


Figure 2. 2 Research Framework

The development of a business circumstances is required after identifying the issue or problem facing the company. The internal and external environment factors that will influence the PLN investment plan were the primary focus of the business circumstances analysis. An organization can mitigate threats and capitalize on opportunities in its competitive environment by conducting an external analysis. The focus of the external environment analysis is on threats

and opportunities. It also looks at how competition in this environment is likely to change and how it will affect an organization's threats and opportunities (Rothaermel, 2019).

The analysis of the industry's structure and the external environment will form the external analysis. One of the tools to describe the external climate of the company is to use the PESTEL model, which consists of six sets of elements that can affect the company's business, namely: Political, Economic, Sociocultural, Technological, Environmental, and Legal aspects (Rothaermel,2019). An exploration of the industry structure will be conducted using the Porter Five forces system, which assesses the threat of competition from existing rivals, the power of suppliers and buyers, the threat of substitutes, and the threat of entry (Rothaermel, 2019). The Porter Five Forces Model identifies and analyzes five competitive forces that shape every industry. These forces can be used to determine an industry's strengths and weaknesses to gain and maintain a competitive advantage. The business situation analysis and Porter's Five Forces frameworks are shown in Figures below.

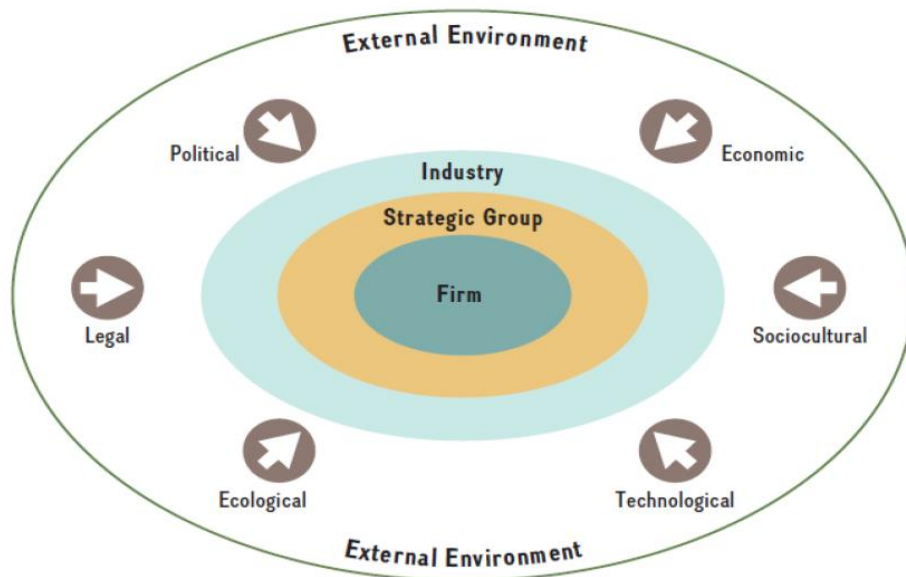


Figure 2. 3 Business Circumstances Analysis

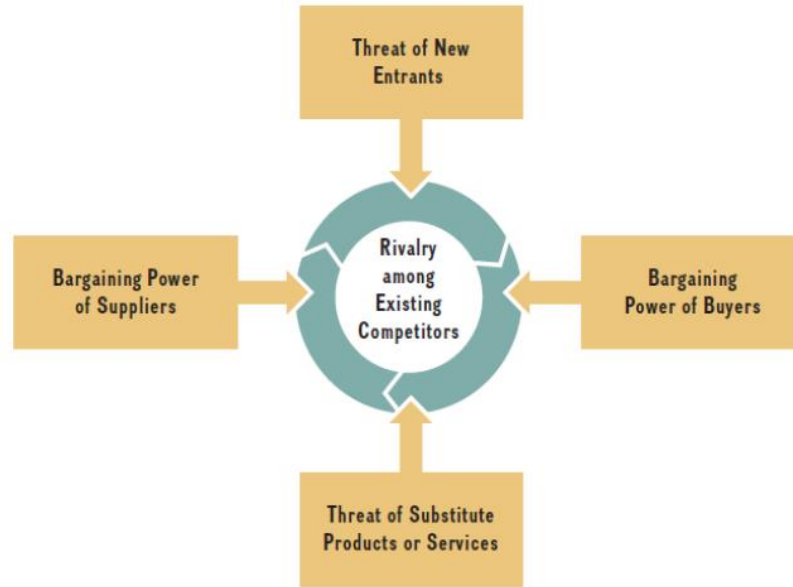


Figure 2. 4 Five Forces Model

The tool used in conducting internal analysis is VRIO analysis. VRIO analysis is used to make an initial measurement of whether the internal resources currently owned by the company are Valuable, Rare, Imitation, and Organized. Resources that meet all VRIO criteria provide advantages and competitive advantages for the company (Rothaermel, 2019). Internal resources are not only limited to assets, including capabilities and competencies owned by the company that can support future development and provide a sustainable competitive advantage.

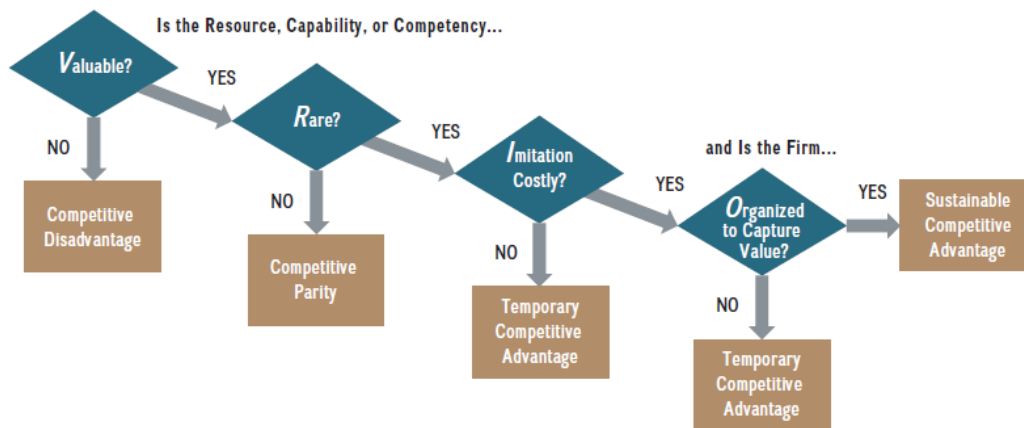


Figure 2.5 VRIO Analysis

Business situation analysis is conducted by combining the evaluation of external and internal analysis using SWOT analysis (Rothaermel, 2019, p. 134). The SWOT framework provides an integrated understanding of a company's internal and external factors, and the results are described in two parts: strengths and weaknesses (S and W) derived from internal analysis and opportunities and threats (O and T) from external analysis. The results of the SWOT analysis were used to build business strategies and develop financial models for the investment projects considered in this study.

The financial model of PLN's investment plan is the next step of this research. In projecting the financial model, development was carried out to obtain Free Cash Flow to the firm (FCFF) and Levelized Cost of Electricity (LCOE). These two criteria are the basis for evaluating financial models. According to Gitman & Zutter (2015), three important criteria used to evaluate in the capital budgeting process are Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP) obtained from FCFF discounted by the project's Average Capital Weighted Cost (WACC). Furthermore, the LCOE evaluation is based on the NPV of the total cost of building and operating the power plant assets (Corporate Finance Institute, 2021).

For the Bawean project, currently there are 3 alternatives being considered by PLN and the alternative with the best value criteria will be chosen. This value certainly results in the best investment criteria and the lowest generation costs indicated by LCOE. Then the project is subjected to a financial risk analysis to ensure that the project is robust. Recommendations and implementation for PLN, will be provided after all analysis has been carried out.

2.2.2 Data Collection

Data collection in this study was carried out using primary and secondary data. Primary data is obtained from PLN's internal data directly related to the Bawean project and other power plant projects, while secondary data is a reference derived from reference books, reports, journals, and the internet.

2.2.3 Analysis Method

The stages of analysis in determining the best investment for the Bawean project include:

1. Calculate Revenue Projection.

2. Expenses and Net Working Capital
3. Income Statement Projection.
4. Balance Sheet Projection.
5. Cash Flow Projection.
6. Capital Budgeting Cash Flow
7. Conduct Capital Budgeting Analysis
8. Calculate LCOE
9. Analysis of Financial Sustainability Model
10. Analysis of Financial Risk Assessment.

2.2.4 Reserve Margin

In 2012, the Ministry of Finance assisted by McKinsey & Company conducted a study of the Development of Service Level Agreement for PLN, which also reviewed whether the electricity system planning performed correctly, including determining the optimal reserve margin for PLN. Approaches used in analyzing reserve margin include:

1. Probabilistic Model
The reserve margin defined as generating capacity divided by peak load, in the probabilistic model is used to satisfy a Loss of Load Probability (LOLP) smaller than 0.274%.
2. Benchmark Reserve Margin from other countries
From some information, the amount of reserve margin in other countries was found to be in the range of 15-40%.
3. Bottom-Up Deterministic Method
This method considers reserve margin needs from the operational side by considering operating reserves, plant performance (planned outage, maintenance outage, forced outage, derating, etc.), economic growth and demand, seasonal influences, and others. From the bottom-up deterministic method, an optimal reserve margin of around 33-38% is obtained.

When designing and implementing plant systems that are small in scale and not yet interconnected, it is advisable to refrain from employing probabilistic methods or economic optimization. Instead, deterministic methods should be utilized. This method involves planning

with a maximum criterion of N-2, wherein the reserve must exceed one unit of the largest element and one unit of the second largest element. The term "reserve" in this context refers to the disparity between the aggregate capacity of currently operational power plants and the maximum power demand during peak periods. The utilization of the N-2 maximum criterion is anticipated to ensure that the reserve margin in isolated systems meets the minimum threshold of 30%.

Especially for intermittent NRE plants, the net capable power from the plant is not calculated into the power balance reserve because it does not provide firm capacity. As for PLTH equipped with batteries/energy storage systems, the net capable power from the plant can be calculated in addition to the reserve margin on firm capacity.

2.2.5 Analysis of Investment Project

Investment project analysis is an assessment process performed to evaluate the feasibility and potential returns of an investment project. The purpose of this analysis is to assist rational and informed decision-making in allocating limited resources to the most profitable projects. According to Clayman et al (2012), the process used by companies for decision making in capital projects, which is a project with a life of a year or more, is done through capital budgeting. In an expansion project, this project will increase the size of the company's business. This decision involves more uncertainty so that in the process of investment project analysis is also conduct risk analysis.

2.2.5.1 Discounted Cash Flow

The financial valuation method used to assess the present value of the expected future cash flows from an investment or project is Discounted Cash Flow (DCF). This method assumes that the future value of money is less valuable than the current value of money, due to the time factor and the applied rate of return. DCF allows companies to calculate the intrinsic value or present value of expected cash flows from investment projects. By considering the time value of money and the discount rate, DCF helps make more informed investment decisions. The process of finding the present value can be calculated by

$$PV = \frac{FVn}{(1+r)^n}$$

Where:

FV = Future Value;

PV = Present Value;

r = Rate of Return;

n = number of period involved in the analysis

According to Gitman & Zutter (2015), the rate of return (r) used in investment analysis is dependent on the capital structure used in the projects because different types of capital used in investment require different rates of return.

2.2.5.2 Capital Structure & Cost of Capital

A company's cost of financing is determined by the cost of capital. To put it another way, this expense will represent the bare minimum rate of return that the project will generate in order to raise the value of the company (Gitman & Zutter, 2015).

- Weighted Average Cost of Capital (WACC)

Gitman & Zutter (2015) explains that the Weighted Average Cost of Capital (WACC), which is the minimum return value expected by a company when making long-term investments, can be used to obtain a weighted value for each type of cost. capital, such as the cost of stock and the cost of debt. This can be used to determine the expected future average cost of capital. The WACC formula is as follows:

$$WACC = (w_d \times r_d) + (w_e \times r_e)$$

Where:

w_d : Proportion of long-term debt in capital structure

r_d : Cost of long-term debt

w_e : Proportion of common stock in capital structure

r_e : Cost of common stock

- Cost of Long-Term Debt

Cost of Long-Term Debt (Cost of Long-Term Debt) is the interest rate or rate of return that must be paid by companies on long-term debt issued. The cost of long-term debt reflects the cost of capital that must be borne by companies to borrow funds from other parties for a longer period, such as long-term bonds or long-term loans.

The cost of long-term debt is important in calculating the Weighted Average Cost of Capital (WACC), which is the weighted average rate of return from all the company's funding sources. The cost of long-term debt is used as a component in determining the weight and cost of debt capital in WACC calculations. The cost of debt is as follows:

$$r_d = r_i \times (1 - T)$$

Where:

r_i : Interest rate

r_d : After-tax cost of debt

T : Tax rate

- Cost of Equity

The rate of return expected by the company's shareholders as compensation for the risk they incur by investing in the company's shares is an explanation of the cost of equity. The cost of equity reflects the rate of return expected by investors for investing their capital in company stock. The cost of equity can be considered as the minimum rate of return that must be achieved by a company.

The method used to estimate the cost of equity capital in analyzing is the Capital Asset Pricing Model (CAPM). CAPM assumes that the cost of equity capital depends on systematic risk or market risk as measured by stock beta. The CAPM formula is as follows:

$$r_e = R_F + [(\beta \times (R_m - R_f))]$$

Where:

r_e	: Cost of Equity
R_F	: Risk-free rate of return
β	: Beta coefficient (non-diversifiable risk of the company)
R_m	: Expected Market Return
$R_m - R_f$: Market Risk Premium

- Hurdle Rate

The hurdle rate, also known as the barrier rate or minimum rate of return, is the minimum rate of return that a project or investment is expected to make to be considered feasible. In this case, PLN investors have set a minimum rate of return that must be achieved by their investment projects to obtain funding which varies each year. According to Dutta & Fan, (2009) the optimal hurdle rate will be higher for companies with relatively good investment opportunities. In this analysis, the hurdle rate obtained from PLN's WACC will be used as a discount factor.

2.2.5.3 Investment Decision Criteria

According to Clayman et al (2012), in analyzing and assessing capital investment, several important criteria are used, namely Net Present Value (NPV), internal rate of return (IRR) are the two most comprehensive measures of whether a project is profitable or not, then another criteria is Payback Period (PP) and Profitability Index (PI).

- Net Present Value: A commonly used method of knowing the present value of future cash flows after taxes minus investment expenses.

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - Outlay$$

Where:

n : the number of years in the lifetime of the machine to be purchased,

CF_t : after-tax cash flow at time t

$Outlay$: investment cash flow at time zero

r : required rate of return for the investment

Because the NPV value reflects the wealth of investors as a result of investment, it will positively increase the wealth of investors, while the negative NPV value will reduce wealth. Then decision making can follow:

Invest if $NPV > 0$

Do not Invest $NPV < 0$

- Internal Rate of Return: the rate of return generated by an investment project that makes the net present value (NPV) of the investment's cash flow equal to zero. In other words, IRR is the discount rate that causes NPV to zero.

$$NPV = \sum_{t=1}^T \frac{CF_t}{(1 + IRR)^t} - Outlay = 0$$

Where:

CF_t : after-tax cash flow at time t

$Outlay$: investment cash flow at time zero

IRR : The internal rate of return

T : The number of time periods

If the IRR is higher than the required rate of return for a project, the decision rule is to invest:

Invest if $IRR > r$

Do not invest if $IRR < r$

- Payback Period (PP): The payback period is the number of years it takes to recover the initial investment in a project. The shorter the payback period, the quicker the initial investment can be repaid, and the project is considered more liquid. However, the payback period does not measure the time value of money or cash flows after the payback period, and so does not provide a complete picture of the long-term profitability of the project.

Therefore, the use of PP should be accompanied by NPV and IRR to ensure a profitable project investment.

- Profitability Index (PI): The profitability index (PI) is the present value of a project's future cash flows divided by the initial investment.

$$PI = \frac{PV \text{ of future cash flows}}{\text{Initial investment}}$$

The investment decision rule for the PI is as follows:

Invest if $PI > 1.0$

Do not invest if $PI < 1.0$

2.2.5.4 Levelized Cost of Electricity (LCOE)

The levelized cost of electricity (LCOE) is a standard tool used for evaluating the costs of various energy production systems. It is a measurement of the overall cost and energy/electricity generated by an asset during its service life. The method delivers a single value representing each technical choice accessible in a specific place. Because a single value can be easily compared, it can assist decision maker in making decisions (IESR, 2019).

Using the LCOE to evaluate a project is one of the first important stages in examining such projects. This is because the LCOE indicates the cost of energy generated per unit, and the risk of each project is a result of the particular discount rate utilized for each power-generating technology (Corporate Finance Institute, 2021). The Formula for LCOE is as follows:

$$LCOE = \frac{NPV \text{ of total costs over lifetime}}{NPV \text{ of electrical energy produced over lifetime}}$$

$$LCOE = \frac{\sum \frac{(I_t + M_t + F_t)}{(1+r)^t}}{\sum \frac{E_t}{(1+r)^t}}$$

Where:

I : The initial cost of investment expenditures

M : Maintenance and operations expenditures

F : Fuel expenditures

E : The sum of all electricity generated

r : The discount rate of the project

t : The life of the system

2.3 Environmental Analysis

2.3.1 External Analysis : PESTEL

At the external environment analysis stage, an analysis of what factors can affect the electricity industry in Indonesia is carried out. These six factors will provide key information in the form of opportunities or threats that can have an impact on the business. PESTEL analysis can be seen in the following table:

Table 2.1 PESTEL Analysis

PESTEL	O/T	DESCRIPTION
Political	O	The task of carrying out the Public Service Obligation (PSO) to provide electricity to the community at affordable prices, serving remote, outermost, and disadvantaged (3T) areas that have geographical and socioeconomic challenges mandated in related laws and regulations.
	O	The Electrification Target Ratio set by the government is 100%, in order to increase social and economic development for all regions in Indonesia
	T	In accordance with current regulations, the existing revenue model makes PLN highly dependent on subsidies and compensation; There is no mechanism to ensure funding needs are met
Economic	O	Amidst slowing global economic conditions, Indonesia's economy still shows positive growth of 5.01 (Q4 2022) and 5.03 (Q12023). Electricity growth is an indicator of economic growth, and vice versa.
	O	Macro indicators show relatively stable conditions such as relatively lower inflation (4.97%/March 2023), investment realization increased 16.5% (Q12023), trade balance surplus USD 2.8 B (Q12023).
	T	Fluctuations in the rupiah exchange rate affect the amount of CAPEX and OPEX values in the structure of electricity production costs
Sociocultural	O	The trend of electrical energy consumption in Indonesia shows growth every year (except during the pandemic), in 2021 and 2022 it grew by 5.78% and 6.17%, this condition demands the readiness of electricity supply in terms of generation, transmission, and distribution.
	O	In Indonesia, the household segment contributed 42% and the industrial segment 31%. The growth of the population and the development of the industrial sector encourage these two segments to continue to grow.
	T	Based on an internal survey, 61% of people want to use PLTS Atap because they want to save electricity bills from PLN and 50% of people want to limit the impact of climate change. With the dominance of the use of fossil fuels in the generation of electrical energy, there is a great desire for the community to be supplied with renewable energy, this can have an impact on reducing electricity consumption in the midst of oversupply (Pertamina & PLN, 2022)
Technological	O	The development of decarbonization supporting technologies such as solar, wind, biomass, hydrogen, and carbon capture storage makes it easier for PLN to develop renewable energy plants in accordance with the availability of energy sources funding, and technology.
	T	The proportion of equipment costs >50% of the total investment cost, providing the largest contribution. Limited availability of domestic materials and manufacturing capabilities causes equipment prices to be expensive, e.g. limited domestic production of producing solar modules, as well as raw materials that are still imported make production costs expensive. The price of solar modules in Indonesia is more expensive than the price in the global market.
	T	The development of solar module technology and ease of installation can reduce PLN's revenue.
Ecological	O	The Government's target of 23% RE mix by 2025 is very challenging (need for additional ~10 GW of RE power plants by 2025). Success in making the energy transition will increase stakeholder trust in PLN
	T	The demand to reduce carbon emissions and switch to clean energy sources requires huge funding to be used for the construction of renewable energy infrastructure, adopting new technologies, and recovering capital for each stranded asset. This condition can affect PLN's financial condition.
Legal	O	The issuance of Presidential Regulation 112/2022 concerning the acceleration of NRE development for electricity supply, increases space for PLN in the development of renewable energy.
	T	The Omnibus Law on Job Creation authorizes local governments to provide Public and Own Electricity Supply Business Licenses (IUPTL-U/S). From ESDM data, until 2022 there are 56 electricity supply business areas, 44 are already operating, 12 are not yet operating.
	T	Obstacles faced in fulfilling compliance with TKDN rules in the procurement of goods and services, considering the ability of domestic industries/manufacturers to supply PLN's needs.
	T	The Omnibus Law on Job Creation allows private parties to build PLTU, when PLN is required to carry out early retirement.

2.3.2 External Analysis for Industry Structure: Porter's Five Forces

Furthermore, in the analysis of the external environment, to identify and measure the attractiveness and level of competition in the existing industrial structure, porter's five forces analysis was carried out. The table below shows the power situation and its impact on the electricity business.

Table 2.2 Porter's Five Forces Analysis on Electricity Business

Porter's five forces	Level	Description
Bargaining power of supplier	Low	The support from the government regarding the Domestic Market Obligation (DMO) regulation of 25% and the price regulation of US \$ 70 / ton for coal for the provision of electricity to the public, helped PLN in fuel availability and control operating costs.
	High	The limited domestic manufacturing industry produces main equipment and supports the electrical system, making PLN has a high dependence.
Bargaining power of buyer	Low	PLN is still the main electricity provider that controls the electricity sector in Indonesia. Customer choice, especially in the household segment, in meeting electricity needs is still limited.
	Moderate	In the Industrial segment, some customers already have captive power, in addition, the development of PV Rooftop technology encourages customers with financial strength and the desire to use renewable energy to build their own plants. However, fluctuations in fuel prices and the intermittent nature of renewable energy make customers still dependent on supplies from PLN.
	High	In the digital era, the ease of obtaining information and expressing aspirations makes public services more open. News and complaints related to electricity that receive public attention can affect PLN's image.
Threat of new entrants	High	The composition of Independent Power Produce (IPP) has now reached 33.26% of the total generating capacity in Indonesia, the Development of Electricity Supply Business Areas has reached 56 (Wilus), the existence of the Omnibus Law on Job Creation makes it easier for private parties and local governments to develop electricity supply.
	Moderate	PLN still dominate the electricity system starting from generation, transmission, and distribution. With the massive IPP, there is a desire for businesses to distribute electricity directly to customers with the Power Wheeling scheme. Existing regulations have not regulated in technical detail and business models. However, in the future the power wheeling scheme can provide ease of entry in the retail market.
Threat of substitute	Low	National strategic projects such as 4 million gas network house connections included in the 2020-2024 Medium-Term Development Plan (RPJM) regulated in Presidential Regulation No. 18 of 2020 can be a substitute for PLN's business. However, its implementation requires funding support and gas network infrastructure development which is not easy.
	Moderate	The trend of using PV Rooftop and the decreasing price of solar modules can increase the intensity of PV Rooftop use in Indonesia. The growth of rooftop PV will reduce the demand for electrical energy from PLN's plants and grid. Although every application for the installation of On-Grid Rooftop PV must get PLN's approval, its growth cannot be detained.
Industry Rivalry	Low	PLN's current electricity tariff is still lower than the electricity tariff offered by other competitors such as Cikarang Listrindo, Bekasi Power or other IUPTL holders.
	Low	Government regulations that strictly regulate, where only PLN can conduct business nationally

The findings of the external analysis reveal several noteworthy observations. One of these is the continued expansion of the electricity sector, which is closely linked to the growth of the Indonesian economy. This reciprocal relationship between economic growth and electricity demand has significant implications. Furthermore, the tasks of the Public Service Obligation (PSO) and the electrification targets aimed at enhancing the socio-economic circumstances of the Indonesian region are administered by the state-owned electricity company, PLN. Conversely, the implementation of a novel policy aimed at expediting the adoption of

renewable energy will facilitate the reduction of entry barriers, particularly in relation to the rapidly advancing solar module technology. The entry of a substitute would pose a risk to the PLN enterprise. Hence, it is imperative for PLN to have a competitive advantage and offer added value to its customers by aligning with emerging trends, such as the establishment of power plants that harness novel renewable energy sources. The assessment of power supply availability and certainty is also subject to evaluation by customers and business entities. In the event that PLN is perceived to lack these qualities, there is a significant probability that new competitors will emerge in the regional supply market, driven by the rapid expansion of Independent Power Producers (IPPs). Customer satisfaction can be enhanced when their electricity demands are promptly and reliably met, irrespective of the supplier they are associated with.

2.3.3 External Analysis for Industry Structure: Porter's Five Forces

The subsequent stage in the analysis of the business situation involved the examination and evaluation of PLN's internal resources and capabilities with the aim of generating value. A VRIO analysis will be undertaken to assess the effective utilization of PLN resources as well as capabilities in delivering services to consumers.

Table 2.3.PLN VRIO Analysis

Resource, capability, or competency	Valuable	Rare	Inimitable	Organized
Competitive Parity				
Standardized customer service that is strengthened by omnichannel support.	V			
The ability to effectively collaborate and cooperate with stakeholders involved in the electricity sector.	V			
Temporary Competitive Advantages				
Proficiency and ability in the field of electricity across various levels	V	V		
The company's favorable reputation, coupled with its capacity to secure capital from both governmental sources and investors.	V	V		
Unexploited Competitive Advantages				
Transformation of customer service facilitated by PLN Mobile Application	V	V	V	
Values and culture in serving customers	V	V	V	
Sustained Competitive Advantages				
Branding as the No. 1 electrical solution in Indonesia	V	V	V	V
Large number of assets, customers, and supporting electricity infrastructure	V	V	V	V
Integration of electricity systems spread throughout Indonesia	V	V	V	V
Strategic role as a driver of Indonesia's economic activities dan Public Service Obligation (PSO)	V	V	V	V

Table 2.3 presents the key resources and capabilities of PLN for the purpose of assessing its level within the VRIO frameworks. The following section provides an explanation of all essential resources.

- Competitive parity refers to the situation where a company possesses resources that are similar to those of its competitors.
- Temporary competitive advantages play a significant strategic role in the Indonesian economy, particularly within the electricity sector. The PLN has been assigned the responsibility of achieving universal electrification, aiming to attain a 100% electrification ratio throughout Indonesia. The acquisition of robust expertise, substantial capital infusion through government backing, and the involvement of financial institutions are essential requisites. PLN, being a reputable corporation, has the capacity to augment its capital through loans.

- One aspect that remains unexplored in terms of competitive advantages is PLN mobile, an innovative solution introduced by PLN to ensure the provision of top-quality electrical services in Indonesia with a high level of responsiveness. Despite operating under a monopoly structure, PLN demonstrates a commitment to enhancing customer satisfaction as a means of improving the company and aligning with the fundamental principles of AKHLAK.
- PLN has achieved a sustained competitive advantage by serving as the leading electricity provider in Indonesia for a period of 76 years. The information presented indicates that PLN possesses a substantial customer base, extensive assets, and a widespread infrastructure throughout Indonesia. The strategic role in the economic development of Indonesia also exhibited distinct characteristics compared to other companies.

2.4 Analysis of the Business Situation: SWOT Analysis

By incorporating the internal and external analysis discussed in section 2.3 above, it is possible to generate a SWOT analysis for PLN in the development of electricity infrastructure, specifically in Bawean Island, as depicted in table 2.4 below.

Table 2.4 PLN SWOT Analysis

Internal				Eksternal			
Strengths		Weaknesses		Opportunities		Threats	
S1	One of the world's largest electric utility companies with 85 million customers	W1	Powerplant assets have technology that lags behind "Best in Class" on Generation Top Quartile.	O1	The economic rebound that occurred after the COVID-19 pandemic made PLN's sales volume increase significantly.	T1	The movement of competitors that try to take value in businesses related to renewable energy and energy transition in the future
S2	Large asset base, one of the largest in the world and the largest in Southeast Asia, with electricity infrastructure spread throughout Indonesia	W2	Lack of reliability than other power companies in ASEAN	O2	The electrification trend is in many aspects of daily life where energy consumption will shift to electricity	T2	Customers are more demanding about quality supply and renewable energy sources
S3	As a state-owned enterprise that runs the electricity business end-to-end, it has competitive electricity tariffs in ASEAN	W3	Has a high emission intensity due to the dominance of coal in the energy mix	O3	Stakeholder support to PLN, because it carries out the role of PSO (Public Service Obligations)	T3	Volatility in natural gas fuel prices and threats to security of supply that can drive BPP increases, driven by world geopolitical dynamics (e.g. Russia-Ukraine conflict)
S4	Supported by 4 subholdings that allow better focus in business operations and efficiency	W4	Lack of visibility on execution plans and investment needs on Energy Transition plans	O4	The availability of natural resources in Indonesia (Geothermal, Hydropower, Solar, Coal, Gas, Nuclear, etc.) that can be utilized further for energy independence and transition	T4	Indonesia's geography is complex, from lowlands to mountains & stretches from Sabang to Merauke consisting of thousands of islands.

The main insights obtained from the SWOT analysis, as presented in Table 2.4, encompass:

- Electricity business in Indonesia still shows potential for growth alongside expansive economic conditions and electrification trends in everyday life (S1, S2, O1, O2).
- PLN has substantial internal and external resources, as well as support, to develop an efficient and environmentally friendly electricity supply. (S3, S4, O3, O4).
- Increased reliability and use of renewable energy will increase the competitive advantage of PLN (W2, W3, T1, T2)

2.4 Business analysis conclusions

Through regards to the SWOT analysis, it is evident that there is still potential for PLN to undertake investment in powerplant projects on Bawean Island in order to respond to the growing demand and enhance reliability. The PLN should carefully select the optimal

powerplant for Bawean Island in order to minimize generation costs. Subsequently, a comprehensive evaluation of each alternative considered by PLN in the Bawean Island will be undertaken through an investment project analysis, with the aim of determining its financial feasibility.

CHAPTER III

BUSINESS SOLUTION

3.1 Project Description

Bawean project is located on Bawean Island, Sungaiteluk village, Sangkapura District, Gresik, East Java Province, which is the same location as PLTD and PLTMG Bawean. The location is advantageous due to its proximity to the Perikanan port and the main road.

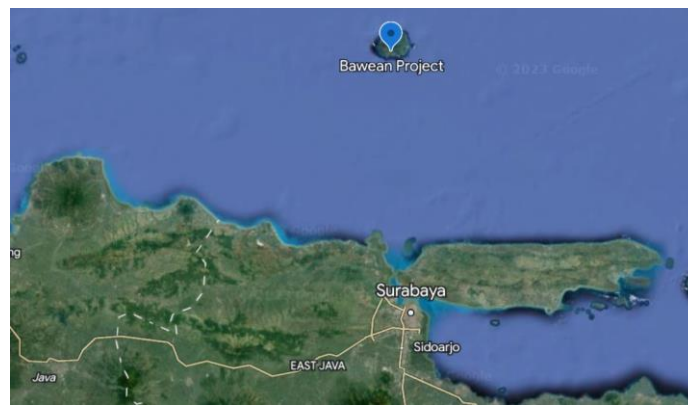


Figure 3. 1 Bawean Island

The available land is vacant land that is cultivated by non-productive crops; topographically, the land consists of flat soil with a reclaimed soil texture. The land area available is 7 ha. If the Bawean project's planners wish to construct floating solar power plants, the island's coastal land can be utilized as an alternative. The area is owned by the Department of Maritime and Fisheries (DKP), so permission from the appropriate authorities is required for its use.

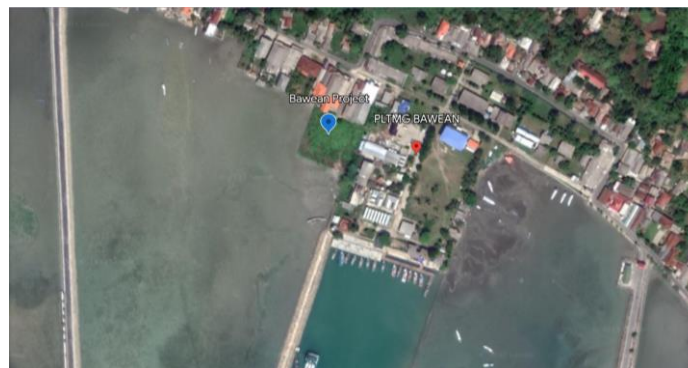


Figure 3. 2 Project Location

The projected power capacity for the Bawean island project is approximately 5 megawatts, which aligns with the anticipated increase in capacity necessary to fulfill demand and maintain reserve margin requirements. The Bawean island project is projected to reach completion within a duration of 18 months, with an anticipated operational commencement in the year 2024. The project is expected to have an estimated lifespan of 20 years. The funding for this project is derived solely from the PLN budget, specifically the Annual PLN Budget (APLN), indicating a complete reliance on equity financing.

3.2 Business Solution Alternatives

As a solution in order to meet the needs of increasing demand and maintain power reserves on Bawean Island as explained in chapter 1.4. The project must also meet the requirements of the least generation cost. This section will focus on analyzing the best alternatives from the 3 most feasible investment options chosen by PLN. Therefore, it requires investment project analysis. Options or alternatives are:

1. Build Off Grid Solar Photovoltaics (PV) Power Plant equipped with Battery Energy Storage System (BESS).
2. Build On Grid Solar Photovoltaics (PV) Power Plant without batteries.
3. Build a Diesel Fired Powerplant

The financial viability of the project is assessed through the utilization of various discounted cash flow (DCF) techniques, as outlined in chapter 2.2.5.3 of the investment decision analysis. Additionally, the cost analysis for the project is conducted using the Levelized Cost of Electricity (LCOE) method, as described in chapter 2.2.5.4.

Upon conducting a comprehensive evaluation of the investment based on various criteria, the assessment of financial risk will be undertaken to facilitate the optimal alternative analysis. This will be accomplished through the utilization of three distinct methods :

1. The utilization of scenario analysis encompassing both the most unfavorable and optimal circumstances.
2. In order to identify variables that exhibit high sensitivity, a sensitivity analysis was conducted using a simulation with a swing of +/- 20%.

3. The utilization of Monte Carlo analysis is used in order to determine the probability distribution of the potential net present value (NPV) of the project, taking into consideration variables that exhibit a high level of sensitivity.

3.3 Assumptions

The scope of this study was limited to the generation business line in order to ascertain the optimal alternative for this project. The evaluation of each alternative does not consider the actual revenue generated from distribution and retail operations, under the assumption that the energy generated will be consistent across all alternatives. However, the evaluation will be conducted on the total cost incurred or required for each alternative throughout the economic lifespan. Consequently, the market size will be determined based on the Net Capacity of the powerplant, which is 5 Megawatts (MW).

In PLN, there exist four distinct categories of component cost.

1. A Component or Capital Expenditure (CAPEX) encompasses various aspects of project construction, including Civil works, Mechanical works, Electrical and Instrumentation Control works, and other related works.
2. B Component or Fixed Operation and Maintenance (O&M) costs encompass two main elements: General & Administrative (G&A) expenses and spare material costs.
3. The cost of the C component or fuel is contingent upon the powerplant type and the specific fuel utilized.
4. D Component or Variable Operations and Maintenance (O&M) encompasses the expenditure on consumable materials required for operational purposes, including lubricants, fuses, and water treatment.

Based on the preceding discussion, it can be inferred that the B, C, and D components are classified as Operating Expenditure (OPEX). The underlying assumptions employed in this study will be expounded upon in the subsequent chapter.

3.3.1 Cost Assumption and Technical Assumption

A component or engineering, procurement, and construction (EPC) The calculation of costs is conducted by utilizing PLN project contract references and an internal database. These sources incorporate various factors such as year adjustments, exchange rates, and the specific location

of the powerplant. The tables 3.1, 3.2, and 3.3 below provide a comprehensive presentation of the description for each infrastructure.

Table 3. 1. EPC Cost for Solar PV + BESS Power plant

Works Description	Cost (IDR)
EPC Cost	
Mechanical Works	70,063,350,000
Electrical-I&C Works	17,154,450,000
Other works	7,569,450,000
Contingency	9,122,475,000
VAT	10,034,722,500
TOTAL	113,944,447,500

Table 3. 2. EPC Cost for Solar PV Powerplant

Works Description	Cost (IDR)
EPC Cost	
Mechanical Works	45,013,350,000
Electrical-I&C Works	14,995,950,000
Other works	7,569,450,000
Contingency	6,401,625,000
VAT	8,137,841,250
TOTAL (Bil Rp)	82,118,216,250

Table 3. 3. EPC for Diesel Fired Power plant.

Works Description	Cost (IDR)
EPC Cost	
Mechanical Works	15,462,500,000
Electrical-I&C Works	3,971,740,865
Other works	3,173,043,333
Contingency	1,546,250,000
VAT	17,163,375,000
TOTAL (Bil Rp)	41,316,909,198

The following section will outline additional assumptions that have been utilized in assessing the feasibility of the project.

1. The B component or Fixed Operations and Maintenance (O&M) is estimated to be 3.75% and 2.5% of the A component depends on the type of power plants, assuming a growth rate of 2%-3%. This assumption is derived from an analysis of O&M costs in a previous power plant project.
2. The D component or Variable Operations and Maintenance (O&M) is assumed to be 1.25% of the A component, with a growth rate of 2%. This assumption is based on an estimated O&M cost analysis from a previous power plant project.
3. The source of information regarding the cost of fuel (HSD) is derived from the RUPTL 2021-2030 PT. PLN (Persero) document.
4. The fuel cost reference for high-speed diesel (HSD) is derived from past powerplant projects and internal databases, which also take into account transportation expenses.
5. The lease cost is determined by the terms outlined in the previous lease agreement.
6. The assumed capacity factor (CF) is 80% due to the intended operation of the system as a baseload for diesel powerplant and 17%-21% for solar PV.
7. The calculation for annual kilowatt-hour (kWh) sales involves multiplying the net capacity of a power plant (5 MW) by the number of days in a year (365), the number of hours in a day (24), and the capacity factor.
8. The references for Net Plant Heat Rate (NPHR) and Specific Fuel Consumption (SFC) are derived from the internal database and past contractual agreements.
9. The determination of the economic lifespan of the asset reference is established in accordance with Regulation No. 0040.P/DIR/2016 of the Board of Directors of PT PLN (Persero). As per this regulation, the economic lifespan for power plants is set at 20 years. The method employed for calculating depreciation is the straight-line method, and the salvage value is assumed to be zero.
10. Electrical and distribution losses based on standard in PLN.

Tables presented below provide a comprehensive overview of the assumptions made for each infrastructure.

Table 3. 4. Solar PV + BESS Power plant Assumption

Solar PV + BESS (5MW) Assumption			
COST ASSUMPTION		TECHNICAL ASSUMPTION	
1. A Component (Investment cost)		1. Net Capacity	MWp 5.00
- EPC Cost	Million IDR 113,944.45	2. CF (Capacity Factor)	Percentage 21%
2. B component (Fixed O&M cost)		3. Annual kWh Sales	MWh 6,832.80
- Annual Fixed O&M cost	Million IDR 2,848.61	4. Economic life	Years 20
- Fixed O&M growth	Percentage 2.00%	5. Performance Ratio	Percentage 85%
3. C component (Fuel cost)			
- Fuel growth	Percentage 0.00%		
4. D component (Variable O&M cost)			

Table 3. 5. Solar PV Power plant Assumption

Floating Photovoltaic (5MW) Assumption			
COST ASSUMPTION		TECHNICAL ASSUMPTION	
1. A Component (Investment cost)		1. Net Capacity	MWp 5.00
- EPC Cost	Million IDR 82,118.22	2. CF (Capacity Factor)	Percentage 17%
2. B component (Fixed O&M cost)		3. Annual kWh Sales	MWh 5,584.50
- Annual Fixed O&M cost	Million IDR 2,052.96	4. Economic life	Years 20
- Fixed O&M growth	Percentage 2.00%	5. Performance Ratio	Percentage 85%
3. C component (Fuel cost)			
4. D component (Variable O&M cost)			

Table 3. 6. Diesel Fired Power plant Assumption.

Diesel Fired Powerplant (30 MW) assumption			
COST ASSUMPTION		TECHNICAL ASSUMPTION	
1. A Component (Investment cost)		1. Net Capacity	MW 5.00
- EPC Cost	Million IDR 41,316.91	2. CF (Capacity Factor)	Percentage 80%
2. B component (Fixed O&M cost)		3. Annual kWh Sales	MWh 35,040.00
- Annual Fixed O&M cost	Million IDR 1,549.38	4. Diesel fired powerplant SFC (Buy)	Liter/ kWh 0.285
- Fixed O&M growth	Percentage 2.0%	5. Diesel fired powerplant SFC (Lease)	Liter/ kWh 0.285
3. C component (Fuel cost)		6. Economic life	Years 20
- High Speed Diesel (HSD)	IDR / Liter 9,513.9		
- Fuel escalation growth	Percentage 0%		
4. D component (Variable O&M cost)			
- Annual Variable O&M cost	Million IDR 516.46		
- Variable O&M growth	Percentage 2.0%		
5. Lease Cost			
- Diesel fired powerplant lease cost	IDR / kWh 289		

3.3.2 Financial Assumption

The financial assumption providing as a basis for constructing the financial model for all alternatives is presented in the subsequent table.

Table 3. 7. Financial Assumption

Financial Assumption			
1. Exchange Rate	USD to IDR	15,000	15,000
2. Discount Factor	Percentage	9.7%	9.7%
3. Generating Cost Bawean	IDR/kWh	3,143	Rupiah
4. Tax	Percentage	22%	22%

There are several remarks commonly employed in financial assumptions, which are outlined below:

- The exchange rate is determined by the budget plan of the company for the year 2022, known as Rencana Kerja Anggaran Perusahaan (RKAP).
- The Discount Factor is also determined by the Weighted Average Cost of Capital (WACC) hurdle rate, specifically the RKAP PLN 2022.

- The calculation of the generating cost is determined by the current cost of the Bawean powerplant for the year 2022.
- According to the official website of the Ministry of Finance of Indonesia (www.kemenkeu.go.id), the government has established a corporate tax rate of 22% for the fiscal year 2022 and beyond.

3.3.3 Initial Net Working Capital

PLN will be obligated to allocate funds towards the acquisition of Net Working Capital (NWC) for the upcoming year of 2023, during the preceding year of 2022, for each available alternative. The subsequent assumptions will be used in the computation of Net Working Capital (NWC):

1. The formula for calculating the net working capital (NWC) is derived by subtracting the current liabilities from the current assets.
2. The current asset category comprises trade receivables and inventory.
 - a. The calculation of Trade Receivables will be based on the assumption that 41.89% of sales are made on credit. The proportion of sales made on credit is derived from the total number of postpaid electricity customers in Indonesia. The average collection period refers to the mean duration derived from the factual financial statement of PLN over a five-year period spanning from 2016 to 2022.
 - b. Inventories shall be computed utilizing the mean values derived from PLN's factual financial statements over the preceding five-year period (2016-2022).
3. Current liabilities typically consist of trade payables and accruals.
 - a. Trade payables will be determined by assuming that 90% of operational expenses are allocated towards procurement from suppliers. The determination of average payment periods is derived from the analysis of the financial statements of PLN over a five-year period, specifically from 2016 to 2022.
 - b. The calculation of accruals as a percentage of operating expenses is based on the average data derived from PLN's actual financial statements over the period of the last five years (2016-2022). The commencement of accrual expenses will occur in the second year of operation, subsequent to the initiation of operating expenses.

Based on the assumption, the calculation of the Net Working Capital (NWC) for the year 2024, which marks the initial year of operation, indicates that PLN will require cash from 2022. The initial net working capital (NWC) outcomes for each alternative are displayed in table 3.8 below. Additionally, the NWC for the period 2024-2043 was computed using the same assumption and will be provided in Appendix 1.

Table 3. 8. Initial Net Working each Alternative

Net Working Capital of PLN Bawean Project In Billion Rupiah	2023		
	Alternative 1	Alternative 2	Alternative 3
Working Capital			
Trade Receivables	2.76	2.24	14.01
Inventories	0.13	0.07	4.58
Total Working Capital	2.90	2.31	18.59
Trade Payables and Accruals			
Trade Payables	0.46	0.25	15.68
Accruals	0.20	0.11	0.11
Total Trade Payables and Accruals	0.66	0.36	15.79
Net Working Capital	2.24	1.95	2.80

3.4 Analysis of Alternative 1

3.4.1 Financial Statement Projection for Alternative 1

A projected financial statement for the Bawean power plant project of PLN Investment can be developed by incorporating all of the assumptions outlined in the preceding chapter.

3.4.1.1 Calculation of Projected Revenue

The calculation of revenue generated by this project is derived from the Salable Energy acquired through Annual kWh Sales, as well as accounting for Generating cost. The revenue generated by each alternative is equivalent due to the consistent powerplant capacity, as indicated in Table 3.9 provided.

Table 3. 9. Project Revenue for All Alternatives

	Description	Unit	Value		
			Alternatif 1	Alternatif 2	Alternatif 3
A	Annual kWh Sales	kWh	6832.80	5584.50	35040.00
B	Losses	Percentage	0.04	0.04	0.05
C	Salable energy	kWh	6559.49	5311.188	33288.00
D	Generating Cost	IDR/kWh	IDR/kWh	IDR/kWh	IDR/kWh
E	Revenue	Billion IDR	22.06	17.86	111.96

3.4.1.2 Projection of The Income Statement

Considering the project's exclusive focus on the generation business line, it is assumed that all net profits will be retained as earnings of PLN. The projected income statement was formulated for the period spanning from 2023 to 2043, encompassing the initial year of construction and a subsequent twenty-year duration of production. The depreciation schedule for alternative 1 is provided in Appendix 2, while the comprehensive Income Statement for alternative 1 is outlined in table 3.9.

3.4.1.3 Projection of The Balance Sheet

The balance sheet is generated after all assets, liabilities, and equity associated with the investment project are accounted for. Table 3.10 presents the complete balance sheet for alternative 1

3.4.1.4 Projection of The Cash Flow

The cash flow statement forecasted the inflows and outflows of cash over the 20-year period of analysis for the investment. Table 3.11 presents the comprehensive projection of the cash flow statement for alternative 1.

Table 3. 10. Income Statement Alternative 1

Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean Electricity Supply Business Plan 2021-2030 INCOME STATEMENT												
Alternative 1		Revenues	Operating Expenses					EBIT	Other Income (interest = 0)	Earning before Tax	Tax	Net Profit
No	Year		Comp.B (Fix O&M)	Comp. C (Fuel Cost)	Comp. D (Var O&M)	Depreciation	Total					
0.	2023	-	-	-	-	-	-	-	-	-	-	-
1.	2024	22.06	2.85	-	-	-	2.85	19.21	-	19.21	4.23	14.99
2.	2025	22.06	2.91	0.00	0.00	5.70	8.60	13.46	-	13.46	2.96	10.50
3.	2026	22.06	2.96	0.00	0.00	5.70	8.66	13.40	-	13.40	2.95	10.45
4.	2027	22.06	3.02	0.00	0.00	5.70	8.72	13.34	-	13.34	2.94	10.41
5.	2028	22.06	3.08	0.00	0.00	5.70	8.78	13.28	-	13.28	2.92	10.36
6.	2029	22.06	3.15	0.00	0.00	5.70	8.84	13.22	-	13.22	2.91	10.31
7.	2030	22.06	3.21	0.00	0.00	5.70	8.91	13.16	-	13.16	2.89	10.26
8.	2031	22.06	3.27	0.00	0.00	5.70	8.97	13.09	-	13.09	2.88	10.21
9.	2032	22.06	3.34	0.00	0.00	5.70	9.03	13.03	-	13.03	2.87	10.16
10.	2033	22.06	3.40	0.00	0.00	5.70	9.10	12.96	-	12.96	2.85	10.11
11.	2034	22.06	3.47	0.00	0.00	5.70	9.17	12.89	-	12.89	2.84	10.06
12.	2035	22.06	3.54	0.00	0.00	5.70	9.24	12.82	-	12.82	2.82	10.00
13.	2036	22.06	3.61	0.00	0.00	5.70	9.31	12.75	-	12.75	2.81	9.95
14.	2037	22.06	3.68	0.00	0.00	5.70	9.38	12.68	-	12.68	2.79	9.89
15.	2038	22.06	3.76	0.00	0.00	5.70	9.46	12.61	-	12.61	2.77	9.83
16.	2039	22.06	3.83	0.00	0.00	5.70	9.53	12.53	-	12.53	2.76	9.77
17.	2040	22.06	3.91	0.00	0.00	5.70	9.61	12.45	-	12.45	2.74	9.71
18.	2041	22.06	3.99	0.00	0.00	5.70	9.69	12.38	-	12.38	2.72	9.65
19.	2042	22.06	4.07	0.00	0.00	5.70	9.77	12.30	-	12.30	2.71	9.59
20.	2043	22.06	4.15	0.00	0.00	5.70	9.85	12.21	-	12.21	2.69	9.53

Table 3. 11. Balance Sheet Alternative 1

Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean																					
Electricity Supply Business Plan 2021-2030																					
BALANCE SHEET																					
In Billion Rupiah																					
Alternative 1		Assets									Liabilities					Equity			Total Liabilities and Equity	Balance Check	
No	Year	Current Assets					Non Current Asset				Total Asset	Current Liabilities			Non Current Liabilities (N/A)	Total Liabilities	Share Capital	Retained Earning			Total Equity
		Excess Cash	Required Cash	Trade Receivables	Inventory	Total Current Asset	Fixed Assets - net of accumulated depreciation	Asset Under Construction	Total Non Current Asset	Trade Payables		Accruals	Total Current Liabilities								
0.	2023	-	-	-	-	-	-	113.94	113.94	113.94	-	-	-	-	-	113.94	-	113.94	113.94	-	
1.	2024	10.51	2.24	2.76	0.13	15.65	113.94	-	113.94	129.59	0.46	0.20	0.66	-	0.66	113.94	14.99	128.93	129.59	-	
2.	2025	26.73	2.23	2.76	0.14	31.85	108.25	-	108.25	140.10	0.47	0.20	0.67	-	0.67	113.94	25.48	139.43	140.10	-	
3.	2026	42.90	2.21	2.76	0.14	48.02	102.55	-	102.55	150.57	0.48	0.21	0.69	-	0.69	113.94	35.94	149.88	150.57	-	
4.	2027	59.03	2.20	2.76	0.14	64.13	96.85	-	96.85	160.99	0.49	0.21	0.70	-	0.70	113.94	46.34	160.29	160.99	-	
5.	2028	75.10	2.19	2.76	0.15	80.21	91.16	-	91.16	171.36	0.50	0.21	0.72	-	0.72	113.94	56.70	170.65	171.36	-	
6.	2029	91.14	2.18	2.76	0.15	96.23	85.46	-	85.46	181.69	0.51	0.22	0.73	-	0.73	113.94	67.01	180.96	181.69	-	
7.	2030	107.12	2.17	2.76	0.15	112.20	79.76	-	79.76	191.96	0.52	0.22	0.74	-	0.74	113.94	77.27	191.22	191.96	-	
8.	2031	123.05	2.16	2.76	0.16	128.13	74.06	-	74.06	202.19	0.53	0.23	0.76	-	0.76	113.94	87.49	201.43	202.19	-	
9.	2032	138.93	2.15	2.76	0.16	144.00	68.37	-	68.37	212.36	0.54	0.23	0.77	-	0.77	113.94	97.65	211.59	212.36	-	
10.	2033	154.76	2.13	2.76	0.16	159.82	62.67	-	62.67	222.49	0.55	0.24	0.79	-	0.79	113.94	107.75	221.70	222.49	-	
11.	2034	170.54	2.12	2.76	0.16	175.59	56.97	-	56.97	232.56	0.56	0.24	0.81	-	0.81	113.94	117.81	231.75	232.56	-	
12.	2035	186.27	2.11	2.76	0.17	191.30	51.28	-	51.28	242.58	0.58	0.25	0.82	-	0.82	113.94	127.81	241.76	242.58	-	
13.	2036	201.93	2.09	2.76	0.17	206.96	45.58	-	45.58	252.54	0.59	0.25	0.84	-	0.84	113.94	137.76	251.70	252.54	-	
14.	2037	217.55	2.08	2.76	0.17	222.57	39.88	-	39.88	262.45	0.60	0.26	0.85	-	0.85	113.94	147.65	261.59	262.45	-	
15.	2038	233.11	2.07	2.76	0.18	238.11	34.18	-	34.18	272.30	0.61	0.26	0.87	-	0.87	113.94	157.48	271.42	272.30	-	
16.	2039	248.60	2.05	2.76	0.18	253.60	28.49	-	28.49	282.09	0.62	0.27	0.89	-	0.89	113.94	167.25	281.20	282.09	-	
17.	2040	264.04	2.04	2.76	0.19	269.03	22.79	-	22.79	291.82	0.64	0.27	0.91	-	0.91	113.94	176.97	290.91	291.82	-	
18.	2041	279.42	2.03	2.76	0.19	284.40	17.09	-	17.09	301.49	0.65	0.28	0.93	-	0.93	113.94	186.62	300.56	301.49	-	
19.	2042	294.74	2.01	2.76	0.19	299.70	11.39	-	11.39	311.10	0.66	0.28	0.94	-	0.94	113.94	196.21	310.16	311.10	-	
20.	2043	309.99	2.00	2.76	0.20	314.95	5.70	-	5.70	320.64	0.67	0.29	0.96	-	0.96	113.94	205.74	319.68	320.64	-	

Table 3. 12. Cash Flow Alternative 1

Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean Electricity Supply Business Plan 2021-2030 CASHFLOW STATEMENT													In Billion Rupiah		
Alternative 1		Operating Activities							Investing Activities			Financing Activities	Net Cash Flow	Beginning Cash	Ending Cash
No	Year	Net Profit	Depreciation	(increase) / decrease in Trade Receivables	(increase) / decrease in Inventory	increase / (decrease) in Trade Payables	increase / (decrease) in Accruals	Total CF from Operating Activities	(Increase)/ Decrease in Fixed Asset	(Increase)/ Decrease in Asset under construction	Total CF from Investing Activities	Increase / (decrease) in Share Capital)			
0.	2023	-	-	-	-	-	-	-	-	(113.94)	(113.94)	113.94	-	-	-
1.	2024	14.99	-	(2.76)	(0.13)	0.46	0.20	12.75	(113.94)	113.94	-	-	12.75	-	12.75
2.	2025	10.50	5.70	-	(0.00)	0.01	0.00	16.21	(0.00)	-	(0.00)	-	16.21	12.75	28.96
3.	2026	10.45	5.70	-	(0.00)	0.01	0.00	16.16	(0.00)	-	(0.00)	-	16.16	28.96	45.12
4.	2027	10.41	5.70	-	(0.00)	0.01	0.00	16.11	(0.00)	-	(0.00)	-	16.11	45.12	61.23
5.	2028	10.36	5.70	-	(0.00)	0.01	0.00	16.07	(0.00)	-	(0.00)	-	16.07	61.23	77.30
6.	2029	10.31	5.70	-	(0.00)	0.01	0.00	16.02	(0.00)	-	(0.00)	-	16.02	77.30	93.32
7.	2030	10.26	5.70	-	(0.00)	0.01	0.00	15.97	(0.00)	-	(0.00)	-	15.97	93.32	109.29
8.	2031	10.21	5.70	-	(0.00)	0.01	0.00	15.92	(0.00)	-	(0.00)	-	15.92	109.29	125.21
9.	2032	10.16	5.70	-	(0.00)	0.01	0.00	15.87	(0.00)	-	(0.00)	-	15.87	125.21	141.08
10.	2033	10.11	5.70	-	(0.00)	0.01	0.00	15.82	0.00	-	0.00	-	15.82	141.08	156.90
11.	2034	10.06	5.70	-	(0.00)	0.01	0.00	15.77	0.00	-	0.00	-	15.77	156.90	172.66
12.	2035	10.00	5.70	-	(0.00)	0.01	0.00	15.71	0.00	-	0.00	-	15.71	172.66	188.37
13.	2036	9.95	5.70	-	(0.00)	0.01	0.00	15.66	0.00	-	0.00	-	15.66	188.37	204.03
14.	2037	9.89	5.70	-	(0.00)	0.01	0.01	15.60	0.00	-	0.00	-	15.60	204.03	219.63
15.	2038	9.83	5.70	-	(0.00)	0.01	0.01	15.54	0.00	-	0.00	-	15.54	219.63	235.17
16.	2039	9.77	5.70	-	(0.00)	0.01	0.01	15.48	0.00	-	0.00	-	15.48	235.17	250.66
17.	2040	9.71	5.70	-	(0.00)	0.01	0.01	15.43	0.00	-	0.00	-	15.43	250.66	266.08
18.	2041	9.65	5.70	-	(0.00)	0.01	0.01	15.36	0.00	-	0.00	-	15.36	266.08	281.45
19.	2042	9.59	5.70	-	(0.00)	0.01	0.01	15.30	-	-	-	-	15.30	281.45	296.75
20.	2043	9.53	5.70	-	(0.00)	0.01	0.01	15.24	-	-	-	-	15.24	296.75	311.99

3.4.2 Analysis of Capital Budgeting for Alternative 1

Once the financial statement has been prepared, a capital budgeting analysis will be conducted for alternative 1 in order to obtain a comprehensive understanding of the resulting financial indicators. The capital budgeting analysis is conducted by evaluating the free cash flow to the firm over a 20-year project lifespan.

3.4.2.1 Analysis of the Cost of Capital

According to the project description outlined in chapter 3.2, the Bawean Island project will rely exclusively on internal financing through its own capital, specifically in the form of common stock. Alternatively, the discount rate for the project's expected average future capital can be determined by utilizing the hurdle rate of PLN's weighted average cost of capital (WACC). This study aims to conduct a comparative analysis of the Hurdle Rate, WACC PLN, and real Cost of Equity in order to ascertain an optimal discount rate for capital budgeting calculations.

- a. The calculation of the cost of equity.

The cost of equity will be determined using the Capital Asset Pricing Model (CAPM) methodology. The necessary data includes β (beta), risk premium, and risk-free rates. As PLN was not a publicly traded company, the necessary inputs for the Capital Asset Pricing Model (CAPM), such as the beta coefficient (β) and the risk premium (R_m), were not readily accessible for PLN. To determine the values of these parameters, data from Damodaran will be utilized for benchmarking purposes.

The data utilized in this study is sourced from Damodaran and pertains specifically to the Power sector within emerging market economies. The risk-free rate utilized in this computation is sourced from the IBPA 10 Years Government Bond Yield, obtained on November 1st, 2021, which reports a rate of 7.22% (IBPA.co.id, 2023). The Cost of Equity was derived using the methodology outlined in section 2.5.2, as presented in the following table.

Table 3. 13. Capital Asset Pricing Model

Cost of Equity Capital Asset Pricing Model		
Levered Beta	Damodaran	0.73
Risk-Free Rate	IBPA 10 Year Government Bond (PHEI)	7.22%
Market Premium	Damodaran	5.98%
Cost of Equity (CAPM)	Calculated	11.25%

Considering that the calculation of the Capital Asset Pricing Model (CAPM) has yielded a discount rate of 11.25%, which is higher than the hurdle rate of 9.7% set by PLN, it is appropriate to utilize the hurdle rate or PLN's Weighted Average Cost of Capital (WACC) as the discount rate.

3.4.2.2 Capital Budgeting Cash Flows (CBCF)

Following the computation of the cost of capital, the subsequent step entails conducting a capital budgeting analysis for alternative 1 in order to ascertain the acceptance criteria for the investment project. The initial stage involves the determination of the Free Cash Flow (FCF) of the project. This analysis aims to develop the concept of Free Cash Flow to the Firm (FCFF), which refers to the cash flows that are accessible to all stakeholders of a firm. These cash flows are calculated after deducting all operating expenses but prior to debt payments.

The subsequent element that necessitates computation is the terminal cash flow, denoting the ultimate cash flow occurring at the conclusion of the project, predicated on the assumption of terminal growth. This study exclusively examines the generation business line, thereby implying that the revenue will remain constant as a result of the powerplant's capacity. Consequently, the projected terminal growth for this project is anticipated to be 0%. Table 3.13 displays the free cash flow to the firm for alternative 1.

3.4.2.3 Capital Budgeting Analysis on The FCFF

The Free Cash Flow to Firm (FCFF) discussed in the preceding chapters will serve as the foundation for the analysis. The investment project will be assessed utilizing the investment

decision analysis criteria outlined in chapter 2.5.3, as previously mentioned. The acceptance criteria encompass the following:

1. The Payback Period (PP) and Discounted Payback Period are criteria used to assess the time required for a project to recoup its initial investment.
2. The Net Present Value (NPV) criterion is utilized to assess the present value of all forthcoming cash flows produced by the project, encompassing the initial investment. The Project Selection Committee will opt for the alternative with the highest Net Present Value (NPV) in order to proceed with the project.
3. The Internal Rate of Return (IRR) is a criterion used to ascertain the discount rates at which the Net Present Value (NPV) of a project becomes zero. The conventional internal rate of return (IRR) approach operates under the assumption that the cash flows generated by the project are reinvested at the IRR. In order to obtain a more comprehensive understanding of the rate of return, this study will employ the Modified Internal Rate of Return (MIRR) methodology, which assumes that positive cash flows are reinvested at the company's cost of capital. PLN will select the alternative with the highest Modified Internal Rate of Return (MIRR) to execute the project.
4. The Profitability Index (PI) is a criterion used to assess the attractiveness of a project. It is calculated by dividing the total present value of all projected future cash flows by the initial investment. The Project Leadership Team (PLN) will select the alternative with the highest Performance Index (PI) to implement the project.

Table 3.14 displays the capital budgeting analysis for alternative 1.

3.4.3 Levelized Cost of Electricity (LCOE) for Alternatives 1

As explained in section 3.2 of the literature, a primary objective of the Bawean Powerplant Project is to achieve a lower cost of electricity generation in comparison to the existing Bawean Powerplant. By utilizing the LCOE formula outlined in chapter 2.2.5.4, it becomes possible to represent the cost of electricity generation for each alternative over the entire duration of the project. PLN will select the alternative with the lowest Levelized Cost of Electricity (LCOE) among the current generating costs at the Bawean power plant for project implementation. Table 3.15 presents the LCOE calculation for alternative 1, while table 3.16 provides a comprehensive summary of alternative 1 by integrating FCFF and LCOE.

Table 3.14. Capital Budgeting Cash Flow Alternative 1

Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean													In Billion Rupiah	
Electricity Supply Business Plan 2021-2030														
CAPITAL BUDGETING CASH FLOW														
Alternative 1		Free Cash Flow to The Firm												
No	Year	EBIT	Tax of EBIT	NOPAT	Depreciation	Operating cashflow	Changes in Current Asset	Changes in Account Payable and Accruals	Net Current Asset Investment	Net Fixed Asset Investment	FCFF	Terminal Cashflow	Total Cashflow	
0.	2023	-	-	-	-	-	-	-	-	113.94	(113.94)		(113.94)	
1.	2024	19.21	4.23	14.99	-	14.99	5.13	0.66	4.47	-	10.51		10.51	
2.	2025	13.46	2.96	10.50	5.70	16.19	(0.01)	0.01	(0.02)	-	16.22		16.22	
3.	2026	13.40	2.95	10.45	5.70	16.15	(0.01)	0.01	(0.02)	-	16.17		16.17	
4.	2027	13.34	2.94	10.41	5.70	16.10	(0.01)	0.01	(0.02)	-	16.13		16.13	
5.	2028	13.28	2.92	10.36	5.70	16.06	(0.01)	0.01	(0.02)	-	16.08		16.08	
6.	2029	13.22	2.91	10.31	5.70	16.01	(0.01)	0.01	(0.02)	-	16.03		16.03	
7.	2030	13.16	2.89	10.26	5.70	15.96	(0.01)	0.01	(0.02)	-	15.98		15.98	
8.	2031	13.09	2.88	10.21	5.70	15.91	(0.01)	0.01	(0.02)	-	15.93		15.93	
9.	2032	13.03	2.87	10.16	5.70	15.86	(0.01)	0.02	(0.02)	-	15.88		15.88	
10.	2033	12.96	2.85	10.11	5.70	15.81	(0.01)	0.02	(0.02)	-	15.83		15.83	
11.	2034	12.89	2.84	10.06	5.70	15.75	(0.01)	0.02	(0.03)	-	15.78		15.78	
12.	2035	12.82	2.82	10.00	5.70	15.70	(0.01)	0.02	(0.03)	-	15.72		15.72	
13.	2036	12.75	2.81	9.95	5.70	15.64	(0.01)	0.02	(0.03)	-	15.67		15.67	
14.	2037	12.68	2.79	9.89	5.70	15.59	(0.01)	0.02	(0.03)	-	15.61		15.61	
15.	2038	12.61	2.77	9.83	5.70	15.53	(0.01)	0.02	(0.03)	-	15.56		15.56	
16.	2039	12.53	2.76	9.77	5.70	15.47	(0.01)	0.02	(0.03)	-	15.50		15.50	
17.	2040	12.45	2.74	9.71	5.70	15.41	(0.01)	0.02	(0.03)	-	15.44		15.44	
18.	2041	12.38	2.72	9.65	5.70	15.35	(0.01)	0.02	(0.03)	-	15.38		15.38	
19.	2042	12.30	2.71	9.59	5.70	15.29	(0.01)	0.02	(0.03)	-	15.32		15.32	
20.	2043	12.21	2.69	9.53	5.70	15.22	(0.01)	0.02	(0.03)	-	15.25	157.26	172.52	

Table 3.15 Capital Budgeting Analysis Alternative 1

**Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean
Electricity Supply Business Plan 2021-2030
CAPITAL BUDGETING ANALYSIS**

In Billion Rupiah

Alternative 1		Free Cash Flow to The Firm			
No	Year	Cash Flow	Accumulated Cashflow	PV of Cash Flow	Accumulated PV of Cash Flow
0.	2023	(113.94)	(113.94)	(113.94)	(113.94)
1.	2024	10.51	(103.43)	9.58	(94.28)
2.	2025	16.22	(87.21)	13.48	(72.47)
3.	2026	16.17	(71.04)	12.25	(53.81)
4.	2027	16.13	(54.92)	11.13	(37.92)
5.	2028	16.08	(38.84)	10.12	(24.45)
6.	2029	16.03	(22.81)	9.20	(13.09)
7.	2030	15.98	(6.83)	8.36	(3.57)
8.	2031	15.93	9.11	7.60	4.34
9.	2032	15.88	24.99	6.90	10.86
10.	2033	15.83	40.82	6.27	16.17
11.	2034	15.78	56.60	5.70	20.44
12.	2035	15.72	72.32	5.18	23.81
13.	2036	15.67	87.99	4.70	26.41
14.	2037	15.61	103.60	4.27	28.35
15.	2038	15.56	119.16	3.88	29.72
16.	2039	15.50	134.66	3.52	30.61
17.	2040	15.44	150.10	3.20	31.11
18.	2041	15.38	165.48	2.91	31.26
19.	2042	15.32	180.79	2.64	31.14
20.	2043	172.52	353.31	27.08	55.47

Table 3.16. Levelized Cost of Electricity Alternative 1

Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean
Electricity Supply Business Plan 2021-2030
LEVELIZED ELECTRICITY GENERATING COST

Alternative 1		PV kWh		PV IDR			
No	Year	Generation energy (gross)	Salable energy (net)	A component (Investment Cost)	B component (Fixed OM Cost)	C component (Fuel Cost)	D component (Variable OM Cost)
0.	2023	-	-	113.94	-	-	-
1.	2024	6,228,624	5,979,479	-	2.60	-	-
2.	2025	5,677,870	5,450,755	-	2.41	-	-
3.	2026	5,175,816	4,968,783	-	2.24	-	-
4.	2027	4,718,155	4,529,429	-	2.09	-	-
5.	2028	4,300,962	4,128,923	-	1.94	-	-
6.	2029	3,920,658	3,763,832	-	1.80	-	-
7.	2030	3,573,982	3,431,022	-	1.68	-	-
8.	2031	3,257,960	3,127,641	-	1.56	-	-
9.	2032	2,969,881	2,851,086	-	1.45	-	-
10.	2033	2,707,275	2,598,984	-	1.35	-	-
11.	2034	2,467,890	2,369,174	-	1.25	-	-
12.	2035	2,249,672	2,159,685	-	1.17	-	-
13.	2036	2,050,749	1,968,719	-	1.08	-	-
14.	2037	1,869,416	1,794,639	-	1.01	-	-
15.	2038	1,704,117	1,635,952	-	0.94	-	-
16.	2039	1,553,434	1,491,296	-	0.87	-	-
17.	2040	1,416,074	1,359,431	-	0.81	-	-
18.	2041	1,290,861	1,239,226	-	0.75	-	-
19.	2042	1,176,719	1,129,650	-	0.70	-	-
20.	2043	1,072,670	1,029,763	-	0.65	-	-
		59,382,782.93	57,007,471.61	113.94	28.36	0.00	0.00

Table 3. 17. Summary of Investment Criteria for Alternative 1

Summary		
Parameter	Alternative 1	Evaluation
NPV (Billion IDR)	44.03	ACCEPT
MIRR (percentage)	11.51%	ACCEPT
Profitability Index	1.39	ACCEPT
Payback period (years)	7.57	ACCEPT
LCOE (IDR/kWh)	-21%	ACCEPT

3.5 Analysis of Alternative 2

3.5.1 Financial Statement Projection for Alternative 2

The method applied to analyzing the financial statement projection in Alternative 2 was consistent with that used in Alternative 1. This approach was based on the assumption previously discussed in the preceding chapter, which was deemed appropriate for Alternative 2.

- The Income Statement Projection is presented in table 3.17. The depreciation schedule can be found in Appendix 2.
- The Balance Sheet Projection is displayed in table 3.18.
- The Cash Flow Projection is displayed in table 3.19.

Table 3. 18. Income Statement Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean Electricity Supply Business Plan 2021-2030 INCOME STATEMENT												
Alternative 2		Revenues	Operating Expenses					EBIT	Other Income (interest = 0)	Earning before Tax	Tax	Net Profit
No	Year		Comp.B (Fix O&M)	Comp. C (Fuel Cost)	Comp. D (Var O&M)	Depreciation	Total					
0.	2023	-	-	-	-	-	-	-	-	-	-	-
1.	2024	17.86	1.55	-	-	-	1.55	16.31	-	16.31	3.59	12.72
2.	2025	17.86	1.58	-	-	4.11	5.69	12.18	-	12.18	2.68	9.50
3.	2026	17.86	1.61	-	-	4.11	5.72	12.15	-	12.15	2.67	9.47
4.	2027	17.86	1.64	-	-	4.11	5.75	12.11	-	12.11	2.66	9.45
5.	2028	17.86	1.68	-	-	4.11	5.78	12.08	-	12.08	2.66	9.42
6.	2029	17.86	1.71	-	-	4.11	5.82	12.05	-	12.05	2.65	9.40
7.	2030	17.86	1.74	-	-	4.11	5.85	12.01	-	12.01	2.64	9.37
8.	2031	17.86	1.78	-	-	4.11	5.89	11.98	-	11.98	2.64	9.34
9.	2032	17.86	1.82	-	-	4.11	5.92	11.94	-	11.94	2.63	9.31
10.	2033	17.86	1.85	-	-	4.11	5.96	11.91	-	11.91	2.62	9.29
11.	2034	17.86	1.89	-	-	4.11	5.99	11.87	-	11.87	2.61	9.26
12.	2035	17.86	1.93	-	-	4.11	6.03	11.83	-	11.83	2.60	9.23
13.	2036	17.86	1.96	-	-	4.11	6.07	11.79	-	11.79	2.59	9.20
14.	2037	17.86	2.00	-	-	4.11	6.11	11.75	-	11.75	2.59	9.17
15.	2038	17.86	2.04	-	-	4.11	6.15	11.71	-	11.71	2.58	9.14
16.	2039	17.86	2.09	-	-	4.11	6.19	11.67	-	11.67	2.57	9.10
17.	2040	17.86	2.13	-	-	4.11	6.23	11.63	-	11.63	2.56	9.07
18.	2041	17.86	2.17	-	-	4.11	6.28	11.59	-	11.59	2.55	9.04
19.	2042	17.86	2.21	-	-	4.11	6.32	11.54	-	11.54	2.54	9.00
20.	2043	17.86	2.26	-	-	4.11	6.36	11.50	-	11.50	2.53	8.97

Table 3. 19. Balance Sheet Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean																				In Billion Rupiah	
Electricity Supply Business Plan 2021-2030																				Total Liabilities and Equity	Balance Check
BALANCE SHEET																					
Alternative 2		Assets									Liabilities					Equity					
No	Year	Current Assets				Non Current Asset				TOTAL Asset	Current Liabilities			Non Current Liabilities	TOTAL Liabilities	Share Capital	Retained Earning	TOTAL Equity			
		Excess Cash	Required Cash	Trade Receivables	Inventory	Total Current Asset	Fixed Assets - net of accumulated depreciation	Asset Under Construction	Total Non Current Asset		Trade Payables	Accruals	Total Current Liabilities								
0.	2023	-	-	-	-	-	-	82.12	82.12	82.12	-	-	-	-	-	82.12	-	82.12	82.12	-	
1.	2024	8.82	1.95	2.24	0.07	13.08	82.12	-	82.12	95.20	0.25	0.11	0.36	-	0.36	82.12	12.72	94.84	95.20	-	
2.	2025	22.44	1.94	2.24	0.07	26.69	78.01	-	78.01	104.71	0.26	0.11	0.37	-	0.37	82.12	22.22	104.34	104.71	-	
3.	2026	36.03	1.94	2.24	0.08	40.28	73.91	-	73.91	114.19	0.26	0.11	0.37	-	0.37	82.12	31.70	113.81	114.19	-	
4.	2027	49.60	1.93	2.24	0.08	53.84	69.80	-	69.80	123.64	0.27	0.11	0.38	-	0.38	82.12	41.14	123.26	123.64	-	
5.	2028	63.14	1.93	2.24	0.08	67.38	65.69	-	65.69	133.07	0.27	0.12	0.39	-	0.39	82.12	50.57	132.68	133.07	-	
6.	2029	76.65	1.92	2.24	0.08	80.89	61.59	-	61.59	142.48	0.28	0.12	0.40	-	0.40	82.12	59.96	142.08	142.48	-	
7.	2030	90.14	1.91	2.24	0.08	94.37	57.48	-	57.48	151.85	0.28	0.12	0.40	-	0.40	82.12	69.33	151.45	151.85	-	
8.	2031	103.60	1.91	2.24	0.08	107.83	53.38	-	53.38	161.21	0.29	0.12	0.41	-	0.41	82.12	78.67	160.79	161.21	-	
9.	2032	117.03	1.90	2.24	0.09	121.26	49.27	-	49.27	170.53	0.29	0.13	0.42	-	0.42	82.12	87.99	170.11	170.53	-	
10.	2033	130.44	1.89	2.24	0.09	134.66	45.17	-	45.17	179.82	0.30	0.13	0.43	-	0.43	82.12	97.27	179.39	179.82	-	
11.	2034	143.82	1.89	2.24	0.09	148.03	41.06	-	41.06	189.09	0.31	0.13	0.44	-	0.44	82.12	106.53	188.65	189.09	-	
12.	2035	157.16	1.88	2.24	0.09	161.37	36.95	-	36.95	198.33	0.31	0.13	0.45	-	0.45	82.12	115.76	197.88	198.33	-	
13.	2036	170.48	1.87	2.24	0.09	174.68	32.85	-	32.85	207.53	0.32	0.14	0.46	-	0.46	82.12	124.96	207.08	207.53	-	
14.	2037	183.77	1.87	2.24	0.09	187.97	28.74	-	28.74	216.71	0.33	0.14	0.46	-	0.46	82.12	134.13	216.24	216.71	-	
15.	2038	197.03	1.86	2.24	0.10	201.22	24.64	-	24.64	225.85	0.33	0.14	0.47	-	0.47	82.12	143.26	225.38	225.85	-	
16.	2039	210.25	1.85	2.24	0.10	214.44	20.53	-	20.53	234.97	0.34	0.14	0.48	-	0.48	82.12	152.37	234.48	234.97	-	
17.	2040	223.44	1.84	2.24	0.10	227.62	16.42	-	16.42	244.05	0.35	0.15	0.49	-	0.49	82.12	161.44	243.55	244.05	-	
18.	2041	236.60	1.84	2.24	0.10	240.78	12.32	-	12.32	253.10	0.35	0.15	0.50	-	0.50	82.12	170.47	252.59	253.10	-	
19.	2042	249.73	1.83	2.24	0.10	253.90	8.21	-	8.21	262.11	0.36	0.15	0.51	-	0.51	82.12	179.48	261.60	262.11	-	
20.	2043	262.82	1.82	2.24	0.11	266.99	4.11	-	4.11	271.09	0.37	0.16	0.52	-	0.52	82.12	188.45	270.57	271.09	-	

Table 3.20. Cash Flow Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean Electricity Supply Business Plan 2021-2030 CASHFLOW STATEMENT													In Billion Rupiah		
Alternative 2		Operating Activities							Investing Activities			Financing Activities	Net Cash Flow	Beginning Cash	Ending Cash
No	Year	Net Profit	Depreciation	(increase) / decrease in Trade Receivables	(increase) / decrease in Inventory	increase / (decrease) in Trade Payables	increase / (decrease) in Accruals	Total CF from Operating Activities	(Increase)/ Decrease in Fixed Asset	(Increase)/ Decrease in Asset under construction	Total CF from Investing Activities	Increase / (decrease) in Share Capital)			
0.	2023	-	-	-	-	-	-	-	-	(82.12)	(82.12)	82.12	-	-	-
1.	2024	12.72	-	(2.24)	(0.07)	0.25	0.11	10.77	(82.12)	82.12	-	-	10.77	-	10.77
2.	2025	9.50	4.11	-	(0.00)	0.01	0.00	13.61	(0.00)	-	(0.00)	-	13.61	10.77	24.38
3.	2026	9.47	4.11	-	(0.00)	0.01	0.00	13.58	(0.00)	-	(0.00)	-	13.58	24.38	37.97
4.	2027	9.45	4.11	-	(0.00)	0.01	0.00	13.56	(0.00)	-	(0.00)	-	13.56	37.97	51.53
5.	2028	9.42	4.11	-	(0.00)	0.01	0.00	13.53	(0.00)	-	(0.00)	-	13.53	51.53	65.06
6.	2029	9.40	4.11	-	(0.00)	0.01	0.00	13.51	(0.00)	-	(0.00)	-	13.51	65.06	78.57
7.	2030	9.37	4.11	-	(0.00)	0.01	0.00	13.48	(0.00)	-	(0.00)	-	13.48	78.57	92.05
8.	2031	9.34	4.11	-	(0.00)	0.01	0.00	13.45	(0.00)	-	(0.00)	-	13.45	92.05	105.51
9.	2032	9.31	4.11	-	(0.00)	0.01	0.00	13.43	(0.00)	-	(0.00)	-	13.43	105.51	118.93
10.	2033	9.29	4.11	-	(0.00)	0.01	0.00	13.40	(0.00)	-	(0.00)	-	13.40	118.93	132.33
11.	2034	9.26	4.11	-	(0.00)	0.01	0.00	13.37	(0.00)	-	(0.00)	-	13.37	132.33	145.70
12.	2035	9.23	4.11	-	(0.00)	0.01	0.00	13.34	(0.00)	-	(0.00)	-	13.34	145.70	159.04
13.	2036	9.20	4.11	-	(0.00)	0.01	0.00	13.31	(0.00)	-	(0.00)	-	13.31	159.04	172.36
14.	2037	9.17	4.11	-	(0.00)	0.01	0.00	13.28	(0.00)	-	(0.00)	-	13.28	172.36	185.64
15.	2038	9.14	4.11	-	(0.00)	0.01	0.00	13.25	(0.00)	-	(0.00)	-	13.25	185.64	198.89
16.	2039	9.10	4.11	-	(0.00)	0.01	0.00	13.22	(0.00)	-	(0.00)	-	13.22	198.89	212.10
17.	2040	9.07	4.11	-	(0.00)	0.01	0.00	13.19	(0.00)	-	(0.00)	-	13.19	212.10	225.29
18.	2041	9.04	4.11	-	(0.00)	0.01	0.00	13.15	(0.00)	-	(0.00)	-	13.15	225.29	238.44
19.	2042	9.00	4.11	-	(0.00)	0.01	0.00	13.12	(0.00)	-	(0.00)	-	13.12	238.44	251.56
20.	2043	8.97	4.11	-	(0.00)	0.01	0.00	13.08	-	-	-	-	13.08	251.56	264.64

3.5.2 Analysis of Capital Budgeting for Alternative 2

Once the financial statement is completed, a capital budgeting analysis will be conducted for alternative 2 to obtain a comprehensive understanding of the resulting financial indicators. The approach for analyzing capital budgeting in Alternative 2 is identical to that of Alternative 1. It also utilizes the assumption discussed in the previous chapter.

- The description of Capital Budgeting Cash Flows can be found in table 3.20.
- The analysis of capital budgeting on the Free Cash Flow to Firm (FCFF) is displayed in table 3.21.

3.5.3 Levelized Cost of Electricity for Alternative 2

The LCOE method allows for the representation of the cost of generating alternative 2 over the entire duration of the project. The approach for analyzing the levelized cost of electricity in Alternative 2 is identical to that of Alternative 1. It also relies on the assumption mentioned in the preceding chapter.

- The Levelized Cost of Electricity is provided in table 3.22.
- The investment analysis for Alternative 2, which combines the FCFF and LCOE criteria, is summarized in table 3.23.

Table 3. 21. Capital Budgeting Cash Flow Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean Electricity Supply Business Plan 2021-2030 CAPITAL BUDGETING CASH FLOW														In Billion Rupiah	
Alternative 2		Free Cash Flow to The Firm													
No	Year	EBIT	Tax of EBIT	NOPAT	Depreciation	Operating cashflow	Changes in Current Asset	Changes in Account Payable and Accruals	Net Current Asset Investment	Net Fixed Asset Investment	FCFF	Terminal Cashflow	Total Cashflow		
0.	2023	-	-	-	-	-	-	-	-	82.12	(82.12)		(82.12)		
1.	2024	16.31	3.59	12.72	-	12.72	4.26	0.36	3.90	-	8.82		8.82		
2.	2025	12.18	2.68	9.50	4.11	13.60	(0.00)	0.01	(0.01)	-	13.62		13.62		
3.	2026	12.15	2.67	9.47	4.11	13.58	(0.00)	0.01	(0.01)	-	13.59		13.59		
4.	2027	12.11	2.66	9.45	4.11	13.55	(0.00)	0.01	(0.01)	-	13.57		13.57		
5.	2028	12.08	2.66	9.42	4.11	13.53	(0.00)	0.01	(0.01)	-	13.54		13.54		
6.	2029	12.05	2.65	9.40	4.11	13.50	(0.00)	0.01	(0.01)	-	13.51		13.51		
7.	2030	12.01	2.64	9.37	4.11	13.48	(0.00)	0.01	(0.01)	-	13.49		13.49		
8.	2031	11.98	2.64	9.34	4.11	13.45	(0.00)	0.01	(0.01)	-	13.46		13.46		
9.	2032	11.94	2.63	9.31	4.11	13.42	(0.00)	0.01	(0.01)	-	13.43		13.43		
10.	2033	11.91	2.62	9.29	4.11	13.39	(0.00)	0.01	(0.01)	-	13.41		13.41		
11.	2034	11.87	2.61	9.26	4.11	13.36	(0.01)	0.01	(0.01)	-	13.38		13.38		
12.	2035	11.83	2.60	9.23	4.11	13.33	(0.01)	0.01	(0.01)	-	13.35		13.35		
13.	2036	11.79	2.59	9.20	4.11	13.30	(0.01)	0.01	(0.01)	-	13.32		13.32		
14.	2037	11.75	2.59	9.17	4.11	13.27	(0.01)	0.01	(0.01)	-	13.29		13.29		
15.	2038	11.71	2.58	9.14	4.11	13.24	(0.01)	0.01	(0.01)	-	13.26		13.26		
16.	2039	11.67	2.57	9.10	4.11	13.21	(0.01)	0.01	(0.02)	-	13.23		13.23		
17.	2040	11.63	2.56	9.07	4.11	13.18	(0.01)	0.01	(0.02)	-	13.19		13.19		
18.	2041	11.59	2.55	9.04	4.11	13.14	(0.01)	0.01	(0.02)	-	13.16		13.16		
19.	2042	11.54	2.54	9.00	4.11	13.11	(0.01)	0.01	(0.02)	-	13.13		13.13		
20.	2043	11.50	2.53	8.97	4.11	13.08	(0.01)	0.01	(0.02)	-	13.09	134.97	148.06		

Table 3. 22. Capital Budgeting Analysis Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean
Electricity Supply Business Plan 2021-2030
CAPITAL BUDGETING ANALYSIS

Alternative 2		Free Cash Flow to The Firm			
No	Year	Cash Flow	Accumulated Cashflow	PV of Cash Flow	Accumulated PV of Cash Flow
0.	2023	(82.12)	(82.12)	(82.12)	(82.12)
1.	2024	8.82	(73.29)	8.04	(66.81)
2.	2025	13.62	(59.68)	11.31	(49.59)
3.	2026	13.59	(46.09)	10.29	(34.91)
4.	2027	13.57	(32.52)	9.37	(22.46)
5.	2028	13.54	(18.98)	8.52	(11.95)
6.	2029	13.51	(5.47)	7.75	(3.14)
7.	2030	13.49	8.02	7.06	4.20
8.	2031	13.46	21.48	6.42	10.24
9.	2032	13.43	34.92	5.84	15.18
10.	2033	13.41	48.32	5.31	19.15
11.	2034	13.38	61.70	4.83	22.28
12.	2035	13.35	75.05	4.39	24.71
13.	2036	13.32	88.36	4.00	26.52
14.	2037	13.29	101.65	3.64	27.81
15.	2038	13.26	114.91	3.31	28.66
16.	2039	13.23	128.13	3.01	29.13
17.	2040	13.19	141.33	2.73	29.29
18.	2041	13.16	154.49	2.49	29.19
19.	2042	13.13	167.61	2.26	28.87
20.	2043	148.06	315.68	23.24	49.56

Table 3. 23. Levelized Cost of Electricity Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean
Electricity Supply Business Plan 2021-2030
LEVELIZED ELECTRICITY GENERATING COST

Alternative 2		PV kWh		PV IDR			
No	Year	Generation energy (gross)	Salable energy (net)	A component (Investment Cost)	B component (Fixed OM Cost)	C component (Fuel Cost)	D component (Variable OM Cost)
0.	2023	-	-	82.12	-	-	-
1.	2024	5,090,702	4,841,557	-	1.41	-	-
2.	2025	4,640,567	4,413,452	-	1.31	-	-
3.	2026	4,230,234	4,023,202	-	1.22	-	-
4.	2027	3,856,184	3,667,458	-	1.14	-	-
5.	2028	3,515,209	3,343,171	-	1.06	-	-
6.	2029	3,204,384	3,047,558	-	0.98	-	-
7.	2030	2,921,043	2,778,083	-	0.91	-	-
8.	2031	2,662,755	2,532,437	-	0.85	-	-
9.	2032	2,427,307	2,308,511	-	0.79	-	-
10.	2033	2,212,677	2,104,386	-	0.73	-	-
11.	2034	2,017,026	1,918,310	-	0.68	-	-
12.	2035	1,838,674	1,748,687	-	0.63	-	-
13.	2036	1,676,093	1,594,063	-	0.59	-	-
14.	2037	1,527,888	1,453,111	-	0.55	-	-
15.	2038	1,392,788	1,324,623	-	0.51	-	-
16.	2039	1,269,633	1,207,496	-	0.47	-	-
17.	2040	1,157,368	1,100,725	-	0.44	-	-
18.	2041	1,055,030	1,003,396	-	0.41	-	-
19.	2042	961,742	914,673	-	0.38	-	-
20.	2043	876,701	833,795	-	0.35	-	-
		48,534,005.28	46,158,693.96	82.12	15.43	0.00	0.0

Table 3. 24. Summary of Investment Criteria for Alternative 2

Summary		
Parameter	Alternative 2	Evaluation
NPV (Billion IDR)	51.70	ACCEPT
MIRR (percentage)	12.41%	ACCEPT
Profitability Index	1.63	ACCEPT
Payback period (years)	6.59	ACCEPT
LCOE (IDR/kWh)	-33%	ACCEPT

3.6 Analysis of Alternative 3

3.6.1 Financial Statement Projection for Alternative 3

Alternative 3 employs the same methodology as Alternative 1 to evaluate the financial statement projections and implement the assumptions outlined in the preceding chapter, making it suitable for this purpose.

- The Income Statement Projection can be found in table 3.24, while the depreciation schedule is provided in Appendix 2.
- The Balance Sheet Projection is displayed in table 3.25.
- The Cash Flow Projection is displayed in table 3.26.

Table 3. 25. Income Statement Alternative 3

Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean Electricity Supply Business Plan 2021-2030 INCOME STATEMENT												
Alternative 3		Revenues	Operating Expenses					EBIT	Other Income (interest = 0)	Earning before Tax	Tax	Net Profit
No	Year		Comp. A,B & D	Comp. C (Fuel Cost)		Depreciation	Total					
0.	2023	-	-	-	-	-	-	-	-	-	-	-
1.	2024	111.96	1.55	95.01	-	-	96.56	15.40	-	15.40	3.39	12.01
2.	2025	111.96	1.58	95.01	0.00	2.07	98.66	13.30	-	13.30	2.93	10.37
3.	2026	111.96	1.61	95.01	0.00	2.07	98.69	13.27	-	13.27	2.92	10.35
4.	2027	111.96	1.64	95.01	0.00	2.07	98.72	13.24	-	13.24	2.91	10.32
5.	2028	111.96	1.68	95.01	0.00	2.07	98.75	13.20	-	13.20	2.90	10.30
6.	2029	111.96	1.71	95.01	0.00	2.07	98.79	13.17	-	13.17	2.90	10.27
7.	2030	111.96	1.74	95.01	0.00	2.07	98.82	13.14	-	13.14	2.89	10.25
8.	2031	111.96	1.78	95.01	0.00	2.07	98.86	13.10	-	13.10	2.88	10.22
9.	2032	111.96	1.82	95.01	0.00	2.07	98.89	13.07	-	13.07	2.87	10.19
10.	2033	111.96	1.85	95.01	0.00	2.07	98.93	13.03	-	13.03	2.87	10.16
11.	2034	111.96	1.89	95.01	0.00	2.07	98.96	12.99	-	12.99	2.86	10.13
12.	2035	111.96	1.93	95.01	0.00	2.07	99.00	12.95	-	12.95	2.85	10.10
13.	2036	111.96	1.96	95.01	0.00	2.07	99.04	12.92	-	12.92	2.84	10.07
14.	2037	111.96	2.00	95.01	0.00	2.07	99.08	12.88	-	12.88	2.83	10.04
15.	2038	111.96	2.04	95.01	0.00	2.07	99.12	12.84	-	12.84	2.82	10.01
16.	2039	111.96	2.09	95.01	0.00	2.07	99.16	12.80	-	12.80	2.82	9.98
17.	2040	111.96	2.13	95.01	0.00	2.07	99.20	12.75	-	12.75	2.81	9.95
18.	2041	111.96	2.17	95.01	0.00	2.07	99.24	12.71	-	12.71	2.80	9.92
19.	2042	111.96	2.21	95.01	0.00	2.07	99.29	12.67	-	12.67	2.79	9.88
20.	2043	111.96	2.26	95.01	0.00	2.07	99.33	12.62	-	12.62	2.78	9.85

Table 3. 26. Balance Sheet Alternative 3

Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean Electricity Supply Business Plan 2021-2030 BALANCE SHEET																		In Billion Rupiah		
Alternative 3		Assets									Liabilities					Equity			Total Liabilities and Equity	Balance Check
No	Year	Current Assets				Non Current Asset					Current Liabilities			Non Current Liabilities	TOTAL Liabilities	Share Capital	Retained Earning	TOTAL Equity		
		Excess Cash	Required Cash	Trade Receivables	Inventory	Total Current Asset	Fixed Assets - net of accumulated depreciation	Asset Under Construction	Total Non Current Asset	TOTAL Asset	Trade Payables	Accruals	Total Current Liabilities							
0.	2023	-	-	-	-	-	-	41.32	41.32	41.32	-	-	-	-	-	41.32	-	41.32	41.32	-
1.	2024	9.21	-	14.01	4.58	27.80	41.32	-	41.32	69.12	15.68	0.11	15.79	-	15.79	41.32	12.01	53.33	69.12	-
2.	2025	21.66	-	14.01	4.58	40.25	39.25	-	39.25	79.50	15.69	0.11	15.80	-	15.80	41.32	22.39	63.70	79.50	-
3.	2026	34.08	-	14.01	4.58	52.67	37.19	-	37.19	89.86	15.69	0.11	15.81	-	15.81	41.32	32.74	74.05	89.86	-
4.	2027	46.48	-	14.01	4.58	65.07	35.12	-	35.12	100.19	15.70	0.11	15.81	-	15.81	41.32	43.06	84.38	100.19	-
5.	2028	58.85	-	14.01	4.58	77.44	33.05	-	33.05	110.50	15.71	0.12	15.82	-	15.82	41.32	53.36	94.68	110.50	-
6.	2029	71.19	-	14.01	4.58	89.79	30.99	-	30.99	120.78	15.71	0.12	15.83	-	15.83	41.32	63.63	104.95	120.78	-
7.	2030	83.51	-	14.01	4.58	102.11	28.92	-	28.92	131.03	15.72	0.12	15.84	-	15.84	41.32	73.88	115.20	131.03	-
8.	2031	95.80	-	14.01	4.59	114.40	26.86	-	26.86	141.26	15.72	0.12	15.85	-	15.85	41.32	84.10	125.42	141.26	-
9.	2032	108.07	-	14.01	4.59	126.67	24.79	-	24.79	151.46	15.73	0.13	15.85	-	15.85	41.32	94.29	135.61	151.46	-
10.	2033	120.30	-	14.01	4.59	138.91	22.72	-	22.72	161.63	15.73	0.13	15.86	-	15.86	41.32	104.45	145.77	161.63	-
11.	2034	132.51	-	14.01	4.59	151.12	20.66	-	20.66	171.77	15.74	0.13	15.87	-	15.87	41.32	114.59	155.90	171.77	-
12.	2035	144.69	-	14.01	4.59	163.30	18.59	-	18.59	181.89	15.75	0.13	15.88	-	15.88	41.32	124.69	166.01	181.89	-
13.	2036	156.84	-	14.01	4.59	175.45	16.53	-	16.53	191.97	15.75	0.14	15.89	-	15.89	41.32	134.77	176.08	191.97	-
14.	2037	168.95	-	14.01	4.60	187.56	14.46	-	14.46	202.03	15.76	0.14	15.90	-	15.90	41.32	144.81	186.13	202.03	-
15.	2038	181.04	-	14.01	4.60	199.65	12.40	-	12.40	212.05	15.76	0.14	15.91	-	15.91	41.32	154.82	196.14	212.05	-
16.	2039	193.09	-	14.01	4.60	211.71	10.33	-	10.33	222.04	15.77	0.14	15.92	-	15.92	41.32	164.80	206.12	222.04	-
17.	2040	205.12	-	14.01	4.60	223.73	8.26	-	8.26	232.00	15.78	0.15	15.93	-	15.93	41.32	174.75	216.07	232.00	-
18.	2041	217.10	-	14.01	4.60	235.72	6.20	-	6.20	241.92	15.79	0.15	15.94	-	15.94	41.32	184.67	225.98	241.92	-
19.	2042	229.06	-	14.01	4.61	247.68	4.13	-	4.13	251.81	15.79	0.15	15.95	-	15.95	41.32	194.55	235.87	251.81	-
20.	2043	240.98	-	14.01	4.61	259.60	2.07	-	2.07	261.67	15.80	0.16	15.96	-	15.96	41.32	204.40	245.71	261.67	-

Table 3. 27. Cash Flow Alternative 3

**Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean
Electricity Supply Business Plan 2021-2030
CASHFLOW STATEMENT**

Alternative 3		Operating Activities							Investing Activities			Financing Activities	In Billion Rupiah		
No	Year	Net Profit	Depreciation	(increase) / decrease in Trade Receivables	(increase) / decrease in Inventory	increase / (decrease) in Trade Payables	increase / (decrease) in Accruals	Total CF from Operating Activities	(Increase)/ Decrease in Fixed Asset	(Increase)/ Decrease in Asset under construction	Total CF from Investing Activities	Increase / (decrease) in Share Capital)	Net Cash Flow	Beginning Cash	Ending Cash
0.	2023	-	-	-	-	-	-	-	-	(41.32)	(41.32)	41.32	-	-	-
1.	2024	12.01	-	(14.01)	(4.58)	15.68	0.11	9.21	(41.32)	41.32	-	-	9.21	-	9.21
2.	2025	10.37	2.07	-	(0.00)	0.01	0.00	12.45	0.00	-	0.00	-	12.45	9.21	21.66
3.	2026	10.35	2.07	-	(0.00)	0.01	0.00	12.42	0.00	-	0.00	-	12.42	21.66	34.08
4.	2027	10.32	2.07	-	(0.00)	0.01	0.00	12.40	0.00	-	0.00	-	12.40	34.08	46.48
5.	2028	10.30	2.07	-	(0.00)	0.01	0.00	12.37	0.00	-	0.00	-	12.37	46.48	58.85
6.	2029	10.27	2.07	-	(0.00)	0.01	0.00	12.35	0.00	-	0.00	-	12.35	58.85	71.19
7.	2030	10.25	2.07	-	(0.00)	0.01	0.00	12.32	0.00	-	0.00	-	12.32	71.19	83.51
8.	2031	10.22	2.07	-	(0.00)	0.01	0.00	12.29	0.00	-	0.00	-	12.29	83.51	95.80
9.	2032	10.19	2.07	-	(0.00)	0.01	0.00	12.26	0.00	-	0.00	-	12.26	95.80	108.07
10.	2033	10.16	2.07	-	(0.00)	0.01	0.00	12.24	0.00	-	0.00	-	12.24	108.07	120.30
11.	2034	10.13	2.07	-	(0.00)	0.01	0.00	12.21	0.00	-	0.00	-	12.21	120.30	132.51
12.	2035	10.10	2.07	-	(0.00)	0.01	0.00	12.18	0.00	-	0.00	-	12.18	132.51	144.69
13.	2036	10.07	2.07	-	(0.00)	0.01	0.00	12.15	0.00	-	0.00	-	12.15	144.69	156.84
14.	2037	10.04	2.07	-	(0.00)	0.01	0.00	12.12	-	-	-	-	12.12	156.84	168.95
15.	2038	10.01	2.07	-	(0.00)	0.01	0.00	12.09	-	-	-	-	12.09	168.95	181.04
16.	2039	9.98	2.07	-	(0.00)	0.01	0.00	12.05	-	-	-	-	12.05	181.04	193.09
17.	2040	9.95	2.07	-	(0.00)	0.01	0.00	12.02	-	-	-	-	12.02	193.09	205.12
18.	2041	9.92	2.07	-	(0.00)	0.01	0.00	11.99	-	-	-	-	11.99	205.12	217.10
19.	2042	9.88	2.07	-	(0.00)	0.01	0.00	11.96	-	-	-	-	11.96	217.10	229.06
20.	2043	9.85	2.07	-	(0.00)	0.01	0.00	11.92	-	-	-	-	11.92	229.06	240.98

3.6.2 Analysis of Capital Budgeting for Alternative 3

Once the financial statement is completed, a capital budgeting analysis is conducted for Alternative 3 in order to obtain a comprehensive understanding of the resulting financial indicators. The approach for analyzing capital budgeting in Alternative 3 is identical to that of Alternative 1. It also relies on the assumption discussed in the previous chapter.

- The description of Capital Budgeting Cash Flows can be found in table 3.27.
- The analysis of Capital Budgeting on the Free Cash Flow to Firm (FCFF) is displayed in table 3.28.

3.6.3 Levelized Cost of Electricity for Alternative 3

The LCOE method allows for the calculation of the total cost of generating Alternative 3 over the entire duration of the project. The approach for analyzing the levelized cost of electricity in Alternative 3 is identical to that of Alternative 1. It also relies on the assumption discussed in the previous chapter.

- The Levelized Cost of Electricity is provided in table 3.29.
- The investment analysis for Alternative 3 is summarized in table 3.30.

Table 3. 28. Capital Budgeting Cash Flow Alternative 3

Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean Electricity Supply Business Plan 2021-2030 CAPITAL BUDGETING CASH FLOW													
Alternative 3		Free Cash Flow to The Firm											
No	Year	EBIT	Tax of EBIT	NOPAT	Depreciation	Operating cashflow	Changes in Current Asset	Changes in Account Payable and Accruals	Net Current Asset Investment	Net Fixed Asset Investment	FCFF	Terminal Cashflow	Total Cashflow
0.	2023	-	-	-	-	-	-	-	-	41.32	(41.32)		(41.32)
1.	2024	15.40	3.39	12.01	-	12.01	18.59	15.79	2.80	-	9.21		9.21
2.	2025	13.30	2.93	10.37	2.07	12.44	0.00	0.01	(0.01)	-	12.45		12.45
3.	2026	13.27	2.92	10.35	2.07	12.42	0.00	0.01	(0.01)	-	12.42		12.42
4.	2027	13.24	2.91	10.32	2.07	12.39	0.00	0.01	(0.01)	-	12.40		12.40
5.	2028	13.20	2.90	10.30	2.07	12.37	0.00	0.01	(0.01)	-	12.37		12.37
6.	2029	13.17	2.90	10.27	2.07	12.34	0.00	0.01	(0.01)	-	12.35		12.35
7.	2030	13.14	2.89	10.25	2.07	12.31	0.00	0.01	(0.01)	-	12.32		12.32
8.	2031	13.10	2.88	10.22	2.07	12.29	0.00	0.01	(0.01)	-	12.29		12.29
9.	2032	13.07	2.87	10.19	2.07	12.26	0.00	0.01	(0.01)	-	12.26		12.26
10.	2033	13.03	2.87	10.16	2.07	12.23	0.00	0.01	(0.01)	-	12.24		12.24
11.	2034	12.99	2.86	10.13	2.07	12.20	0.00	0.01	(0.01)	-	12.21		12.21
12.	2035	12.95	2.85	10.10	2.07	12.17	0.00	0.01	(0.01)	-	12.18		12.18
13.	2036	12.92	2.84	10.07	2.07	12.14	0.00	0.01	(0.01)	-	12.15		12.15
14.	2037	12.88	2.83	10.04	2.07	12.11	0.00	0.01	(0.01)	-	12.12		12.12
15.	2038	12.84	2.82	10.01	2.07	12.08	0.00	0.01	(0.01)	-	12.09		12.09
16.	2039	12.80	2.82	9.98	2.07	12.05	0.00	0.01	(0.01)	-	12.05		12.05
17.	2040	12.75	2.81	9.95	2.07	12.01	0.00	0.01	(0.01)	-	12.02		12.02
18.	2041	12.71	2.80	9.92	2.07	11.98	0.00	0.01	(0.01)	-	11.99		11.99
19.	2042	12.67	2.79	9.88	2.07	11.95	0.00	0.01	(0.01)	-	11.96		11.96
20.	2043	12.62	2.78	9.85	2.07	11.91	0.00	0.01	(0.01)	-	11.92	122.90	134.82

Table 3. 29. Capital Budgeting Analysis for Alternative 3

Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean Electricity Supply Business Plan 2021-2030 CAPITAL BUDGETING ANALYSIS					
Alternative 3		Free Cash Flow to The Firm			
No	Year	Cash Flow	Accumulated Cashflow	PV of Cash Flow	Accumulated PV of Cash Flow
0.	2023	(41.32)	(41.32)	(41.32)	(41.32)
1.	2024	9.21	(32.10)	8.40	(29.27)
2.	2025	12.45	(19.66)	10.34	(16.34)
3.	2026	12.42	(7.24)	9.41	(5.48)
4.	2027	12.40	5.16	8.56	3.56
5.	2028	12.37	17.53	7.79	11.04
6.	2029	12.35	29.88	7.08	17.14
7.	2030	12.32	42.20	6.44	22.07
8.	2031	12.29	54.49	5.86	25.98
9.	2032	12.26	66.75	5.33	29.01
10.	2033	12.24	78.99	4.85	31.30
11.	2034	12.21	91.19	4.41	32.94
12.	2035	12.18	103.37	4.01	34.03
13.	2036	12.15	115.52	3.65	34.67
14.	2037	12.12	127.64	3.32	34.92
15.	2038	12.09	139.72	3.01	34.85
16.	2039	12.05	151.78	2.74	34.51
17.	2040	12.02	163.80	2.49	33.95
18.	2041	11.99	175.79	2.26	33.21
19.	2042	11.96	187.74	2.06	32.33
20.	2043	134.82	322.56	21.16	50.64

Table 3. 30. Levelized Cost of Electricity for Alternative 3

Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean
Electricity Supply Business Plan 2021-2030
LEVELIZED ELECTRICITY GENERATING COST

Alternatives 3		PV kWh		PV IDR			
No	Year	Generation energy (gross)	Salable energy (net)	A component (Investment Cost)	B component (Fixed OM Cost)	C component (Fuel Cost)	D component (Variable OM Cost)
0.	2023	-	-	41.32	-	-	-
1.	2024	31,941,659	30,344,576	-	1.41	86.61	0.47
2.	2025	29,117,283	27,661,419	-	1.31	78.95	0.44
3.	2026	26,542,646	25,215,514	-	1.22	71.97	0.41
4.	2027	24,195,666	22,985,883	-	1.14	65.61	0.38
5.	2028	22,056,214	20,953,403	-	1.06	59.80	0.35
6.	2029	20,105,938	19,100,641	-	0.98	54.52	0.33
7.	2030	18,328,111	17,411,705	-	0.91	49.70	0.30
8.	2031	16,707,485	15,872,111	-	0.85	45.30	0.28
9.	2032	15,230,159	14,468,651	-	0.79	41.30	0.26
10.	2033	13,883,463	13,189,290	-	0.73	37.64	0.24
11.	2034	12,655,846	12,023,054	-	0.68	34.32	0.23
12.	2035	11,536,779	10,959,940	-	0.63	31.28	0.21
13.	2036	10,516,663	9,990,829	-	0.59	28.52	0.20
14.	2037	9,586,748	9,107,411	-	0.55	25.99	0.18
15.	2038	8,739,059	8,302,106	-	0.51	23.70	0.17
16.	2039	7,966,326	7,568,009	-	0.47	21.60	0.16
17.	2040	7,261,919	6,898,823	-	0.44	19.69	0.15
18.	2041	6,619,799	6,288,809	-	0.41	17.95	0.14
19.	2042	6,034,457	5,732,734	-	0.38	16.36	0.13
20.	2043	5,500,872	5,225,828	-	0.35	14.92	0.12
		304,527,091.93	289,300,737.33	41.32	15.43	825.71	5.1

Table 3. 31. Summary of Investment Criteria for Alternative 3

Summary		
Parameter	Alternative 3	Evaluation
NPV (Billion IDR)	81.86	ACCEPT
MIRR (percentage)	15.86%	ACCEPT
Profitability Index	2.98	ACCEPT
Payback period (years)	3.42	ACCEPT
LCOE (IDR/kWh)	-2%	ACCEPT

3.7 Comparison of Alternative 1,2, and 3

After conducting a comprehensive analysis of all alternatives, it is evident from table 3.31 that Alternative 2 is the most favorable choice for the Bawean project. This alternative demonstrates the highest Capital Budgeting Analysis criteria and the lowest Levelized Cost of Electricity (LCOE) when compared to the current generation cost of the Bawean power plant. In fact, the LCOE of Alternative 2 is 33% lower than the current generating cost. Therefore, the analysis will exclusively focus on Alternative 2 for the subsequent chapter and beyond.

Table 3. 32. Summary of Investment Criteria for All Alternatives

Summary			
Parameter	Alternative 1	Alternative 2	Alternative 3
NPV (Billion IDR)	44.03	51.70	81.86
MIRR (percentage)	11.51%	12.41%	15.86%
Profitability Index	1.39	1.63	2.98
Payback period (years)	7.57	6.59	3.42
LCOE (IDR/kWh)	-21%	-33%	-2%

3.8 Analysis of Financial Model Sustainability

The sustainability of the investment project will be assessed by analyzing various financial ratios derived from the projected financial model. The ratios under evaluation include Liquidity Ratio, Activity Ratio, Debt Ratio, and Profitability Ratio. The outcome of the financial ratio calculations is outlined in Table 3.31.

Table 3. 33. Analysis of Financial Ratio for Sustainability Alternative 2

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean Electricity Supply Business Plan 2021-2030 SUSTAINABILITY ANALYSIS											
Alternative 1		Liquidity Ratio		Activity Ratio			Profitability Ratio				
No	Year	Current Ratio	Quick (Acid-Test) Ratio	Average Age of Inventory	Average Collection Period	Average Payment Period	Total Asset Turnover	Operating Profit Margin	Net Profit Margin	Return on Asset	Return on Equity
0.	2022										
1.	2023	11.85	11.65	17.29	109.08	65.88	0.22	91%	71%	13%	15%
2.	2024	11.61	11.40	17.29	109.08	65.88	0.23	68%	53%	9%	12%
3.	2025	11.37	11.16	17.29	109.08	65.88	0.25	68%	53%	8%	12%
4.	2026	11.13	10.93	17.29	109.08	65.88	0.26	68%	53%	8%	13%
5.	2027	10.90	10.70	17.29	109.08	65.88	0.28	68%	53%	7%	14%
6.	2028	10.68	10.48	17.29	109.08	65.88	0.30	67%	53%	7%	14%
7.	2029	10.46	10.25	17.29	109.08	65.88	0.32	67%	52%	6%	15%
8.	2030	10.24	10.04	17.29	109.08	65.88	0.35	67%	52%	6%	16%
9.	2031	10.03	9.83	17.29	109.08	65.88	0.38	67%	52%	5%	18%
10.	2032	9.82	9.62	17.29	109.08	65.88	0.41	67%	52%	5%	19%
11.	2033	9.62	9.41	17.29	109.08	65.88	0.46	66%	52%	5%	21%
12.	2034	9.42	9.21	17.29	109.08	65.88	0.51	66%	52%	5%	23%
13.	2035	9.22	9.02	17.29	109.08	65.88	0.58	66%	51%	4%	25%
14.	2036	9.03	8.82	17.29	109.08	65.88	0.66	66%	51%	4%	28%
15.	2037	8.84	8.64	17.29	109.08	65.88	0.78	66%	51%	4%	32%
16.	2038	8.65	8.45	17.29	109.08	65.88	0.96	65%	51%	4%	38%
17.	2039	8.47	8.27	17.29	109.08	65.88	1.23	65%	51%	4%	45%
18.	2040	8.30	8.09	17.29	109.08	65.88	1.70	65%	51%	4%	57%
19.	2041	8.12	7.92	17.29	109.08	65.88	2.80	65%	50%	3%	76%
20.	2042	7.95	7.75	17.29	109.08	65.88	7.81	64%	50%	3%	116%

3.9 Analysis of Financial Risk Assessment

A financial risk assessment and analysis are conducted on the project to evaluate the potential risks associated with the financial aspects resulting from changes in assumptions. The findings of this assessment can be utilized by PLN to develop a mitigation plan prior to and during the project implementation. The risk analysis will focus on evaluating the project based on the criterion of Net Present Value (NPV) derived from the Free Cash Flow to the Firm. We will conduct three risk assessments using the following phases:

- Scenario Analysis: to assess the impact on Net Present Value (NPV) caused the Solar PV powerplant doesn't operating. This analysis will ascertain the project's outcome in scenarios 1, 2, and 3.
- Conduct a sensitivity analysis to determine the variables that have the greatest impact on the net present value (NPV).
- The Monte Carlo Simulation is used to determine the probability distribution of the Net Present Value (NPV) as a result of changes in sensitive variables. The range data of this simulation is based on three scenarios: low, most likely, and high.

3.9.1 Scenario Analysis

Solar photovoltaic (PV) power plants offer several benefits, including the providing of clean and sustainable energy, as well as the reduction of carbon emissions. Nevertheless, Solar PV, similar to other technologies, presents weaknesses that are heavily influenced by weather conditions. Solar photovoltaic (PV) systems rely significantly on weather factors and the solar irradiance. Adverse weather conditions or cloud cover can significantly reduce solar energy production, while solar power production is completely zero during night. The risk analysis scenario should encompass the potential consequences of adverse weather conditions on project timelines and the potential decrease in energy generation. An approach taken to address supply constraints resulting from the decrease in Solar PV production is to optimize diesel generators. This implies that there will be an increase in the consumption of high-speed diesel (HSD) that is equivalent to the amount of energy produced. This research delineates three scenarios, considering the ten-year duration of the RUPTL project (2021-2030) and the twenty-year economic lifespan of the powerplant (2023-2042).

- Scenario 1: Solar PV production decreases by 10%, so there is the use of HSD of the amount of energy produced.
- Scenario 2: Solar PV production decreases by 15%, so there is the use of HSD of the amount of energy produced.
- Scenario 3: Solar PV production decreases by 20%, so there is the use of HSD of the amount of energy produced.

The result of scenario analysis can be seen in table 3.32

Based on the simulated scenarios, it has been determined that the project will result in a negative net present value (NPV) when implemented under scenarios 1-3. The net present value (NPV) for scenarios 1 to 3 is 74.41 billion IDR. A potential strategy to address the issues faced by PLN is to focus on maximizing the efficiency of the solar panels, implementing condition-based maintenance, and managing the load. This will help to achieve an optimal capacity factor, ensuring that the project returns meet the expected net present value.

3.9.2 Sensitivity Analysis

Sensitivity analysis is conducted by examining the variables that exhibit a substantial correlation. By conducting these tests, it will determine which variables will impact the feasibility of the project. This study employs a fluctuation range of +/-20% to ascertain the impact on the firm's net present value (NPV). The variables employed for conducting sensitivity analysis include Exchange rate, HSD Cost, Fix O&M Growth, Variable O&M Growth, and A Component (EPC Cost).

The sensitivity results of the investment project are described in Table 3.32, which is accompanied by tornado and spider charts as shown in Figures 3.3 and 3.4 respectively. During this analysis, two critical variables were identified that caused a significant change in NPV beyond the input swing of +/-20%. These variables are the A Component (EPC Cost) and the HSD Cost.

3.9.3 Monte Carlo Simulation

A Monte Carlo simulation was conducted for two variables that are highly sensitive. The data distribution employed for each variable is: HSD The cost will be estimated using a triangulation distribution due to the scarcity of historical data available for this research. The data utilized is derived from the HSD cost range specified in the RUPTL 2021-2030. The exchange rate will be modeled using a normal distribution. The data cited pertains to the chronological daily exchange rate acquired from bi.go.id spanning from 1 January 2022 to 1 December 2022.

The outcomes of the Monte Carlo simulation are displayed in Table 3.33, 3.34. The analysis was conducted a total of 10,000 times. Based on the research findings, the likelihood of obtaining a negative net present value (NPV) is 100%, indicating that the Bawean project is expected to yield negative returns and is therefore not a viable investment.

Table 3. 34 Scenario Analysis Result

SCENARIO ANALYSIS				
Variables	Input Cell	Scenario 1 (Solar PV production decreased by 10%, HSD usage by 10%)	Scenario 2 (Solar PV production decreases by 15%, HSD usage by 15%)	Scenario 3 (Solar PV production decreased by 20%, HSD usage by 20%)
Fuel cost (Year)		1	2	3
2023	9.50	9.50	14.25	19.00
2024	9.50	9.50	14.25	19.00
2025	9.50	9.50	14.25	19.00
2026	9.50	9.50	14.25	19.00
2027	9.50	9.50	14.25	19.00
2028	9.50	9.50	14.25	19.00
2029	9.50	9.50	14.25	19.00
2030	9.50	9.50	14.25	19.00
2031	9.50	9.50	14.25	19.00
2032	9.50	9.50	14.25	19.00
2033	9.50	9.50	14.25	19.00
2034	9.50	9.50	14.25	19.00
2035	9.50	9.50	14.25	19.00
2036	9.50	9.50	14.25	19.00
2037	9.50	9.50	14.25	19.00
2038	9.50	9.50	14.25	19.00
2039	9.50	9.50	14.25	19.00
2040	9.50	9.50	14.25	19.00
2041	9.50	9.50	14.25	19.00
2042	9.50	9.50	14.25	19.00
NPV (Bil IDR)	51.70	(22.71)	(59.91)	(97.11)
		Range	(74.41)	

Table 3. 35 Sensitivity Analysis Result

SENSITIVITY ANALYSIS						
In Billion IDR						
Variables	Normal	+20% Swing	-20% Swing	Current NPV	+20% Swing NPV	-20% Swing NPV
Exchange rate	15,000.00	18,000.00	12,000.00	51.70	197.47	1,123.34
HSD Cost	9513.90	11,416.68	7,611.12	51.70	205.04	1,115.77
Fixed O&M growth	2.00%	2.40%	1.60%	51.70	638.35	680.79
A component (EPC Cost)	82,118	98,542	65,695	51.70	644.92	675.89
Variable O&M growth	2.00%	2.40%	1.60%	51.70	656.16	664.43

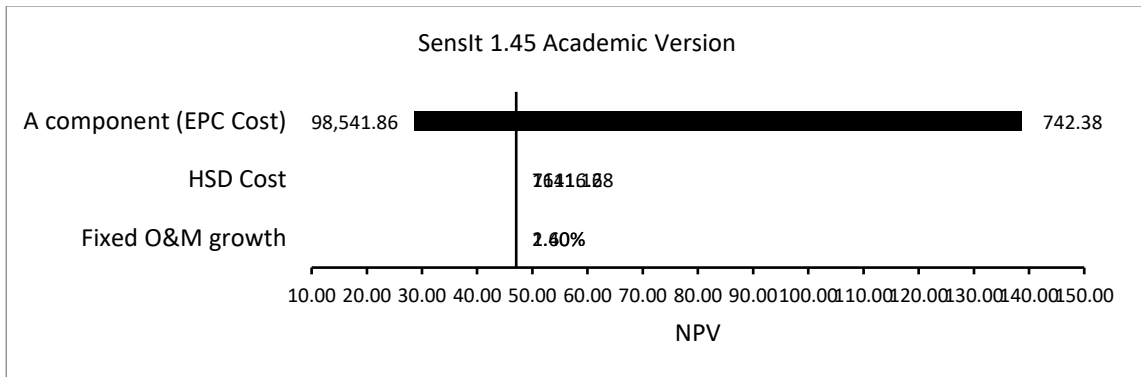


Figure 3. 3 Tornado Chart Result

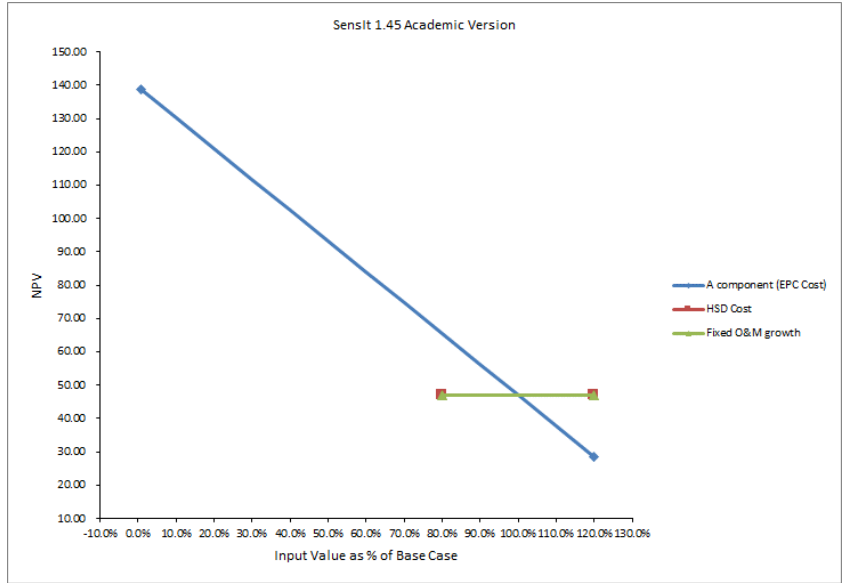


Figure 3. 4. Spider Chart Result

Table 3. 36. Monte Carlo Simulation Statistics Result

Forecast: 0	
Edit View Forecast Preferences Help	
10.000 Trials	
Statistic	Forecast values
Trials	10.000
Base Case	0,00
Mean	24.520,72
Median	24.520,99
Mode	---
Standard Deviation	726,67
Variance	528.052,62
Skewness	-0,0210
Kurtosis	2,62
Coeff. of Variation	0,0296
Minimum	22.310,34
Maximum	26.595,93
Mean Std. Error	7,27

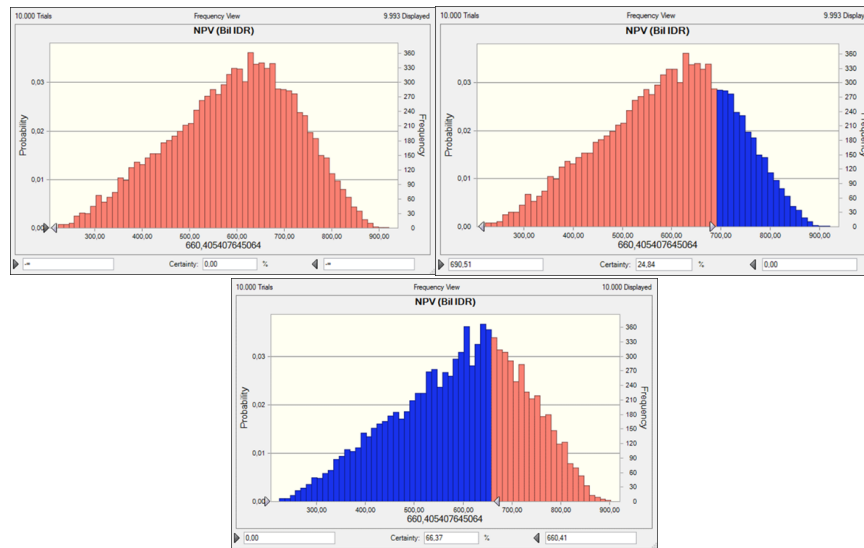


Figure 3. 5. Montecarlo simulation

3.10 Discussion

This section will highlight all the conducted analysis in this research.

- a. Analysis of capital budgeting and levelized cost of electricity.

Alternative 2 is the optimal choice among all the alternatives that PLN has evaluated. The analysis reveals that the NPV is 51.70 billion IDR, the MIRR is 12.41%, the Profitability Index is 1.63, the Payback Period is 8.60 years, and the LCOE is 33% lower than the current Bawean powerplant.

- b. Scenario Analysis

Alternative 2 would not be economically viable if the project followed scenario 1-3, involving the use of HSD to replace the decreased capacity factor of PLTS. The NPV range from scenario 1 to scenario 3 was 74.41 billion IDR.

- c. Sensitivity analysis

Based on Alternative 2, the sensitivity analysis revealed that the A Component (EPC Cost) and HSD cost are the two most influential variables.

- d. Monte Carlo Simulation

Based on the simulation of Alternative 1, the probability of obtaining a negative net present value (NPV) is 0%. The probability of achieving an NPV higher than 51.70 Billion IDR is 33.63%, while the probability of obtaining an NPV lower than 51.70 Billion IDR is 66.37%.

CHAPTER IV

CONCLUSION AND IMPLEMENTATION PLAN

4.1 Conclusion

The conclusions resulting from the feasibility analysis of PLN's plan to invest in a new power plant to meet the electricity demand on Bawean Island, Gresik, East Java are as follows:

1. Among the three options that PLN has evaluated, Alternative 2, which involves constructing a On Grid Solar Photovoltaics (PV) Power Plant without batteries with a capacity of 5 MW, is the most favourable investment. The Net Present Value (NPV) is calculated to be 51.70 billion IDR. The Modified Internal Rate of Return (MIRR) is 12.41%. The Profitability Index is 1.63. The Payback Period is 8.60 years.
2. Alternative 2 involves constructing a On Grid Solar Photovoltaics (PV) Power Plant without batteries with a capacity of 5 MW, which also has the lowest Levelized Cost of Electricity (LCOE) among the options. A reduction of 33% compared to the current Bawean powerplant
3. According to the scenario analysis evaluation, Alternative 2 would not be economically viable if the project followed scenario 1-3, involving the use of HSD to replace the decreased capacity factor of PLTS. The NPV range from scenario 1 to scenario 3 was 74.41 billion IDR.
4. During the sensitivity analysis evaluation for Alternative 2, it was found that two variables have the highest level of sensitivity. The A Component (EPC Cost) and HSD cost exist.
5. Based on the Monte-Carlo analysis, it is determined that for Alternative 1, there is a 0% chance of having a negative NPV, a 33.63% chance of having an NPV higher than 51.70 Billion IDR, and a 66.37% chance of having an NPV lower than 51.70 Billion IDR. These results suggest that the Bawean Project has a high likelihood of being a optimum investment project.

4.2 Recommendation

4.2.1 Recommendation for future research

There are several suggestions for future research:

1. To enhance the accuracy and comprehensiveness of a project's financial feasibility study, it is advisable to prepare a complete financial statement that incorporates asset depreciation and corporate taxes.
2. Prior to implementing a project, it is advisable to contemplate various potential alternatives to enhance its attractiveness to stakeholders.

4.2.2 Recommendation for PLN

There are several suggestions for improving this project for PLN:

1. The analysis conducted on Bawean Island has revealed a significant economic opportunity to transition from a diesel plant to photovoltaic solar energy, resulting in a 33% decrease in the cost of electricity production.
2. The lifetime of a PV solar power plant is determined at every stage of design and planning, construction, and operation due to its intermittent nature and status as a new technology. Therefore, effective supervision is required at these three stages.
3. Monitoring the performance indicators and conducting regular maintenance of Solar PV systems is essential due to the low Capacity Factor (CF) and intermittent nature of solar PV. A reduction in CF will affect the utilization of HSD, which experiences price volatility, thereby influencing the financial operations of the company.
4. Moreover, it is necessary to enhance the human resource capacity and develop a comprehensive understanding of the environment, considering the plant's location on remote islands with restricted accessibility.
5. Building a solar PV power plant with BESS (alternative 1) is worth considering if we are talking about a long-term investment considering improved supply reliability and economic scale that makes the battery price cheaper.

4.3 Project Implementation Plan

The initial phase of this project is anticipated to occur in 2024, with the objective of completing installation and achieving operational readiness by the end of 2024. Table 3.37 contains the implementation plan, as well as the expected time and duration.

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Appendix 1 Net Working Capital

Financial Model - Alternative 1 - Build Solar PV+BESS 5 MW Bawean
Electricity Supply Business Plan 2021-2030
Net Working Capital

In Billion Rupiah

Alternative 1		Net Working Capital						
No	Year	Working Capital			Trade Payables and Accruals			Total Net Working Capital
		Trade Receivables	Inventory	Total Working Capital	Trade Payables	Accruals	Total	
0.	2023	-	-	-	-	-	-	-
1.	2024	2.76	0.13	2.90	0.46	0.20	0.66	2.24
2.	2025	2.76	0.14	2.90	0.47	0.20	0.67	2.23
3.	2026	2.76	0.14	2.90	0.48	0.21	0.69	2.21
4.	2027	2.76	0.14	2.90	0.49	0.21	0.70	2.20
5.	2028	2.76	0.15	2.91	0.50	0.21	0.72	2.19
6.	2029	2.76	0.15	2.91	0.51	0.22	0.73	2.18
7.	2030	2.76	0.15	2.91	0.52	0.22	0.74	2.17
8.	2031	2.76	0.16	2.92	0.53	0.23	0.76	2.16
9.	2032	2.76	0.16	2.92	0.54	0.23	0.77	2.15
10.	2033	2.76	0.16	2.92	0.55	0.24	0.79	2.13
11.	2034	2.76	0.16	2.93	0.56	0.24	0.81	2.12
12.	2035	2.76	0.17	2.93	0.58	0.25	0.82	2.11
13.	2036	2.76	0.17	2.93	0.59	0.25	0.84	2.09
14.	2037	2.76	0.17	2.94	0.60	0.26	0.85	2.08
15.	2038	2.76	0.18	2.94	0.61	0.26	0.87	2.07
16.	2039	2.76	0.18	2.94	0.62	0.27	0.89	2.05
17.	2040	2.76	0.19	2.95	0.64	0.27	0.91	2.04
18.	2041	2.76	0.19	2.95	0.65	0.28	0.93	2.03
19.	2042	2.76	0.19	2.95	0.66	0.28	0.94	2.01
20.	2043	2.76	0.20	2.96	0.67	0.29	0.96	2.00

Financial Model - Alternative 2 - Build Solar PV 5 MW Bawean
Electricity Supply Business Plan 2021-2030
Net Working Capital

In Billion Rupiah

Alternative 2		Net Working Capital						
No	Year	Working Capital			Trade Payables and Accruals			Total Net Working Capital
		Trade Receivables	Inventory	Total Working Capital	Trade Payables	Accruals	Total	
0.	2023	-	-	-	-	-	-	-
1.	2024	2.24	0.07	2.31	0.25	0.11	0.36	1.95
2.	2025	2.24	0.07	2.31	0.26	0.11	0.37	1.94
3.	2026	2.24	0.08	2.31	0.26	0.11	0.37	1.94
4.	2027	2.24	0.08	2.31	0.27	0.11	0.38	1.93
5.	2028	2.24	0.08	2.32	0.27	0.12	0.39	1.93
6.	2029	2.24	0.08	2.32	0.28	0.12	0.40	1.92
7.	2030	2.24	0.08	2.32	0.28	0.12	0.40	1.91
8.	2031	2.24	0.08	2.32	0.29	0.12	0.41	1.91
9.	2032	2.24	0.09	2.32	0.29	0.13	0.42	1.90
10.	2033	2.24	0.09	2.32	0.30	0.13	0.43	1.89
11.	2034	2.24	0.09	2.33	0.31	0.13	0.44	1.89
12.	2035	2.24	0.09	2.33	0.31	0.13	0.45	1.88
13.	2036	2.24	0.09	2.33	0.32	0.14	0.46	1.87
14.	2037	2.24	0.09	2.33	0.33	0.14	0.46	1.87
15.	2038	2.24	0.10	2.33	0.33	0.14	0.47	1.86
16.	2039	2.24	0.10	2.33	0.34	0.14	0.48	1.85
17.	2040	2.24	0.10	2.34	0.35	0.15	0.49	1.84
18.	2041	2.24	0.10	2.34	0.35	0.15	0.50	1.84
19.	2042	2.24	0.10	2.34	0.36	0.15	0.51	1.83
20.	2043	2.24	0.11	2.34	0.37	0.16	0.52	1.82

Financial Model - Alternative 3 - Build Diesel Fired Powerplant 5 MW Bawean
Electricity Supply Business Plan 2021-2030
Net Working Capital

In Billion Rupiah

Alternative 3		Net Working Capital						
No	Year	Working Capital			Trade Payables and Accruals			Total Net Working Capital
		Trade Receivables	Inventory	Total Working Capital	Trade Payables	Accruals	Total	
0.	2023	-	-	-	-	-	-	-
1.	2024	14.01	4.58	18.59	15.68	0.11	15.79	2.80
2.	2025	14.01	4.58	18.59	15.69	0.11	15.80	2.79
3.	2026	14.01	4.58	18.59	15.69	0.11	15.81	2.79
4.	2027	14.01	4.58	18.59	15.70	0.11	15.81	2.78
5.	2028	14.01	4.58	18.60	15.71	0.12	15.82	2.77
6.	2029	14.01	4.58	18.60	15.71	0.12	15.83	2.77
7.	2030	14.01	4.58	18.60	15.72	0.12	15.84	2.76
8.	2031	14.01	4.59	18.60	15.72	0.12	15.85	2.76
9.	2032	14.01	4.59	18.60	15.73	0.13	15.85	2.75
10.	2033	14.01	4.59	18.60	15.73	0.13	15.86	2.74
11.	2034	14.01	4.59	18.61	15.74	0.13	15.87	2.74
12.	2035	14.01	4.59	18.61	15.75	0.13	15.88	2.73
13.	2036	14.01	4.59	18.61	15.75	0.14	15.89	2.72
14.	2037	14.01	4.60	18.61	15.76	0.14	15.90	2.71
15.	2038	14.01	4.60	18.61	15.76	0.14	15.91	2.71
16.	2039	14.01	4.60	18.62	15.77	0.14	15.92	2.70
17.	2040	14.01	4.60	18.62	15.78	0.15	15.93	2.69
18.	2041	14.01	4.60	18.62	15.79	0.15	15.94	2.68
19.	2042	14.01	4.61	18.62	15.79	0.15	15.95	2.68
20.	2043	14.01	4.61	18.62	15.80	0.16	15.96	2.67

Appendix 2 Depreciation Schedule

Depreciation schedule Solar PV + BESS 5 MW Bawean

Asset life	20 years
Annual Depreciation rate	5% per annum
Double Rate	10% per annum
Salvage Value	0

Straight Line			
year	Beginning Balance	Depreciation Expense	Ending Balance
1	113.94	-	113.94
2	113.94	5.70	108.25
3	108.25	5.70	102.55
4	102.55	5.70	96.85
5	96.85	5.70	91.16
6	91.16	5.70	85.46
7	85.46	5.70	79.76
8	79.76	5.70	74.06
9	74.06	5.70	68.37
10	68.37	5.70	62.67
11	62.67	5.70	56.97
12	56.97	5.70	51.28
13	51.28	5.70	45.58
14	45.58	5.70	39.88
15	39.88	5.70	34.18
16	34.18	5.70	28.49
17	28.49	5.70	22.79
18	22.79	5.70	17.09
19	17.09	5.70	11.39
20	11.39	5.70	5.70

Depreciation schedule Solar PV 5 MW Bawean

Asset life	20 years
Annual Depreciation rate	5% per annum
Double Rate	10% per annum
Salvage Value	0

Straight Line			
year	Beginning Balance	Depreciation Expense	Ending Balance
1	82.12		82.12
2	82.12	4.11	78.01
3	78.01	4.11	73.91
4	73.91	4.11	69.80
5	69.80	4.11	65.69
6	65.69	4.11	61.59
7	61.59	4.11	57.48
8	57.48	4.11	53.38
9	53.38	4.11	49.27
10	49.27	4.11	45.17
11	45.17	4.11	41.06
12	41.06	4.11	36.95
13	36.95	4.11	32.85
14	32.85	4.11	28.74
15	28.74	4.11	24.64
16	24.64	4.11	20.53
17	20.53	4.11	16.42
18	16.42	4.11	12.32
19	12.32	4.11	8.21
20	8.21	4.11	4.11

Depreciation schedule
Diesel Fired Powerplant 5 MW Bawean

Asset life	20 years
Annual Depreciation rate	5% per annum
Double Rate	10% per annum
Salvage Value	0

Straight Line			
year	Beginning Balance	Depreciation Expense	Ending Balance
1	41.32		41.32
2	41.32	2.07	39.25
3	39.25	2.07	37.19
4	37.19	2.07	35.12
5	35.12	2.07	33.05
6	33.05	2.07	30.99
7	30.99	2.07	28.92
8	28.92	2.07	26.86
9	26.86	2.07	24.79
10	24.79	2.07	22.72
11	22.72	2.07	20.66
12	20.66	2.07	18.59
13	18.59	2.07	16.53
14	16.53	2.07	14.46
15	14.46	2.07	12.40
16	12.40	2.07	10.33
17	10.33	2.07	8.26
18	8.26	2.07	6.20
19	6.20	2.07	4.13
20	4.13	2.07	2.07

Appendix 2 Historical Financial Statement of PT PLN (Persero) 2016-2020

PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA DAN ENTITAS ANAK/AND SUBSIDIARIES

Lampiran 1/1 Schedule

LAPORAN POSISI KEUANGAN KONSOLIDASIAN PADA TANGGAL 31 DESEMBER 2020 DAN 2019

(Disajikan dalam jutaan Rupiah, kecuali dinyatakan lain)

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION AS AT DECEMBER 31, 2020 AND 2019

(Expressed in millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2020	2019 ¹⁾	
ASET				ASSETS
ASET TIDAK LANCAR				NON-CURRENT ASSETS
Aset tetap	6	1,401,888,487	1,400,685,118	Property, plant and equipment
Aset hak-guna	7	31,193,985	-	Right-of-use assets
Properti investasi	8	5,408,572	5,283,708	Investment properties
Investasi pada entitas asosiasi dan ventura bersama	9	14,112,585	10,300,765	Investments in associates and joint ventures
Pajak dibayar di muka	19	8,898,076	-	Prepaid taxes
Aset pajak tangguhan	48	195,289	2,215,963	Deferred tax assets
Piutang pihak berelasi	10	975,149	951,643	Receivables from related parties
Rekening bank dan deposito berjangka dibatasi penggunaannya	11	5,882,934	5,980,703	Restricted cash in banks and time deposits
Piutang lain-lain	17	1,295,416	824,545	Other receivables
Piutang dari Pemerintah	16	17,275,490	-	Receivables from Government
Aset tidak lancar lain	12	4,780,480	7,445,895	Other non-current assets
Jumlah Aset Tidak Lancar		1,491,906,463	1,433,688,340	Total Non-current Assets
ASET LANCAR				CURRENT ASSETS
Kas dan setara kas	13	54,735,434	46,598,783	Cash and cash equivalents
Investasi jangka pendek	14	366,708	334,153	Short-term investments
Piutang usaha				Trade receivables
Pihak berelasi	15	731,817	819,836	Related parties
Pihak ketiga	15	20,546,599	24,310,702	Third parties
Piutang dari Pemerintah	16	819,067	45,426,981	Receivables from Government
Piutang lain-lain	17	1,746,344	2,024,103	Other receivables
Persediaan	18	10,277,289	12,934,233	Inventories
Pajak dibayar di muka	19	7,287,693	17,634,137	Prepaid taxes
Biaya dibayar di muka dan uang muka	20	640,881	1,206,785	Prepaid expenses and advances
Piutang pihak berelasi	10	1,486	4,719	Receivables from related parties
Aset lancar lain	56	-	72,241	Other current assets
Jumlah Aset Lancar		97,153,318	151,366,673	Total Current Assets
JUMLAH ASET		1,589,059,781	1,585,055,013	TOTAL ASSETS

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

Lampiran 2/1 Schedule

**LAPORAN LABA RUGI DAN PENGHASILAN
KOMPREHENSIF LAIN KONSOLIDASIAN
UNTUK TAHUN YANG BERAKHIR
31 DESEMBER 2020 DAN 2019**

(Disajikan dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF PROFIT OR LOSS
AND OTHER COMPREHENSIVE INCOME
FOR THE YEARS ENDED
DECEMBER 31, 2020 AND 2019**

(Expressed in millions of Rupiah, unless otherwise stated)

	Catatan/ Nofes	2020	2019	
PENDAPATAN USAHA				REVENUE
Penjualan tenaga listrik	37	274,898,464	276,061,925	<i>Sale of electricity</i>
Penyambungan pelanggan	23	312,725	6,934,597	<i>Customer connection fees</i>
Subsidi listrik Pemerintah	38	47,988,114	51,711,774	<i>Government electricity subsidy</i>
Pendapatan kompensasi	16	17,904,508	22,253,517	<i>Compensation income</i>
Lain-lain	39	<u>4,311,826</u>	<u>2,644,067</u>	<i>Others</i>
Jumlah Pendapatan Usaha		<u>345,415,637</u>	<u>359,605,880</u>	<i>Total Revenue</i>
BEBAN USAHA				OPERATING EXPENSES
Bahan bakar dan pelumas	40	106,014,285	136,084,482	<i>Fuel and lubricants</i>
Pembelian tenaga listrik	41	98,651,604	83,563,991	<i>Purchased electricity</i>
Sewa	42	3,101,334	3,617,376	<i>Leases</i>
Pemeliharaan	43	21,940,509	22,328,178	<i>Maintenance</i>
Kepegawaian	44	24,965,707	25,908,771	<i>Personnel</i>
				<i>Property, plant and equipment depreciation</i>
Penyusutan aset tetap	6	36,662,917	35,318,071	<i>Right-of-use assets depreciation</i>
Penyusutan aset hak-guna	7	2,479,663	-	<i>Others</i>
Lain-lain	45	<u>7,192,146</u>	<u>8,620,069</u>	
Jumlah Beban Usaha		<u>301,008,165</u>	<u>315,440,938</u>	<i>Total Operating Expenses</i>
LABA USAHA		<u>44,407,472</u>	<u>44,164,942</u>	OPERATING PROFIT
Penghasilan/(beban) lain-lain - bersih (Kerugian)/keuntungan	47	1,916,966	(3,667,666)	<i>Other income/(expenses) - net</i>
kurs mata uang asing - bersih		(7,742,152)	9,486,326	<i>(Loss)/gain on foreign exchange - net</i>
Penghasilan keuangan		1,125,519	755,103	<i>Finance income</i>
Beban keuangan	46	<u>(27,415,886)</u>	<u>(24,619,495)</u>	<i>Finance costs</i>
LABA SEBELUM PAJAK		<u>12,291,919</u>	<u>26,119,210</u>	PROFIT BEFORE TAX
BEBAN PAJAK	48	<u>(6,298,491)</u>	<u>(21,797,080)</u>	INCOME TAX EXPENSE
LABA TAHUN BERJALAN		<u>5,993,428</u>	<u>4,322,130</u>	PROFIT FOR THE YEAR

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

Lampiran 2/2 Schedule

**LAPORAN LABA RUGI DAN PENGHASILAN
KOMPREHENSIF LAIN KONSOLIDASIAN
UNTUK TAHUN YANG BERAKHIR
31 DESEMBER 2020 DAN 2019**

(Disajikan dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF PROFIT OR LOSS
AND OTHER COMPREHENSIVE INCOME
FOR THE YEARS ENDED
DECEMBER 31, 2020 AND 2019**

(Expressed in millions of Rupiah, unless otherwise stated)

	<u>Catatan/ Notes</u>	<u>2020</u>	<u>2019</u>	
LABA TAHUN BERJALAN		5,993,428	4,322,130	PROFIT FOR THE YEAR
Penghasilan komprehensif lain tahun berjalan				Other comprehensive income for the year
Pos-pos yang akan direklasifikasi ke laba rugi:				<i>Items that may be reclassified subsequently to profit or loss:</i>
Bagian penghasilan komprehensif lain dari entitas asosiasi dan ventura bersama	9	107,890	(286,917)	<i>Share of other comprehensive income from associates and joint ventures</i>
Pos-pos yang tidak akan direklasifikasi ke laba rugi:				<i>Items that will not be reclassified to profit or loss:</i>
Perubahan surplus revaluasi aset tetap	6	(1,657,836)	(1,183,109)	<i>Changes in property, plant and equipment revaluation surplus</i>
Pengukuran kembali atas program imbalan pasti	50	1,915,369	(3,775,959)	<i>Remeasurement on defined benefit plans</i>
(Beban)/manfaat pajak terkait	48	(56,657)	950,394	<i>Related income tax (expense)/benefit</i>
Penghasilan komprehensif lain tahun berjalan setelah pajak		308,766	(4,295,591)	Other comprehensive income for the year after tax
JUMLAH PENGHASILAN KOMPREHENSIF TAHUN BERJALAN		6,302,194	26,539	TOTAL COMPREHENSIVE INCOME FOR THE YEAR
Laba tahun berjalan diatribusikan kepada:				<i>Profit for the year attributable to:</i>
Pemilik entitas induk		5,950,884	4,270,922	<i>Owners of the parent</i>
Kepentingan non-pengendali		42,544	51,208	<i>Non-controlling interests</i>
Jumlah		5,993,428	4,322,130	Total
Jumlah penghasilan komprehensif tahun berjalan diatribusikan kepada:				<i>Total comprehensive income for the year attributable to:</i>
Pemilik entitas induk		6,259,650	(24,669)	<i>Owners of the parent</i>
Kepentingan non-pengendali		42,544	51,208	<i>Non-controlling interests</i>
Jumlah		6,302,194	26,539	Total
LABA PER SAHAM DASAR/DILUSIAN (dalam Rupiah penuh)	49	48,439	37,516	EARNINGS PER SHARE BASIC/DILUTED (In Rupiah full amount)

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

Lampiran 1/2 Schedule

**LAPORAN POSISI KEUANGAN
KONSOLIDASIAN PADA TANGGAL
31 DESEMBER 2020 DAN 2019**
(Disajikan dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF
FINANCIAL POSITION
AS AT DECEMBER 31, 2020 AND 2019**
(Expressed in millions of Rupiah, unless otherwise stated)

	<u>Catatan/ Notes</u>	<u>2020</u>	<u>2019</u>	
LIABILITAS DAN EKUITAS				LIABILITIES AND EQUITY
EKUITAS				EQUITY
Ekuitas yang dapat diatribusikan kepada pemilik entitas induk				Equity attributable to owners of the parent
Modal saham - nilai nominal Rp1 per saham				Capital stock - par value of Rp1 per share
Modal dasar - 439,000,000 saham				Authorised - 439,000,000 shares
Modal ditempatkan dan disetor penuh				Subscribed and paid-up
135,342,182 saham				135,342,182 shares,
pada 31 Desember 2020 dan				as at December 31, 2020 and
115,181,002 saham pada				115,181,002 shares, as at
31 Desember 2019	21	135,342,182	115,181,002	December 31, 2019, respectively
Penyertaan modal Negara dalam proses penerbitan saham	21	-	10,528,230	Stock subscription from Government in issuance process
Tambahan modal disetor	22	5,216,571	9,919,958	Additional paid-in capital
Saldo laba				Retained earnings
Ditentukan penggunaannya	21	64,657,026	60,334,896	Appropriated
Belum ditentukan penggunaannya	21	71,928,554	70,997,731	Unappropriated
Penghasilan komprehensif lain		<u>661,734,097</u>	<u>661,509,952</u>	Other comprehensive income
Ekuitas yang dapat diatribusikan kepada pemilik entitas induk		938,878,430	928,471,769	Equity attributable to owners of the parent
Kepentingan non-pengendali		<u>934,162</u>	<u>908,644</u>	Non-controlling interests
Jumlah Ekuitas		<u>939,812,592</u>	<u>929,380,413</u>	Total Equity
LIABILITAS JANGKA PANJANG				NON-CURRENT LIABILITIES
Liabilitas pajak tangguhan	48	31,746,600	28,121,540	Deferred tax liabilities
Utang jangka panjang - setelah dikurangi bagian jatuh tempo dalam satu tahun				Long-term liabilities - net of current portion
Penerusan pinjaman	24	35,617,153	35,251,741	Two-step loans
Utang kepada Pemerintah dan lembaga keuangan				Government and non-bank Government financial institution loans
Pemerintah non-bank	25	3,649,146	4,359,569	Lease liabilities
Utang sewa	26	14,035,913	11,569,377	Bank loans
Utang bank	27	154,489,751	184,023,820	Bonds payable and sukuk ijarah
Utang obligasi dan sukuk ijarah	28	192,850,308	174,292,298	Electricity purchase payable
Utang listrik swasta	29	6,097,857	6,431,448	KIK - EBA loans
Utang KIK - EBA	28	655,772	1,354,642	Payable to related parties
Utang pihak berelasi	30	9,432	92	Other payables
Utang lain-lain	32	182,093	133,662	Deferred revenue
Pendapatan ditangguhkan	23	5,644,472	-	Employee benefits liabilities
Liabilitas imbalan kerja	50	<u>54,609,453</u>	<u>50,838,258</u>	
Jumlah Liabilitas Jangka Panjang		<u>499,587,950</u>	<u>496,376,447</u>	Total Non-current Liabilities

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

Lampiran 1/3 Schedule

**LAPORAN POSISI KEUANGAN
KONSOLIDASIAN PADA TANGGAL
31 DESEMBER 2020 DAN 2019**

(Disajikan dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF
FINANCIAL POSITION
AS AT DECEMBER 31, 2020 AND 2019**

(Expressed in millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2020	2019 ¹⁾	
LIABILITAS JANGKA PENDEK				CURRENT LIABILITIES
Utang usaha				Trade payables
Pihak berelasi	31	8,505,191	11,814,735	Related parties
Pihak ketiga	31	30,643,364	40,188,048	Third parties
Utang pajak	33	1,747,279	2,383,288	Taxes payable
Biaya masih harus dibayar	34	7,449,309	11,043,469	Accrued expenses
Liabilitas imbalan kerja				Short-term employee
jangka pendek	50	8,500,782	10,943,638	benefits liabilities
Uang jaminan langganan	35	14,802,396	14,235,879	Customer's security deposits
Utang biaya proyek	36	153,983	150,664	Project cost payables
Pendapatan ditangguhkan	23	1,617,725	1,049,231	Deferred revenue
Liabilitas derivatif	56	327,544	-	Derivative liabilities
Utang jangka panjang jatuh tempo				Current maturities of
dalam satu tahun				long-term liabilities
Penerusan pinjaman	24	3,062,879	2,725,805	Two-step loans
Utang kepada Pemerintah dan				Government and non-bank
lembaga keuangan				Government financial
Pemerintah non-bank	25	2,416,967	1,998,476	institution loans
Utang sewa	26	4,450,390	2,540,107	Lease liabilities
Utang bank	27	18,816,957	21,693,338	Bank loans
Utang obligasi dan sukuk ijarah	28	14,970,000	6,946,478	Bonds payable and sukuk ijarah
Utang listrik swasta	29	427,974	399,458	Electricity purchase payable
Utang KIK - EBA	28	871,177	586,620	KIK - EBA loans
Utang lain-lain	32	30,895,322	30,598,919	Other payables
Jumlah Liabilitas Jangka Pendek		149,659,239	159,298,153	Total Current Liabilities
JUMLAH LIABILITAS		649,247,189	655,674,600	TOTAL LIABILITIES
JUMLAH EKUITAS DAN LIABILITAS		1,589,059,781	1,585,055,013	TOTAL EQUITY AND LIABILITIES

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/ AND SUBSIDIARIES**

LAPORAN POSISI KEUANGAN KONSOLIDASIAN

31 Desember 2019, 2018 dan 2017

(Dalam jutaan Rupiah, kecuali dinyatakan lain)

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

December 31, 2019, 2018 and 2017

(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2019 Rp	2018 Rp	2017 Rp	
ASET					ASSETS
ASET TIDAK LANCAR					NON-CURRENT ASSETS
Aset tetap	6	1,400,685,118	1,336,478,233	1,204,568,429	Property, plant and equipment
Properti investasi	7	5,283,708	5,125,448	4,723,070	Investment properties
Investasi pada entitas asosiasi	8	3,868,060	3,002,665	2,432,830	Investments in associates
Investasi pada ventura bersama	8	6,432,705	5,723,674	4,445,668	Investments in joint ventures
Aset pajak tangguhan	48	2,215,963	7,578,386	9,566,473	Deferred tax assets
Piutang pihak berelasi	9	951,643	1,031,237	237,181	Receivables from related parties
Rekening bank dan deposito berjangka					Restricted cash in banks and
dibatasi penggunaannya	10	5,980,703	5,688,712	7,487,709	time deposits
Piutang lain-lain	17	824,545	961,377	634,949	Other receivables
Aset tidak lancar lain	11	7,445,895	13,482,762	7,064,097	Other non-current assets
Jumlah Aset Tidak Lancar		1,433,688,340	1,379,072,494	1,241,160,406	Total Non-current Assets
ASET LANCAR					CURRENT ASSETS
Kas dan setara kas	12	46,598,783	33,294,560	42,291,959	Cash and cash equivalents
Investasi jangka pendek	13	334,153	1,216,886	286,697	Short-term investments
Piutang usaha					Trade receivables
Pihak berelasi	14	819,836	593,646	580,993	Related parties
Pihak ketiga	14	24,310,702	23,209,017	21,885,850	Third parties
Piutang subsidi listrik	15	-	-	7,588,977	Receivables on electricity subsidy
Piutang kompensasi	16	-	23,173,464	-	Compensation receivables
Piutang lain-lain	17	47,451,084	9,507,768	1,672,237	Other receivables
Persediaan	18	12,934,233	15,506,567	12,828,118	Inventories
Pajak dibayar di muka	19	17,634,137	5,894,120	4,997,393	Prepaid taxes
Biaya dibayar di muka dan uang muka	20	1,206,785	1,007,572	1,629,609	Prepaid expenses and advances
Piutang pihak berelasi	9	4,719	5,954	5,294	Receivables from related parties
Aset lancar lain	56	72,241	5,697	30,124	Other current assets
Jumlah Aset Lancar		151,366,673	113,415,251	93,797,251	Total Current Assets
JUMLAH ASET		1,585,055,013	1,492,487,745	1,334,957,657	TOTAL ASSETS

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/ AND SUBSIDIARIES**

**LAPORAN POSISI KEUANGAN KONSOLIDASIAN
(Lanjutan)**

31 Desember 2019, 2018 dan 2017
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF FINANCIAL POSITION
(Continued)**

December 31, 2019, 2018 and 2017
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2019 Rp	2018 Rp	2017 Rp	
LIABILITAS DAN EKUITAS					LIABILITIES AND EQUITY
EKUITAS					EQUITY
Ekuitas yang dapat diatribusikan kepada pemilik entitas induk					Equity attributable to owners of the parent
Modal saham - nilai nominal Rp1 per saham					Capital stock - par value of Rp1 per share
Modal dasar - masing-masing 439.000.000 saham					Authorized - 439,000,000 shares, respectively
Modal ditempatkan dan disetor penuh - masing-masing 115.181.002 saham, 109.826.526 saham, dan 109.826.526 saham per 31 Desember 2019, 2018 dan 2017	21	115,181,002	109,826,526	109,826,526	Subscribed and paid-up 115,181,002 shares, 109,826,526 shares, and 109,826,526 shares as of December 31, 2019, 2018 and 2017, respectively
Tambahan modal disetor	22	9,919,958	20,179,333	20,871,265	Additional paid-in capital
Penyertaan modal Negara dalam proses penerbitan saham	21	10,528,230	--	--	Stock subscription from Government in issuance process
Saldo laba					Retained earnings
Ditentukan penggunaannya	21	60,334,896	52,766,610	48,665,115	Appropriated
Tidak ditentukan penggunaannya	21	70,997,731	78,251,316	71,093,240	Unappropriated
Penghasilan komprehensif lain		<u>661,509,952</u>	<u>665,849,322</u>	<u>618,462,276</u>	Other comprehensive income
Ekuitas yang dapat diatribusikan kepada pemilik entitas induk		928,471,769	926,873,107	868,918,422	Equity attributable to owners of the parent
Kepentingan non-pengendali		908,644	540,750	498,182	Non-controlling interests
Jumlah Ekuitas		<u>929,380,413</u>	<u>927,413,857</u>	<u>869,416,604</u>	Total Equity
LIABILITAS JANGKA PANJANG					NON-CURRENT LIABILITIES
Liabilitas pajak tangguhan	48	28,121,540	13,420,136	2,066,364	Deferred tax liabilities
Utang jangka panjang - setelah dikurangi bagian jatuh tempo dalam satu tahun					Long-term liabilities - net of current portion
Penerusan pinjaman	24	35,251,741	36,105,279	31,485,476	Two-step loans
Utang kepada Pemerintah dan lembaga keuangan					Government and non-bank Government financial institution loans
Pemerintah non-bank	25	4,359,569	5,343,629	6,309,173	
Utang sewa pembiayaan	26	11,569,377	14,468,336	15,713,269	Lease liabilities
Utang bank	27	184,023,820	152,965,997	116,017,364	Bank loans
Utang obligasi dan sukuk ijarah	28	174,292,298	131,681,821	100,440,360	Bonds payable and sukuk ijarah
Utang listrik swasta	29	6,431,448	7,115,916	7,026,434	Electricity purchase payable
Utang KIK - EBA	28	1,354,642	2,221,167	2,907,986	KIK - EBA loans
Utang pihak berelasi	30	92	1,000	794	Payable to related parties
Liabilitas imbalan kerja	50	50,838,258	43,760,226	43,559,022	Employee benefits liabilities
Utang lain-lain	32	133,662	94,427	940,153	Other payables
Jumlah Liabilitas Jangka Panjang		<u>496,376,447</u>	<u>407,177,934</u>	<u>326,466,395</u>	Total Non-current Liabilities

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/ AND SUBSIDIARIES**

**LAPORAN POSISI KEUANGAN KONSOLIDASIAN
(Lanjutan)**

31 Desember 2019, 2018 dan 2017
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF FINANCIAL POSITION
(Continued)**

December 31, 2019, 2018 and 2017
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2019 Rp	2018 Rp	2017 Rp	
LIABILITAS JANGKA PENDEK					CURRENT LIABILITIES
Utang usaha					Trade payables
Pihak berelasi	31	11,814,735	9,044,530	11,215,239	Related parties
Pihak ketiga	31	40,188,048	39,563,144	32,496,186	Third parties
Utang pajak	33	2,383,288	2,560,128	2,387,864	Taxes payable
Biaya masih harus dibayar	34	16,754,640	14,809,018	11,477,437	Accrued expenses
Uang jaminan langganan	35	14,235,879	13,465,735	12,642,333	Customers' security deposits
Utang biaya proyek	36	150,664	315,828	723,992	Project cost payable
Pendapatan ditangguhkan	23	1,049,231	929,947	1,218,400	Deferred revenue
Utang jangka panjang jatuh tempo dalam satu tahun					Current maturities of long-term liabilities
Penerusan pinjaman	24	2,725,805	2,530,273	2,735,992	Two-step loans
Utang kepada Pemerintah dan lembaga keuangan					Government and non-bank Government financial institution loans
Pemerintah non-bank	25	1,998,476	1,860,649	1,043,793	
Utang sewa pembiayaan	26	2,540,107	2,624,629	4,871,908	Lease liabilities
Utang bank	27	21,693,338	28,145,737	26,548,747	Bank loans
Utang obligasi dan sukuk ijarah	28	6,946,478	2,120,612	914,000	Bonds payable and sukuk ijarah
Utang listrik swasta	29	399,458	394,403	349,968	Electricity purchase payable
Utang KIK - EBA	28	586,620	686,819	630,600	KIK - EBA loans
Liabilitas imbalan kerja	50	5,232,467	5,873,558	8,562,927	Employee benefits liabilities
Utang lain-lain	32	30,598,919	32,970,944	21,255,272	Other payables
Jumlah Liabilitas Jangka Pendek		159,298,153	157,895,954	139,074,658	Total Current Liabilities
JUMLAH LIABILITAS		655,674,600	565,073,888	465,541,053	TOTAL LIABILITIES
JUMLAH EKUITAS DAN LIABILITAS		1,585,055,013	1,492,487,745	1,334,957,657	TOTAL EQUITY AND LIABILITIES

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/ AND SUBSIDIARIES**

**LAPORAN LABA RUGI DAN PENGHASILAN
KOMPREHENSIF LAIN KONSOLIDASIAN**

Untuk Tahun-tahun yang Berakhir pada
Tanggal 31 Desember 2019, 2018 dan 2017
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF PROFIT OR LOSS
AND OTHER COMPREHENSIVE INCOME**

For the Years Ended
December 31, 2019, 2018 and 2017
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2019 Rp	2018 Rp	2017 Rp	
PENDAPATAN USAHA					REVENUES
Penjualan tenaga listrik	37	276,061,925	263,477,551	246,586,856	Sale of electricity
Penyambungan pelanggan	23	6,934,597	7,309,172	7,113,454	Customer connection fees
Lain-lain	39	2,644,067	2,111,019	1,594,933	Others
Jumlah Pendapatan Usaha		285,640,589	272,897,742	255,295,243	Total Revenues
BEBAN USAHA					OPERATING EXPENSES
Bahan bakar dan pelumas	40	136,084,482	137,266,678	116,947,824	Fuel and lubricants
Pembelian tenaga listrik	41	83,563,991	84,267,611	72,426,641	Purchased electricity
Sewa	42	3,617,376	4,272,082	6,592,161	Lease
Pemeliharaan	43	22,328,178	20,737,601	19,515,606	Maintenance
Kepegawaian	44	25,908,771	22,950,087	23,124,511	Personnel
Penyusutan	6	35,318,071	30,744,712	29,160,597	Depreciation
Lain-lain	45	8,620,089	7,950,118	7,706,754	Others
Jumlah Beban Usaha		315,440,938	308,188,889	275,474,094	Total Operating Expenses
RUGI USAHA SEBELUM SUBSIDI		(29,800,349)	(35,291,147)	(20,178,851)	OPERATING LOSS BEFORE SUBSIDY
Subsidi listrik Pemerintah	38	51,711,774	48,101,754	45,738,215	Government's electricity subsidy
Pendapatan kompensasi	16	22,253,517	23,173,464	--	Compensation income
LABA USAHA SETELAH SUBSIDI		44,164,942	35,984,071	25,559,364	OPERATING INCOME AFTER SUBSIDY
Penghasilan (beban) lain-lain - bersih	47	(3,667,666)	15,663,363	3,409,941	Other income (expense) - net
Keuntungan (kerugian) kurs mata uang asing - bersih		9,486,326	(10,926,741)	(2,935,144)	Gain (loss) on foreign exchange - net
Penghasilan keuangan		755,103	804,321	1,066,842	Financial income
Beban keuangan	46	(24,619,495)	(21,624,176)	(18,556,931)	Financial cost
LABA SEBELUM PAJAK		26,119,210	19,900,838	8,544,072	INCOME BEFORE TAX
BEBAN PAJAK	48	(21,797,080)	(8,325,082)	(4,115,955)	TAX EXPENSES
LABA TAHUN BERJALAN		4,322,130	11,575,756	4,428,117	INCOME FOR THE YEAR

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/ AND SUBSIDIARIES**

**LAPORAN LABA RUGI DAN PENGHASILAN
KOMPREHENSIF LAIN KONSOLIDASIAN (Lanjutan)**

Untuk Tahun-tahun yang Berakhir pada
Tanggal 31 Desember 2019, 2018 dan 2017
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF PROFIT OR LOSS
AND OTHER COMPREHENSIVE INCOME (Continued)**

For the Years Ended
December 31, 2019, 2018 and 2017
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2019 Rp	2018 Rp	2017 Rp	
LABA TAHUN BERJALAN		4,322,130	11,575,756	4,428,117	INCOME FOR THE YEAR
Penghasilan komprehensif lain tahun berjalan					Other comprehensive income for the year
Pos-pos yang akan direklasifikasi ke laba rugi:					<i>Items that may be reclassified subsequently to profit or loss:</i>
Bagian penghasilan (beban) komprehensif lain dari entitas asosiasi dan ventura bersama	8	(286,917)	255,493	461,901	<i>Share of other comprehensive income (expenses) from associates and joint venture</i>
Pos-pos yang tidak akan direklasifikasi ke laba rugi:					<i>Items that will not be reclassified to profit or loss:</i>
Perubahan surplus revaluasi aset tetap	6	(1,183,109)	48,336,627	(6,933,307)	<i>Changes in property, plant and equipment revaluation surplus</i>
Pengukuran kembali atas program imbalan pasti	50	(3,775,959)	4,319,690	(5,635,015)	<i>Remeasurement on defined benefit plans</i>
Manfaat pajak terkait	48	950,394	(5,524,764)	1,408,754	<i>Related income tax benefits</i>
Penghasilan komprehensif lain tahun berjalan setelah pajak		(4,295,591)	47,387,046	(10,697,667)	Other comprehensive income for the year after tax
JUMLAH PENGHASILAN (RUGI) KOMPREHENSIF TAHUN BERJALAN		26,539	58,962,802	(6,269,550)	TOTAL COMPREHENSIVE (LOSS) INCOME FOR THE YEAR
Laba tahun berjalan diatribusikan kepada:					<i>Income for the year attributable to:</i>
Pemilik entitas induk		4,270,922	11,568,286	4,410,210	<i>Owner of the parent</i>
Kepentingan non-pengendali		51,208	7,470	17,907	<i>Non-controlling interest</i>
Jumlah		4,322,130	11,575,756	4,428,117	Total
Jumlah penghasilan komprehensif tahun berjalan diatribusikan kepada:					<i>Total comprehensive income for the year attributable to:</i>
Pemilik entitas induk		(24,669)	58,955,332	(6,287,457)	<i>Owner of the parent</i>
Kepentingan non-pengendali		51,208	7,470	17,907	<i>Non-controlling interest</i>
Jumlah		26,539	58,962,802	(6,269,550)	Total
LABA PER SAHAM DASAR (Dalam Rupiah penuh)	49	37,516	105,332	50,541	BASIC EARNINGS PER SHARE (In Rupiah full amount)

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

LAPORAN POSISI KEUANGAN KONSOLIDASIAN

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

31 Desember 2016 dan 2015

December 31, 2016 and 2015

(Dalam jutaan Rupiah, kecuali dinyatakan lain)

(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2016 Rp	2015 Rp	
ASET				ASSETS
ASET TIDAK LANCAR				NON-CURRENT ASSETS
Aset tetap	6	1,145,529,527	1,187,879,590	<i>Property, plant and equipment</i>
Properti investasi	7	1,325,297	1,000,974	<i>Investment properties</i>
Investasi pada entitas asosiasi	8	1,980,118	1,645,413	<i>Investments in associates</i>
Investasi pada ventura bersama	8	1,849,864	1,529,285	<i>Investments in joint ventures</i>
Aset pajak tangguhan	47	9,882,003	29,088,271	<i>Deferred tax assets</i>
Piutang pihak berelasi	9	263,064	268,647	<i>Receivables from related parties</i>
Rekening bank dan deposito berjangka dibatasi penggunaannya	10	7,464,260	8,796,977	<i>Restricted cash in banks and time deposits</i>
Piutang lain-lain	16	350,465	312,084	<i>Other receivables</i>
Aset tidak lancar lain	11	4,964,300	4,504,847	<i>Other non-current assets</i>
Jumlah Aset Tidak Lancar		<u>1,173,608,898</u>	<u>1,235,026,088</u>	Total Non-current Assets
ASET LANCAR				CURRENT ASSETS
Kas dan setara kas	12	41,909,223	23,596,339	<i>Cash and cash equivalents</i>
Investasi jangka pendek	13	374,771	120,059	<i>Short-term investments</i>
Piutang usaha				<i>Trade receivables</i>
Pihak berelasi	14	565,458	569,088	<i>Related parties</i>
Pihak ketiga	14	21,145,503	19,265,139	<i>Third parties</i>
Piutang subsidi listrik	15	12,446,110	17,501,009	<i>Receivables on electricity subsidy</i>
Piutang lain-lain	16	2,411,384	481,681	<i>Other receivables</i>
Persediaan	17	11,569,596	11,415,863	<i>Inventories</i>
Pajak dibayar dimuka	18	7,206,530	5,265,445	<i>Prepaid taxes</i>
Biaya dibayar dimuka dan uang muka	19	898,039	1,058,501	<i>Prepaid expenses and advances</i>
Piutang pihak berelasi	9	36,548	71,669	<i>Receivables from related parties</i>
Aset lancar lain	55	5,915	--	<i>Other current assets</i>
Jumlah Aset Lancar		<u>98,569,077</u>	<u>79,344,793</u>	Total Current Assets
JUMLAH ASET		<u>1,272,177,975</u>	<u>1,314,370,881</u>	TOTAL ASSETS

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

**LAPORAN POSISI KEUANGAN KONSOLIDASIAN
(Lanjutan)**

31 Desember 2016 dan 2015
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF FINANCIAL POSITION
(Continued)**

December 31, 2016 and 2015
(In millions of Rupiah, unless otherwise stated)

	<u>Catatan/ Nofes</u>	<u>2016 Rp</u>	<u>2015 Rp</u>	
LIABILITAS DAN EKUITAS				LIABILITIES AND EQUITY
EKUITAS				EQUITY
Ekuitas yang dapat diatribusikan kepada pemilik Entitas Induk				Equity attributable to owners of the Parent
Modal saham - nilai nominal Rp1 per saham				Capital stock - par value of Rp1 per share
Modal dasar - masing-masing 204.000.000 saham dan 63.000.000 saham per 31 Desember 2016 dan 2015				Authorized - 204,000,000 shares and 63,000,000 shares as of December 31, 2016 and 2015, respectively
Modal ditempatkan dan disetor penuh- masing-masing 55.666.007 saham dan 46.197.380 saham per 31 Desember 2016 dan 2015				Subscribed and paid-up 55,666,007 shares and 46,197,380 shares as of December 31, 2016 and 2015, respectively
	20	55,666,007	46,197,380	
Tambahan modal disetor	21	21,797,016	49,707,027	Additional paid-in capital
Penyertaan Modal Negara dalam proses penerbitan saham	21	54,160,519	9,468,627	Stock subscription from Government in issuance process
Saldo laba				Retained earnings
Ditentukan penggunaannya	20	40,304,040	26,872,493	Appropriated
Tidak ditentukan penggunaannya	20	77,194,942	41,222,131	Unappropriated
Penghasilan komprehensif lain		629,159,943	631,241,725	Other comprehensive income
Ekuitas yang dapat diatribusikan kepada pemilik Entitas Induk		878,282,467	804,709,383	Equity attributable to owners of the Parent
Kepentingan nonpengendali		116,990	81,234	Non-controlling interests
Jumlah Ekuitas		878,399,457	804,790,617	Total Equity
LIABILITAS JANGKA PANJANG				NON-CURRENT LIABILITIES
Liabilitas pajak tangguhan	47	59,725	5,475	Deferred tax liabilities
Utang jangka panjang - setelah dikurangi bagian jatuh tempo dalam satu tahun				Long-term liabilities - net of current portion
Penerusan pinjaman	23	29,133,756	29,205,236	Two-step loans
Utang kepada Pemerintah dan lembaga keuangan				Government and non-bank Government financial institution loans
Pemerintah non-bank	24	7,257,810	8,194,693	
Utang sewa pembiayaan	25	17,933,075	149,621,763	Lease liabilities
Utang bank	26	100,362,498	77,828,870	Bank loans
Utang obligasi dan sukuk ijarah	27	68,824,683	80,043,338	Bonds payable and sukuk ijarah
Utang listrik swasta	28	7,315,422	7,093,280	Electricity purchase payable
Utang pihak berelasi	29	2,301	2,566	Payable to related parties
Liabilitas imbalan kerja	49	41,110,112	37,378,472	Employee benefits liabilities
Utang lain-lain	31	155,781	67,678	Other payables
Jumlah Liabilitas Jangka Panjang		272,155,163	389,441,371	Total Non-current Liabilities

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

**LAPORAN POSISI KEUANGAN KONSOLIDASIAN
(Lanjutan)**

31 Desember 2016 dan 2015
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF FINANCIAL POSITION
(Continued)**

December 31, 2016 and 2015
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2016 Rp	2015 Rp	
LIABILITAS DAN EKUITAS				LIABILITIES AND EQUITY
LIABILITAS JANGKA PENDEK				CURRENT LIABILITIES
Utang usaha				Trade payables
Pihak berelasi	30	7,772,693	8,910,438	Related parties
Pihak ketiga	30	22,419,391	17,715,563	Third parties
Utang pajak	32	1,950,946	15,131,857	Taxes payable
Biaya masih harus dibayar	33	10,644,559	10,627,055	Accrued expenses
Uang jaminan langganan	34	12,049,554	11,324,898	Customers' security deposits
Utang biaya proyek	35	384,739	1,113,825	Project cost payable
Pendapatan ditangguhkan	22	1,147,227	1,533,703	Deferred revenue
Utang jangka panjang jatuh tempo dalam satu tahun				Current maturities of long-term liabilities
Penerusan pinjaman	23	2,562,332	2,505,347	Two-step loans
Utang kepada Pemerintah dan lembaga keuangan				Government and non-bank
Pemerintah non-bank	24	1,043,793	293,793	Government financial institution loans
Utang sewa pembiayaan	25	3,789,317	6,759,138	Lease liabilities
Utang bank	26	26,394,780	11,752,458	Bank loans
Utang obligasi dan sukuk ijarah	27	9,568,000	9,122,350	Bonds payable and sukuk ijara
Utang listrik swasta	28	328,683	311,196	Electricity purchase payable
Liabilitas imbalan kerja	49	3,494,487	2,848,664	Employee benefits liabilities
Utang lain-lain	31	18,072,854	20,188,608	Other payables
Jumlah Liabilitas Jangka Pendek		121,623,355	120,138,893	Total Current Liabilities
JUMLAH LIABILITAS		393,778,518	509,580,264	TOTAL LIABILITIES
JUMLAH EKUITAS DAN LIABILITAS		1,272,177,975	1,314,370,881	TOTAL EQUITY AND LIABILITIES

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

**LAPORAN LABA RUGI DAN PENGHASILAN
KOMPREHENSIF LAIN KONSOLIDASIAN**

Untuk Tahun-tahun yang Berakhir pada
Tanggal 31 Desember 2016 dan 2015
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF PROFIT OR LOSS
AND OTHER COMPREHENSIVE INCOME**

For the Years Ended
December 31, 2016 and 2015
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2016 Rp	2015 Rp	
PENDAPATAN USAHA				REVENUES
Penjualan tenaga listrik	36	214,139,834	209,844,541	Sale of electricity
Penyambungan pelanggan	22	7,052,136	6,141,335	Customer connection fees
Lain-lain	38	1,629,986	1,361,114	Others
Jumlah Pendapatan Usaha		<u>222,821,956</u>	<u>217,346,990</u>	Total Revenues
BEBAN USAHA				OPERATING EXPENSES
Bahan bakar dan pelumas	39	109,492,383	138,408,315	Fuel and lubricants
Pembelian tenaga listrik	40	59,729,390	4,420,859	Purchased electricity
Sewa	41	6,545,114	8,065,522	Lease
Pemeliharaan	42	21,226,736	21,861,310	Maintenance
Kepegawaian	43	22,659,965	20,321,137	Personnel
Penyusutan	6	27,512,150	25,406,856	Depreciation
Lain-lain	44	7,284,064	7,090,077	Others
Jumlah Beban Usaha		<u>254,449,802</u>	<u>225,574,076</u>	Total Operating Expenses
RUGI USAHA SEBELUM SUBSIDI		<u>(31,627,846)</u>	<u>(8,227,086)</u>	OPERATING LOSS BEFORE SUBSIDY
Subsidi listrik Pemerintah	37	58,043,265	56,552,532	Government's electricity subsidy
LABA USAHA SETELAH SUBSIDI		<u>26,415,419</u>	<u>48,325,446</u>	OPERATING INCOME AFTER SUBSIDY
Penghasilan lain-lain - bersih	46	1,092,366	2,437,066	Other income - net
Keuntungan (kerugian) kurs mata uang asing - bersih		4,195,210	(27,326,131)	Gain (loss) on foreign exchange - net
Penghasilan keuangan		578,507	627,412	Financial income
Beban keuangan	45	(18,703,276)	(39,977,228)	Financial cost
LABA (RUGI) SEBELUM PAJAK		<u>13,578,226</u>	<u>(15,913,435)</u>	INCOME (LOSS) BEFORE TAX
MANFAAT (BEBAN) PAJAK	47	<u>(5,427,843)</u>	<u>21,939,942</u>	TAX BENEFIT (EXPENSES)
LABA TAHUN BERJALAN		<u>8,150,383</u>	<u>6,026,507</u>	INCOME FOR THE YEAR

**PERUSAHAAN PERSEROAN (PERSERO) PT PERUSAHAAN LISTRIK NEGARA
DAN ENTITAS ANAK/AND SUBSIDIARIES**

**LAPORAN LABA RUGI DAN PENGHASILAN
KOMPREHENSIF LAIN KONSOLIDASIAN (Lanjutan)**

Untuk Tahun-tahun yang Berakhir pada
Tanggal 31 Desember 2016 dan 2015
(Dalam jutaan Rupiah, kecuali dinyatakan lain)

**CONSOLIDATED STATEMENTS OF PROFIT OR LOSS
AND OTHER COMPREHENSIVE INCOME (Continued)**

For the Years Ended
December 31, 2016 and 2015
(In millions of Rupiah, unless otherwise stated)

	Catatan/ Notes	2016 Rp	2015 Rp	
LABA TAHUN BERJALAN		8,150,383	6,026,507	INCOME FOR THE YEAR
Penghasilan komprehensif lain tahun berjalan				Other comprehensive income for the year
Pos-pos yang akan direklasifikasi ke laba rugi				<i>Items that might be reclassified subsequently to profit or loss</i>
Bagian penghasilan (beban) komprehensif lain dari entitas asosiasi dan ventura bersama		(9,313)	36,978	<i>Share of Other Comprehensive Income (expense) from associates and joint ventures</i>
Pos-pos yang tidak akan direklasifikasi ke laba rugi				<i>Items that will not be reclassified to profit or loss</i>
Surplus revaluasi aset tetap		2,287	653,441,219	<i>Property, plant and equipment revaluation surplus</i>
Pengukuran kembali atas program imbalan pasti		(2,766,341)	6,120,608	<i>Remeasurement on defined benefit plans</i>
Manfaat (beban) pajak terkait		691,585	(16,865,984)	<i>Related income tax benefits (expenses)</i>
Penghasilan (beban) komprehensif lain tahun berjalan setelah pajak		(2,081,782)	642,732,821	Other comprehensive (expenses) income for the year after tax
JUMLAH PENGHASILAN KOMPREHENSIF TAHUN BERJALAN		6,068,601	648,759,328	TOTAL COMPREHENSIVE INCOME FOR THE YEAR
Laba tahun berjalan diatribusikan kepada:				<i>Income for the year attributable to:</i>
Pemilik entitas induk		8,113,656	6,010,568	<i>Owners of the parent</i>
Kepentingan nonpengendali		36,727	15,939	<i>Non-controlling interest</i>
Jumlah		8,150,383	6,026,507	Total
Total penghasilan komprehensif tahun berjalan diatribusikan kepada:				<i>Total comprehensive income for the year attributable to:</i>
Pemilik entitas induk		6,031,874	648,743,389	<i>Owners of the parent</i>
Kepentingan nonpengendali		36,727	15,939	<i>Non-controlling interest</i>
Jumlah		6,068,601	648,759,328	Total
LABA PER SAHAM DASAR (Dalam Rupiah penuh)	48	150,009	130,106	BASIC EARNINGS PER SHARE (In Rupiah full amount)

Appendix 3 Application Letter for Final Task Research Permission



INSTITUT TEKNOLOGI BANDUNG SEKOLAH BISNIS DAN MANAJEMEN

Jalan Ganesha 10 Bandung 40132, Telp: +6222 2531923, Fax +6222 2504249, e-mail : info@sbm-itb.ac.id

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No. : 3818/IT1.C09.4.3/TA.00/2021
Perihal : Permohonan Izin Penelitian Tugas Akhir Bandung, 10 Agustus 2021

Kepada Yth.
Bapak General Manager
PT. PLN (Persero) Unit Induk Distribusi Jawa Timur
Jl. Embong Trengguli No.19-21, Embong Kahasin, Kec. Genteng, Kota SBY, Jawa Timur 60271

Salah satu sistem pembelajaran Program MBA-ITB adalah dengan menggunakan *case method*, dimana mahasiswa lebih ditekankan untuk menyelesaikan kasus-kasus nyata yang terjadi di perusahaan. Hal ini diharapkan dapat menambah wawasan praktis mahasiswa terutama di dunia bisnis.

Sehubungan dengan akan dilakukannya penelitian untuk memenuhi Tugas Akhir dari mahasiswa berikut :

NIM	Nama	Topik
29120144	Luddie Wied Hardono	Analisa Investasi Program Transisi Energi dari diesel based menjadi Solar Photovoltaics-Battery-Diesel Hybrid Pada Sistem Isolated

Kami mohon kesediaan Bapak/Ibu dapat memberikan ijin kepada mahasiswa tersebut untuk melakukan penelitian, wawancara dan pengambilan data di PT. PLN (Persero) Unit Induk Distribusi Jawa Timur.

Demikian permohonan ini kami sampaikan, atas perhatian dan kerjasama yang baik kami ucapkan terima kasih.

Ketua Program

Yunieta Anny Nainggolan, S.E., M.Com., Ph.D.
Nopeg. 115 110 004

Accredited by:



Data yang dibutuhkan :

1. Kondisi Sistem Ketenagalistrikan saat ini di Pulau yang akan dilakukan transisi energy dari Diesel ke Solar PV-Battery-Diesel Hybrid/Dedieselisasi
 - a. Kapasitas terpasang dan daya mampu (Pembangkit, trafo, jaringan distribusi)
 - b. Tegangan operasi
 - c. Pembebanan Trafo
 - d. Capacity Factor (CF)
2. Rencana Pengembangan Sistem
 - a. Demand Forecast
 - b. Neraca Daya
 - c. Jadwal Pelaksanaan Proyek
3. Perkiraan beban harian pada Pulau yang akan dilakukan transisi energy dari Diesel ke Solar PV-Battery-Diesel Hybrid (termasuk Potensi Pelanggan, rata-rata daya terpasang)
4. Rencana Lokasi pengembangan Dedieselisasi
5. Data pendukung kajian finansial :
 - a. Rincian biaya Investasi, operasi, dan pemeliharaan PLTD
 - b. Rincian biaya investasi, operasi, dan pemeliharaan Solar PV-Battery