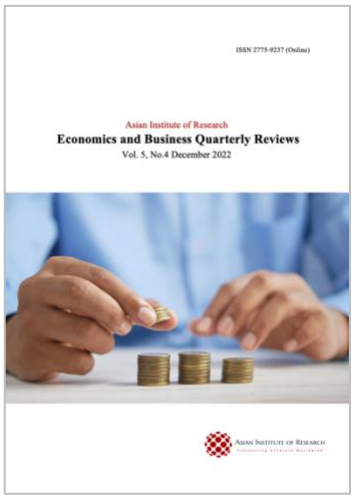

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Utilizing LNG as a Cheap and Environmentally Friendly Energy Source (Regasification) in West Java

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Abstract
The increase in population and economic development requires more energy support that grows every year. To meet energy needs in Indonesia, especially in Java, it is necessary to find cheap and environmentally friendly energy sources other than oil and coal, by utilizing LNG (*Liquid Natural Gas*). This study aims to determine the business feasibility of developing an LNG terminal as a cheap and environmentally friendly energy source (regasification) in West Java. The approach used in this research is analytical descriptive, data collection through interviews and discussions with stakeholders selected from the retail LNG terminal which includes owners, potential investors, potential customers and competitors. The data analysis used economic feasibility NPV (Net present value), IRR (Internal Rate Of Return), PBP (payback period) and PI (Profitability Index). The results of the analysis show that the construction of the LNG terminal is feasible with the net present value of the project amounting to USD 9,883,927 with a discount of 11%. This result displays a positive NPV value which means that the invested funds are able to generate positive cash flows thus the NPV value is positive. IRR Project value is 12.48% and IRR Equity is 19.42% which is greater than bank interest. The payback period for this LNG project is 6 years with a profitability index (PI) of 1.3. A PI value of 1.3 which is greater than 1 means that the proposed investment project is declared feasible (accepted). It also indicates the *present value of cash inflows* generated by the investment project is greater than the *present value of cash out flows*. Given the urgent need for alternative energy, the construction of an LNG terminal must be carried out immediately; therefore, it needs affirmative policy support from the government.

Keywords: Business Plan, Economic Feasibility, Environmentally Friendly Energy, LNG

1. Introduction

In 2019, proven reserves of oil were 3.6 billion barrels; natural gas was 100.3 TCF and coal reserves were 32.27 billion tons. If it is assumed that no new reserves are discovered, based on the 2019 R/P (*Reserve/Production*) ratio, then oil will run out in 12 years, natural gas in 37 years, and coal in 70 years. These reserves will even run out faster than the estimated year due to the increasing trend of fossil energy production (Adiarso,et.al, 2020). In the last few decades, humans have begun to think about obtaining new energy sources as a substitute for energy sources that are widely known and used, such as oil and coal because the availability of these energy sources in

nature is decreasing, and has been proven to cause pollution to the environment. This is highly undesirable as it will cause increasing natural damage.

Various efforts have been made to obtain alternative energy sources that can meet energy needs in large quantities, in the long term, and are environmentally friendly. One source of energy that is currently gaining interest is natural gas. Natural gas as well as petroleum is a mixture of hydrocarbon compounds formed from piles of organic fossils that have been in the layers of the earth's bowels since millions of years ago. The difference with petroleum, natural gas contains more light hydrocarbon compounds, especially CH4 (methane) and can be found either together with petroleum (associated gas) or separately from petroleum (non-associated gas) (Łaciak et al., 2019).
To solve the problem of storage and transportation to consumers, natural gas liquefaction is considered to be the best way. By this method, natural gas can be stored 1/600 times less than its volume in the gaseous state. In principle, this technology includes the liquefaction of natural gas using refrigerant. This liquefied natural gas is called *liquefied natural gas* (LNG) (Ikealumba & Wu, 2014). LNG is liquefied natural gas with the main element being methane (CH4). In general, this natural gas is used as fuel for housing and industry, and can also be used as raw material for the petrochemical industry (Łaciak et al., 2019).

LNG (liquid natural gas) is liquefied natural gas fuel. Since large quantities of natural gas are produced in areas far from energy users, in order to economically bring the gas to user centers, it needs to be liquefied into LNG. The advantage of LNG is that it can be transported by ships with a distance of thousands of kilometers at a low cost, low pressure and a temperature of -162 degrees Celsius. After arriving near the LNG user center, LNG is stored in special tanks and gasified before being used as fuel.

The need for natural gas for electricity in Indonesia is not always fulfilled. PLN faces problems with the adequacy of gas supply in several small and large scale plants as well as the need for households (Adiarso et al., 2020). Java is an energy user of 70% of the national needs, while West Java is around 40% of the national needs but does not enjoy the use of energy derived from LNG which is exported abroad. Java is the centre of economic and industrial activity in Indonesia as here is the capital city of the government centre, namely DKI Jakarta which is also full of commerce. Other islands such as Sumatra, Borneo and Sulawesi which have developing areas in both the industrial, commercial and residential sectors and industrial activities also require very large amounts of energy. Unfortunately, the energy demand in Java itself is very high, absorbing about 50% of the total energy consumption in Indonesia (Hilmawan et al.,, 2021).

Java has a population of no less than 110 million people with around 360 thousand industries spread from the East to the West of Java. This condition is very potential as a source of foreign exchange for the improvement of the national economy. The energy demand level in Java is 70% which reaches 4 GWh and 5,149 MMSCFD. Natural Gas, including LPG, is a solid consumer of energy and this will continue to increase from year to year. As for every growth in the industrial sector, commercial and even residential, it is always associated with an increase in energy demand (Hilmawan et al.,, 2021 and Adiarso et al.,2020). The demand for natural gas in Java in 2025 is estimated to reach 12,009 MMSCFD. Meanwhile, the ability to supply natural gas in the island, in 2025, is only 4,493 MMSCFD. Therefore, to meet the demand for gas in Java, it must take natural gas sources outside Java (Hilmawan et al., 2021).

The distribution of LNG must also be supported by the existence of a regasification terminal which functions to convert LNG back into natural gas. That is the reason, besides the construction of transmission from South Sumatra to West Java (SSWJ) being a top priority, the construction of an LNG receiving terminal is also a potential alternative considering that the volume of LNG is approximately 600 times the volume of natural gas (Wardana et al., 2020). In this way, LNG can be supplied to Java through a receiving terminal which is relatively close to the transmission/distribution pipeline network or industrial area. Currently LNG cannot be used for substitution due to the unavailability of LNG infrastructure in Java. Considering that there is still sufficient LNG available in Indonesia and West Java is a large energy user, the construction of LNG infrastructure for retail sales

for industry is very promising for the provision of more competitive and cleaner energy in the form of a regasification terminal.

Therefore, the research problem of this study is how is the business feasibility of using LNG as a cheap and environmentally friendly energy source (regasification) in West Java? While the purpose of this research is to determine the business feasibility of the business feasibility of using LNG as a cheap and environmentally friendly energy source (regasification) in West Java.

2. Literature Review

According to MCGerty (1989) and Purnomo et al.,(2002), a business plan is a document provided by an entrepreneur that is adjusted to the views of his professional adviser which contains details about the past, present and future trends of a company. Meanwhile, according to Hisrich and Peters (in Ardiarso, 2020), a business plan is a written document prepared by an entrepreneur that describes all relevant elements, both internal and external, regarding the company to start a business.

LNG itself has a character close to that of diesel. The use of LNG is highly suitable to apply in heavy equipment or heavy duty trucks compared to Compressed Natural Gas (CNG).

To assess the feasibility of a business plan, a feasibility study is carried out. The purpose of a business feasibility study according to Suliyanto (2021) is to assess whether the investment is feasible or not to run. According to Riadi (2019) Pauceanu,A.M (2016), there are 5 aspects that must be considered in conducting the study, namely legal aspects, market and marketing aspects, operations aspects, human resources aspects and financial aspects. The business concept of a retail LNG terminal is the construction of an LNG storage terminal to carry out gasification before being used as fuel by marketing the product not to retail or end consumers, but to companies. This LNG terminal provides products at affordable prices but still of high quality. Through the framework above, it is explained that to realize the business concept of developing a retail LNG terminal, a feasibility study is carried out with reference to the business aspects which include legal, marketing, operations, human resources, to financial.

3. Research Methodology

This study applies a descriptive analytical research design. In this case, the analysis is carried out to determine the feasibility of the LNG terminal for the needs of the West Java area. The informants of this research are all people who are stakeholders of the retail LNG terminal, such as owners, potential investors, potential customers and competitors. Data collection methods used are interviews and questionnaires to selected respondents from relevant stakeholders. The data analysis method uses business planning analysis based on business feasibility aspects, namely legal, marketing, operations, HR, to financial aspects with NPV (Net Present Value), IRR (Internal Rate of Return), PBP (Payback Period) and PI (Profitability Index) indicators.

4. Results and Discussion

4.1. Market and Marketing Aspects

In order to support the use of gas for industry, the government through Presidential Regulation Number 40 of 2016 establishes a policy of adjusting gas prices to encourage accelerated economic growth and increase the competitiveness of the national industry. The government is very serious about implementing this policy, especially for certain industries such as fertilizer, ceramics and so on by setting a gas price of USD 6 per MMBTU. Meanwhile, the government also provides support to the energy industry by providing incentives. This is regulated in the Minister of Energy and Mineral Resources Regulation Number 8 of 2020 which states that business entities that distribute natural gas to natural gas users can be given proportional incentives. Other efforts are supported by the Minister of Energy and Mineral Resources Number 19 of 2021, which cuts bureaucracy and provides legal certainty in doing business for business entities, as well as providing reliable supply of natural gas

consumers and providing business opportunities for natural gas infrastructure to business entities or investors.

The use of gas in fulfilling the needs of domestic industry continues to increase from year to year. In 2021, the industrial sector was recorded as the largest consumer by absorbing 1,597.44 Billion British Thermal Unit Days (BBTUD) or 28.22% of the total utilization of national gas production. Traditionally, there are three major groups that become benchmarks or references for LNG prices. For the European market, it refers to the National Balancing Point (NBP) – namely the price index on the UK Future market. In the Asia Pacific market it is indexed with crude oil which is dominated by the Japan Korea Marker – JKM for spot. While in the United States market, it refers to the pipeline gas price index of Henry Hub.

In spot or retail gas contracts, such patterns are no longer found. Even though the volume of LNG traded on the spot is very large, the spot price is sensitive to aspects that are not fundamental, such as the plan to build an LNG facility. This is because in general 1 barrel of crude oil is equivalent to 6 – 7 MBTU of gas. Taking into account the costs of LNG processing, transportation elements, insurance and gas regasification per MBTU at the receiving terminal, the LNG price is 11 – 14% of crude oil, in normal cases it is a reasonable equilibrium price proxy so it is much cheaper when compared to oil On the other hand, there is still no gas terminal in Java, especially West Java. The demand for gas, which is not only for industry but the largest consumer, for example in fertilizer factories, was recorded at 705.03 BBTUD or 12.45% followed by the electricity sector at 681.50 BBTUD or 12.04%, and domestic LNG at 504.51 BBTUD or 8 ,91%. Therefore, the LNG terminal business opportunity can be profitable.

Socio-culturally, the industrial use of gas is common. However, it is necessary to have an affordable gas allocation for retail so that it is also able to provide direct benefits to the community. The current price of LNG gas is considered more profitable than the use of LPG. This is because in terms of price, LNG is cheaper. This condition will be able to affect the welfare of people's lives where the expenditure from the community for the purchase of LPG will be reduced by using LNG.

LNG is natural gas that has been processed to remove impurities and heavy hydrocarbons and which is then condensed into water at atmospheric pressure by cooling it to about -160° Celsius. LNG is transported by vehicles and placed in specially designed tanks. LNG is approximately 1/640 of natural gas at standard temperature and pressure, making it more economical to transport over long distances where pipelines are not readily available. When moving natural gas by pipeline is considered to be impracticable or uneconomical, it can be transported by LNG vehicles where most types of tanks are membrane or "moss."

LNG offers energy density that is equal to petrol and diesel fuels which produce less pollution. Unfortunately, the relatively high cost of production and the need for storage in expensive cryogenic tanks prevent its use in commercial applications. In general, the release of CO2 into the air in LNG consumption is lower when compared to LPG and oil as follows:

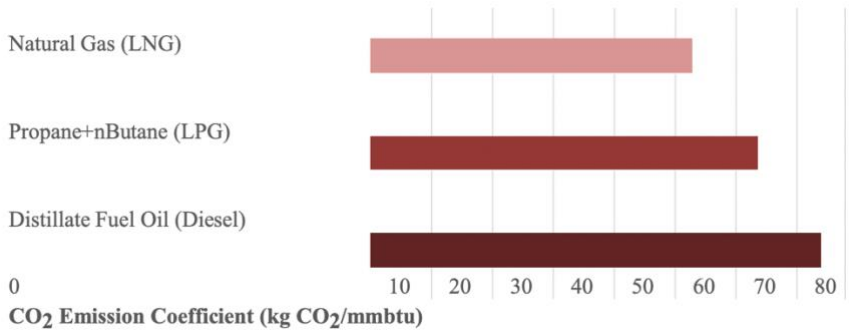

Figure 1: Comparison of the release of CO2 into the air in LNG, LPG and Oil

Source: eia, 2021

LNG has the lowest CO2 emission coefficient compared to LPG and oil. This is also confirmed by the comparison of greenhouse gas emissions as follows:

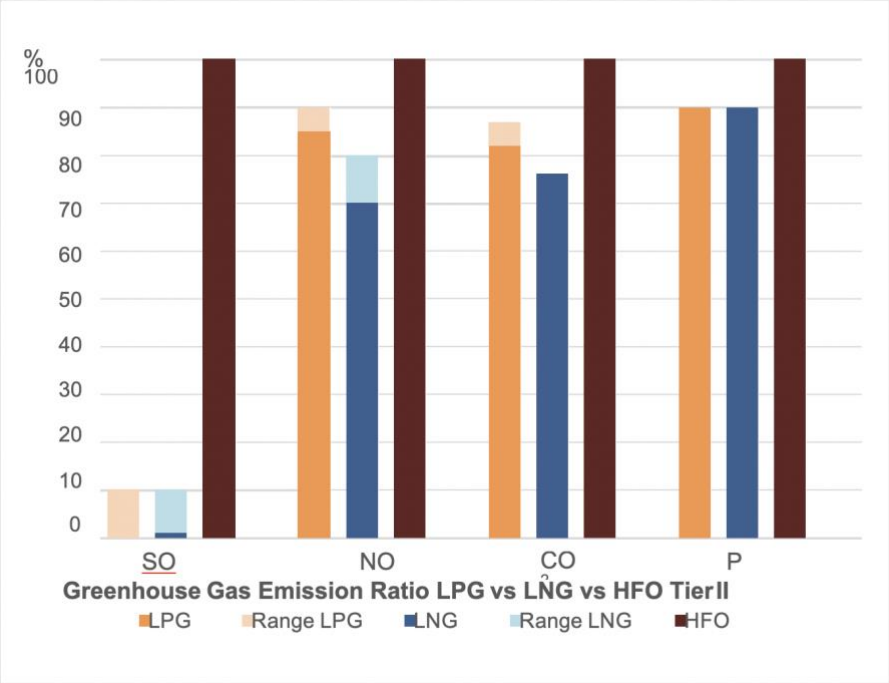

Figure 2: Comparison of the release of CO2 into the air in LNG, LPG and Oil for Industry

Source: MAN Energy Solutions

Greenhouse gas emissions for industry in terms of SOx, NOx, CO2 and PM from LNG are much lower when compared to petroleum and LPG. In addition, the greenhouse gas emissions for cargo ships in terms of SOx, NOx, CO2 and PM from LNG are also lower when compared to petroleum and LPG.

Currently, Indonesia's LNG production is around 2,000 BBTU/day, the majority of which is processed from the Bontang and Tangguh Papua refineries with relatively balanced proportions. Bontang LNG export contracts to Japan will expire in the next 5 years. The future of the Bontang LNG plant is highly dependent on gas supplies from the ENI and Pertamina Mahakam fields, as well as the ability to penetrate the export market. In the future, there will be a project being developed, namely Abadi Masela. The Abadi gas field contains huge gas reserves of 18.5 TCF and condensate of 225 million barrels. The field is projected to start production by the end of 2027, with a capacity of 10.5 million metric tons per year (9.5 mtpa LNG, and 150 mmscfd gas.

In spot or retail gas contracts, such patterns do not exist. Even though the volume of LNG traded on the spot is very large, spot prices are sensitive to things that are not fundamental, such as the plan to build an LNG facility (FID – Final Investment Decision), gas bunkering capacity, weather, political tensions and others. This will provide a high risk of uncertainty to business people. More than 100 billion cubic meters of new LNG capacity will enter the market between 2018 and 2023 due to the narrow market share. Coupled with the diversification of energy sources, including the flow of piped gas and LNG from Russia to the Asian region lead producing countries to fiercely compete to take advantage of this narrow gap. Australia, Qatar, Senegal and Canada entered this competition by offering more flexible commercial terms. This is because the barrier to business is low as it only relies on supplies from suppliers and capital for the construction of new refineries or terminals, so there is a threat to the company.

Based on the comparison with other fuels, there is a saving of IDR 1,021/liter compared to industrial diesel or 12.02% and there is also a potential savings of IDR 1,944/kg or 16.90% compared to LPG. LNG substitution can save more than 10% of the costs incurred for LPG and industrial diesel fuel. Taking into account the costs of

LNG processing, transportation elements, insurance and gas regasification per mbtu at the receiving terminal, the LNG price is 11 – 14% of crude oil, in the normal case is a reasonable equilibrium price proxy. This is in contrast to LPG, where the price of LPG is US$ 20-US$ 23 per mmbtu so that the price of LNG is still 50% cheaper than LPG.

Based on this, economically the price of LNG is still cheaper when compared to oil and LPG. However, infrastructure causes problems, such as the LNG terminal in Java and inter-island transport ships for distribution which have not been able to reach all potential consumers. This encourages the need for investment in the opening of an LNG terminal in Java.

4.2. Market Segmenting, Targeting and Positioning

Table 1: Substitution Potential for Solar in West Java

No	Province	In Kilo Liter	Eq'v MMBTU	Eq'v Ton LNG	Eq'vTon/D LNG	Eq'v mmscfd
1	DKI Jakarta	733,670	26,837,636	509,804	1,457	73
2	Banten	777,638	28,445,987	540,356	1,544	77
3	West Java	2,023,947	74,035,993	1,406,379	4,018	201
	Total	**3,535,255**	**129,319,617**	**2,456,540**	**7,019**	**351**

Diesel consumption in West Java is 3,535,255 kilo litres or equivalent to 2,456,540 tons of LNG. Meanwhile, LP consumption in West Java is 3,000,000 tons of LPG equivalents to 2,663,602 LNG. Based on the data in tables 4.2 and 4.3, it can be seen that there is a large market share in the use of LNG in West Java which can be served by the operation of the LNG terminal. According to the data, there is a potential of 30% of diesel and LPG users who can be converted into LNG users.

The data shows that there is a need for around 717.4 tons of LNG per day for industrial needs in West Java with the largest demand being from PT Citra Nusantara Gemilang which is a medium-level natural gas distributor. Currently the company has 37 downstream customers, including 12 food factories, 6 textile factories, 3 automobile production plants, 5 wood-related factories, 2 steel processing plants, and a pharmaceutical factory, 4 hotels, 3 central kitchens and 1 hospital. Another potential consumer is PT Harmoni Lintas Bhumi which uses LPG and diesel and has plans to build LNG as a Central Gas Source which will then be distributed to LNG gas pipelines in the industrial complex. The company will use LNG to convert the use of LPG and Diesel in shopping centres and malls into LNG users.

The next is PT Indah Prakasa Sentosa which is a super block real estate, hotels, restaurants, catering services, laundry companies, and other LPG & Diesel Retail customers. The company will turn it into an LNG user. The company in this case positions itself as the only LNG distributor by providing infrastructure in the form of terminals that can provide services for industrial scale consumers and retail consumers in the western part of Java.

4.3. Legal Aspect

The legality of the construction of the LNG terminal has been obtained from the main license, namely the Investment Coordinating Board Letter No. 1740/1/IP/PMA/2014 dated June 13, 2014, Approval of Establishment of Limited Liability Company, Company registration and domicile letter, Submission of Investment Activity Report (LKPM)) and Permanent Business Permit (IUT). For taxation, a Taxpayer Identification Number (NPWP) has been made, a Taxable Entrepreneur Confirmation Letter, a Permit to Employ Foreign Workers, the BPJS Employment Program and the BPJS Health Program as well as the Ratification of

Collective Labor Agreements (PKB/Company Regulations). In terms of project location and construction, PT. BJP (Sister Company – KG) as the owner of the land has given the right to use an area of approximately 30 hectares to PT. Nusantara Gas Services (NGS) based on the Decree of the Regent of Serang number 17.1/SK.IL-I/NF/DTRBP/2012.

The location legality has been obtained by Decree of the Regent of Serang number 593/Kep.770-Huk.BPTPM/2015 dated 5 November 2015, which requires an extension after its expiration in 2018 as well as a construction legality by the EPC contractor. From the environment, environmental permission have been obtained by Decree of the Head of the Investment Coordinating Board and Integrated Services of Banten Province Number 570/15/ILH.BKPMPT/VII/2016 dated 1 July 2016. Temporary LNG Storage License obtained from the Capital Coordinating Board dated 18 May 2016 number 245/A.8/MIGAS/2016. For port needs, a Port Permission (Special Oil and Gas Port for Own Use) has been obtained by Decree of the Director General of Sea Transportation number BX.326/PP008 dated 30 September 2016. For shipping, an MOU of LNG Vessel Lease Agreement with PCL Tanker has been signed PTE. LTD. on 15 February 2021. Ships with a capacity of 30,000 m3 are planned for use.

4.4. Operation Aspect

The choice of business site is in Bojonegara, Serang Banten. The land is located in the village of Argawana, Puloampel, Serang, Banten, with an area of ± 86 Ha HGB belonging to the KG, with a water front of ± 600 m and a draft of 7 – 8 m. The location is on the edge of the East Cilegon exit toll road to PLTU Suralaya and the area around the industrial environment and ± 7 km from the east exit of the Cilegon Jakarta-Merak Toll Road. Main Permits have been completed: Location Permit, AMDAL, Port (TUKS), Temporary LNG Storage Permit, NGS Business Legal Permit.

The master plan layout of the LNG terminal has ports for unloading from LNG carriers, piping, LNG storage tanks, processing or gasification facilities, ORV & HP pumps, BOG recovery units and LNG truck stations. LNG is unloaded from the ship on a jetty to be loaded into the LNG Tank via cryogenic pipelines. From this LNG storage tank, LNG will be filled directly to the LNG Truck station or reprocessed using ORV & HP pumps and BOG recovery units for the gasification process which is then sent via pipelines in the form of gas to consumers. The LNG processing facility is in the area (BM-6) which is used to produce LNG of 30mmscfd LNG every day. The ability to produce 47 mmscfd or 934 tons per day, can meet most of the LNG needs in West Java.

The LNG terminal will select several natural gas suppliers with quality and capacity that can meet the target and also SOPs to be able to receive orders continuously. Currently, the sole supplier for LNG needs is PT Pertamina, where Pertamina's role is to market state-owned LNG, both for export and domestically. Pertamina's main source of LNG comes from the Bontang LNG plant. In addition to the Bontang LNG plant, LNG is also produced at the Tangguh Papua LNG plant where the government appoints British Petroleum for marketing.

4.5. Human Resource Aspect

In running the LNG Terminal business, the owner of the company is responsible for managing company finances, managing employee recruitment, designing strategies for the company and also providing direction to employees so that they can work optimally as well as supervising the production process. The LNG terminal requires 3 stages of human resource preparation which includes the preparation of human resources for the pre-project, preparation of human resources for the construction phase and preparation of human resources for the operational phase of the LNG terminal.

4.6. Financial Aspect

LNG supply comes from Bontang with a molecular price of LNG of USD 6.6/mmbtu where the slope is 11% and the ICP is USD 60/bbl. The shipping fee is USD 1.2/mmbtu with a terminal fee of USD 3.3/mmbtu. These results indicate that the current LNG price at the terminal is USD 11.1/mmbtu. The capacity of LNG that can be

produced is 47 mmscfd or 934 tons of LNG per day. Sales will be made using a 60% cash and 40% credit system with a payment period of 30 days. The minimum annual cash is around USD 52,050,000 for the purchase of molecules and OPEX for 3 months as well as for payment of bank interest and principal for 6 months. Depreciation of infrastructure is within a period of 10 business years. The financing component of the LNG project is a bank loan of USD 128,272,000 with a loan rate of 7%, a term of 9 years and a grace period of 2 years. Meanwhile, equity comes from USD 32,068,000. So the total value of CAPEX is USD 160,340,000.

Revenue for seven years from year 3 to year 10 is projected to be USD198.19 million with expenditures from purchasing products from suppliers in the form of LNG element of USD 117.84 million, while expenses from shipping are USD 21.43 million. Depreciation of the product amounted to USD 16.03 million. Taking into account the component, the company's gross profit is estimated at USD 42.89 million so that with the expenses for administration and general sales, the operating profit is USD 30.5 million in the third year, the largest projected operating profit is in the fifth year, which is USD 31.55 million and the lowest was in the 10th year, namely operating profit of USD 29.74 million. Consideration of expenses for interest and agent fees as well as the existence of taxes shows that the use of LNG as a cheap and environmentally friendly energy source is projected to be able to generate profits since the third year of USD 16.54 million, and the profit continues to grow in the following years until the 10th year to USD 23.20 million.

Utilization of LNG as a cheap and environmentally friendly energy source has positive cash flow since year 3 and this positive cash flow increases in the following year and the highest is projected in year 10, which is USD 90.97 million in one year. Net cash flow from operating activities has grown since the third year where this growth starts from the third year, which is USD 30.63 million and is projected to be USD 45.78 million in the 10th year. Investment cash flows are only available in the first and second years considering the two the first year was infrastructure development with a total investment for capital expenditure of USD 160.34 million.

For investment cash flows, it can be seen that in the first two years there were cash inflows originating from funding for equity participation of USD 32.07 million and investment loans of USD 119.15 million. Meanwhile, cash outflows for funding are based on principal payments in the third to 9th years, amounting to USD 128.27 million, while dividends will be distributed from the sixth to the tenth year with a total amount of USD 70 million.

4.7. Company Financial Feasibility Analysis

The financing component of the LNG project is a bank loan of USD 128,272,000 with a loan rate of 7%, a term of 9 years and a grace period of 2 years. Meanwhile, equity comes from USD 32,068,000 so that the total value of CAPEX is USD 160,340,000. The net present value of the project is USD 9,883,927 with a discount of 11%. These results indicate a positive NPV value which means that the invested funds are able to generate positive cash flows so that the NPV value is positive.

The IRR Project value of 12.48% and the IRR Equity of 19.42% are the interest rate that makes NPV = 0, as it equates the present value of the investment with the present value of net cash receipts. With an IRR rate that is greater than bank interest, this business is feasible to run. Based on these results, it can be stated financially that the business of utilizing LNG as a cheap and environmentally friendly energy source can be carried out. The payback period for this LNG project is 6 years with a profitability index (PI) of 1.3. A PI value of 1.3 which is greater than 1 means that the proposed investment project is declared feasible (accepted), meaning that the present *value of cash inflows* generated by the investment project is greater than the current *value of cash out flows*.

5. Conclusion

Based on the results of the business feasibility analysis of using LNG as a cheap and environmentally friendly energy source (regasification) in West Java with the plan to build an LNG terminal in Bojonegara, Serang, Banten, the conclusion obtained is that LNG has a large market with a need of around 717.4 tons of LNG per day for industrial needs in West Java with the largest demand being PT Citra Nusantara Gemilang which is a

medium level natural gas distributor, and currently has 37 downstream customers, including 12 food factories, 6 textile factories, 3 car production plants, 5 wood related factories, 2 steel processing plants, and a pharmaceutical factory, 4 hotels, 3 central kitchens and 1 hospital. On the other hand, there is a saving of IDR 1,021/liter compared to industrial diesel or 12.02% and there is also a potential savings of IDR 1,944/kg or 16.90% compared to LPG. LNG substitution can save more than 10% of the costs incurred for LPG and industrial diesel fuel. In terms of the environment, greenhouse gas emissions for industry in terms of SOx, NOx, CO2 and PM from LNG are much lower than petroleum and lower than LPG. LNG also has the lowest CO2 emission coefficient when compared to LPG and oil.

The choice of business site is in Bojonegara, Serang Banten because it has a water front width of ± 600m and a draft of 7-8 m, located on the edge of the Cilegon Timur exit toll road to PLTU Suralaya and the area around the industrial environment, ± 7 Km from the east exit toll Cilegon Jakarta Toll -Merak and has major permits such as Location Permit, AMDAL, Port (TUKS), Temporary LNG Storage Permit, NGS Business Legal Permit. This LNG terminal is planned to have a production capacity of 47 mmscfd or 934 tons per day.

Based on the revenue projection, it can be seen that the revenue for seven years from year 3 to year 10 is predicted to be USD198.19 million. Utilization of LNG as a cheap and environmentally friendly energy source is projected to be able to generate profits from the third year of USD 16.54 million, and this profit continues to grow in the following years until the 10th year to USD 23.20 million. The results of this study indicate that the LNG terminal is feasible to run with the net present value of the project amounting to USD 9,883,927 with a discount of 11%. This result shows a positive NPV value which means that the invested funds are able to generate positive cash flows so that the NPV value is positive. IRR Project value is 12.48% and IRR Equity is 19.42% which is greater than bank interest. The payback period for this LNG project is 6 years with a profitability index (PI) of 1.3. A PI value of 1.3 which is greater than 1 means that the proposed investment project is declared feasible (accepted), meaning that the present *value of cash inflows* generated by the investment project is greater than the present *value of cash out flows.*

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