FINANCIAL FEASIBILITY STUDIES FOR PERUSAHAAN GAS NEGARA (PGN) PROJECT: A CASE STUDY OF CITY GAS PROJECT IN INDONESIA FOR THE PERIOD OF 2018-2038

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ABSTRACT

Before 2013, PGN was only focused on the serving industry. This was due to the demands of the gas for households was low compared the industry. After 2013 PGN is demanded by the government to grow sustainable and professionally to serve the demands of the people. PGN has taken the opportunity to join with the Ministry of Energy and Mineral Resources (ESDM) in developing the large-scale gas pipeline design to reduce construction cost and ensuring the availability of licenses so that the construction of gas pipes for households could be cheaper. The program, which is called "Jargas", which is a municipal gas distribution, optimizes the use of natural gas through pipelines to serve households by providing natural gas as a low-cost and clean form of energy. The aims of this study are to examine prospective revenue and to measure the financial feasibility of investment in Jargas project in Serang, Bogor, and Cirebon for the period 2018 - 2038. The author is involved in this project and provides data related to this study. Capital Budgeting Model indicators: Payback Period, Return on Investment (ROI), Net Present Value (NPV), NPV Index, Discounted Payback Period, and Internal Rate of Return (IRR) analysis were used to analyze the data based on first alternative, which is using government selling price with subsidy and second alternative based on purely commercial price. The finding shows that based on first alternative, the project is not feasible, but the second alternative project is feasible. The authors believe that the findings will be beneficial for the company to implement Jargas project opportunities in order to provide a better return by using the second alternative.

Keywords: Capital budgeting, financial, feasibility, city gas

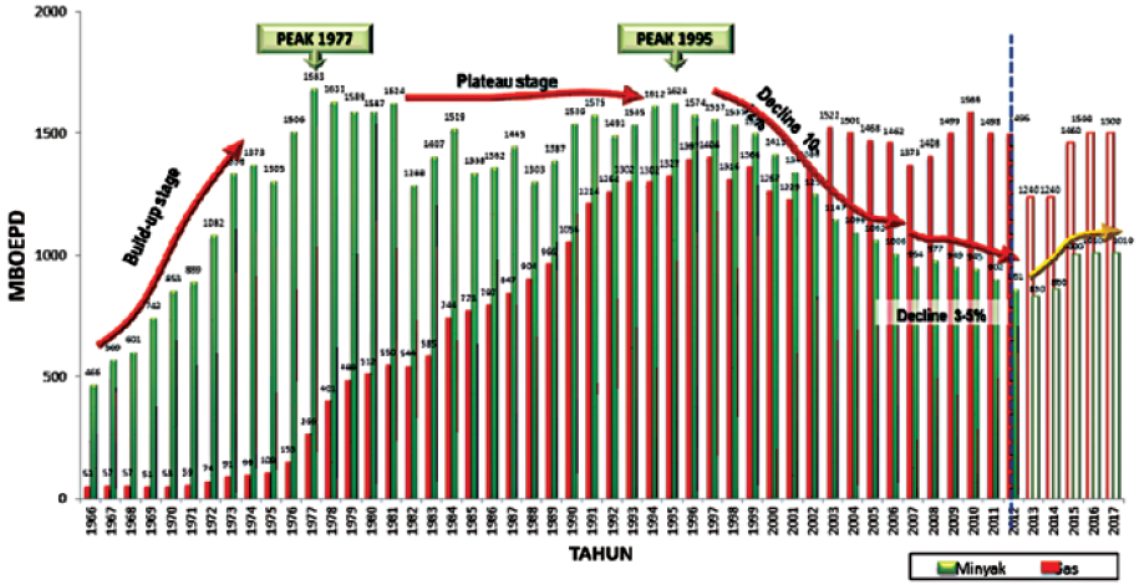
INTRODUCTION

The oil and gas industry, both in Indonesia and globally, has experienced high volatility. Records show that from its peak in mid-2008 (US$ 145 per barrel), the oil price collapsed by more than 70% and ended in 2008 at US$ 40 per barrel following the global financial crisis.

Source: https://oilprice.com/oil-price-charts

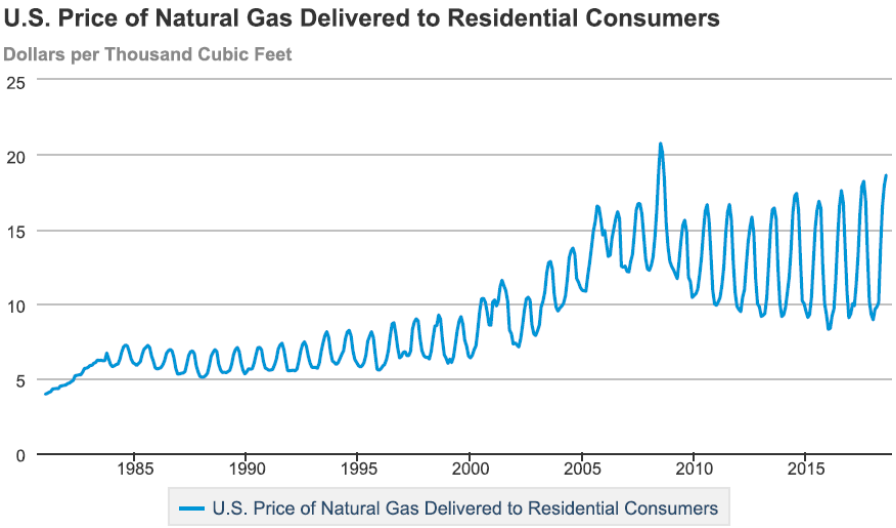
As market confidence returned at 2014 crude oil prices rose again to an average (on an annual basis) of approximately US$ 94-98 a barrel (WTI) from 2011 to 2014 (PWC, 2017). In 2016 oil prices fell below the US $ 40 per barrel. Now the price is more than US$ 70 per barrel. Meanwhile, oil reserves in Indonesia are currently depleting. The volatility of oil price has been affected by the limited production and high demand Daryanto, W. M., & Nurfadilah. D. (2018).

Profile of Indonesian Oil and Gas Production



Source: Indonesian Ministry of Energy and Mineral Resources, Natural gas development for households

Considering international crude oil prices tend to soar sharply, the issue of depleting oil reserves, and high LPG subsidize is a strong reason for the government converting oil to natural gas which is still available in large quantities.

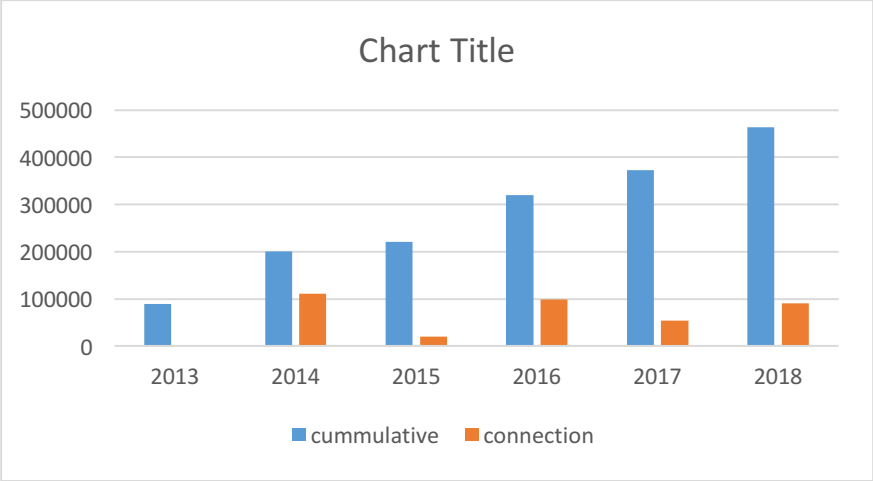


Source: https://www.eia.gov/dnav/ng/hist/n3010us3m.htm

Using gas provides benefits for the community at a lower cost rather than using oil because the heating is better and more environmentally friendly.

It causes the industry to move from using oil to gas. One of the leading companies in Indonesia that are trusted to manage the gas business industry is PT Perusahaan Gas Negara (Persero) Tbk ("PGN") which is a well-known state-owned company that specializes in gas distribution industries and natural gas. PGN is Indonesia's largest national company in the field of natural gas transportation and distribution which plays a major role in the fulfillment of domestic natural gas and foreign demand also (PGN Annual report, 2017).

Jargas household connection (cumulative) 2013-2015



Source: https://nasional.tempo.co/read/1145188/jaringan-gas-kota-bikin-hemat-rumah-tangga

In 2013 PGN take the opportunity to join with the Ministry of Energy and Mineral Resources (ESDM) in developing the large-scale gas pipeline design to reduce construction cost, permit easiness and ensuring the availability of licenses so that the construction of gas pipes for households could be cheaper. The program, which is called "Jargas" (municipal gas distribution), optimizes the use of natural gas through pipelines to serve households by providing natural gas as a low-cost and clean form of energy. Construction of natural gas distribution networks for households is one of the government's programs to increase natural gas utilization, reduce fuel subsidies and encourage cleaner energy use. The development of Jargas has been carried out by the Directorate General of Oil and Gas (ESDM Ministry) since 2009.

Financial Feasibility studies on a Jargas project are very important given the need for a foundation that can be used as a reference to assess whether a project is feasible or not to be implemented. One of the things that are usually reviewed in a project feasibility study is about financial analysis. In this research, investment appraisal analysis will be carried out on the development of gas distribution in Indonesia for 5043 households in Serang, 5120 households in Bogor, 3503 households in Cirebon with 180792-meter polyethylene pipeline various diameter. While according to BPS Statistic (2017) the total number of households in each city is 140090 Households in Serang (3.6%), 189511 Household in Bogor (2.3%) and 75136 households in Cirebon (4.6%). The construction of gas pipelines is important to be done so that all communities can benefit from the use of natural gas as an alternative energy that is cheap and environmentally friendly. During this time for everyday life, people who have not felt the use of natural gas still use LPG as a source of energy for cooking. This is what the writer will discuss the financial assessment in the construction of household gas pipelines distribution.

LITERATURE REVIEW

Indonesia produces natural gas about twice as much of it consumes Daryanto, W. M., & Samidi, S. (2018). Natural gas form millions of years ago, from the remains of plants and animals (diatoms) decayed and built up in thick layers, sometimes mixed with sand and silt. Over time, these layers were buried under sand, silt, and rock. Pressure and heat changed some of this organic material into coal, some into oil (petroleum), and some into natural gas. In some places, the natural gas moved into large cracks and spaces between layers of overlying rock. In other places, natural gas occurs in the tiny pores (spaces) within some formations of shale, sandstone, and other types of sedimentary rock, where it is referred to as shale gas or tight gas. Natural gas also occurs in coal deposits, which is called coalbed methane (EIA, 2018) and natural gas is considered as one of the cleanest, safest, and most useful forms of energy in our day-to-day lives. (Alberta Energy, 2018).

Gas Transportation

Transporting natural gas from the wellhead to consumers requires many infrastructure assets and processing steps, and it includes several physical transfers of custody.

Most common method of gas delivery to consumers are (Hetland, 2015):

a. Pipeline Network System. The transportation method using gas pipe is carried out for transport distance <2,500 km. Pipeline transportation methods only apply to adjacent locations, large limitations, but the supply of resources is more stable.
b. CNG, The distance travelled by gas for CNG is between 800-3,000 km with the amount of gas transported <300 MMSCF.
c. LNG, transportation system is carried out if the distance is more than 3,000 km with the amount of gas transported at least 500 MMSCF.

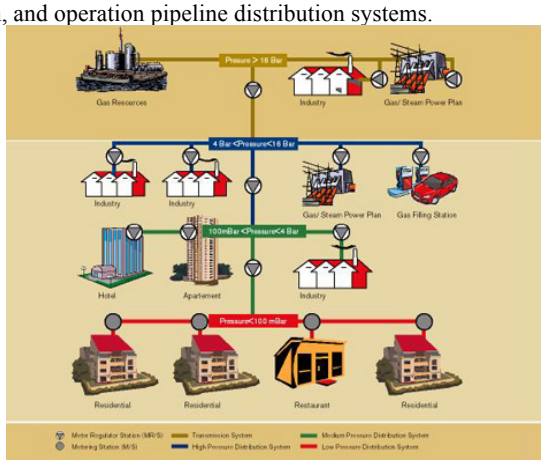
Pipeline Network System

There is a great deal of behind-the-scenes activity that goes into delivering natural gas to your home Natgas (2018).

1. Transmission Pipes
   Transmission pipes can be measured anywhere from 6 to 48 inches in diameter, depending on their function. Mainline transmission pipes, the principle pipeline in a given system, are usually between 16 and 48 inches in diameter. Lateral pipelines, which deliver natural gas to or from the mainline, are typically between 6 and 16 inches in diameter. Most

major interstate pipelines are between 24 and 36 inches in diameter. The actual pipeline itself, commonly called 'line pipe', consists of a strong carbon steel material, engineered to meet standards set by the American Petroleum Institute (API). Line pipe is also covered with a specialized coating to ensure that it does not corrode once placed in the ground. In addition, cathodic protection is often used; which is a technique of running an electric current through the pipe to ward off corrosion and rusting.

2. Compressor Stations
To ensure that the natural gas flowing through any one pipeline remains pressurized, compression of this natural gas is required periodically along the pipe. This is accomplished by compressor stations, usually placed at 40 to 100-mile intervals along the pipeline. The natural gas enters the compressor station, where it is compressed by either a turbine, motor, or engine.
3. Metering Station
Metering stations measure the flow of gas along the pipeline and allow pipeline companies to 'track' natural gas as it flows along the pipeline. These metering stations employ specialized meters to measure the natural gas as it flows through the pipeline, without impeding its movement.
4. Valves
These valves work like gateways; they are usually open and allow natural gas to flow freely, or they can be used to stop gas flow along a certain section of pipe.
5. Control Stations and SCADA Systems
These systems are essentially sophisticated communications systems that take measurements and collect data along the pipeline (usually in a metering or compressor stations and valves) and transmit it to the centralized control station. The flow rate through the pipeline, operational status, pressure, and temperature readings may all be used to assess the status of the pipeline at any one time. These systems also work in real time.
6. The Distribution System
Refers to SNI 13-3507-1994: Construction of Polyethylene Pipe Systems for Natural Gas, This standard is used as a basis for planning, construction, and operation pipeline distribution systems.



Source: PGN Schematic distribution pipeline refer to ESDM No 300.K/38/M.PE/1997

Leaks in the pipelines, in the distribution networks or at the end consumer decrease the economically usable volume of natural gas. The losses in the industrialized western nations have been estimated to range up to 1 % of the volume of natural gas produced (Jurgen Messner & Georg Babies, 2012). The steel pipe and polyethylene pipe was used to construct distribution networks. The smaller-diameter pipe from 20 mm to 180 mm also is used to transport natural gas from the city gate to individual consumers.

In order to complete measurement of the feasibility of a project design, a company should also develop Capital Budgeting Model analysis in terms of quantitative measurement and evaluation.

Capital Budgeting

According to Anthony, Hawkins & Merchant (2011), Capital Budgeting Investment Problems also commonly called Capital Budgeting Problems is defined as an alternative decision to those that involve relatively long-term differential investments of capital. Capital budgeting is the process by which a company determines and evaluates possible costs or large investments. These expenditures and investments include projects such as building new infrastructure or investing in long-term businesses. Often, cash inflows and outflows from prospective projects are evaluated to determine whether the potential returns generated to meet the objectives or sufficient company standards, also known as "investment appraisal."

While internally the company should manage the cost-effectiveness. But before expanding, another research suggests that a company must evaluate the feasibility of its projects and mitigate the risks that exist in its investment area by using methods commonly used in the industry (oil and gas) for example capital budgeting method (Bhappu & Guzman, 1995).

Payback Period

The PBP method calculates and estimates the period of time required for the profit or benefits to equal the cost or to reach the break-even point (Newnan, Lavelle, & Eschenbach, 2013). In order to calculate this, you would take the total cost of the project

and divide it by how much cash inflow you expect to receive each year; this will give you the total number of years or the payback period.

Return on Investment
Return on Investment (ROI) is the most common profitability ratio because of its versatility and simplicity. The calculation is not complicated, relatively easy to interpret, and has a range of applications. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment. The result is expressed as a percentage or a ratio. If an investment's ROI is not positive, or if other opportunities with higher ROIs are available, these signals can help investors eliminate or select the best options.

Net Present Value (NPV)
According to Newman et al. (2013), the basic notion of this method is to calculate the present value of the investment by subtracting the present value of cost from the present value of benefits. The net present value decision tool is a more common and more effective process of evaluating a project. Based on Daryanto & Primadona (2018). The NPV tool is effective because it uses discounted cash flow analysis, where future cash flows are discounted at a discount rate to compensate for the uncertainty of those future cash flows. NPV seems to be a preferable method in the event that projects are mutually exclusive. Sometimes, investors prefer to use this method because it is an easy way to calculate and reinvest cash flows at the cost of the capital (Arshad, 2012).

Net Present Value (NPV) Index
NPV Index or a Profitability Index (PI) attempts to identify the relationship between the costs and benefits of a proposed project. The profitability index is calculated by dividing the present value (NPV) of the project's future cash flows by the initial investment. A PI greater than 1.0 indicates that profitability is positive, while a PI of less than 1.0 indicates that the project will lose money.

Discounted Payback Period
The calculation starts with the cash flow of a project must be estimated and broken down into periods. These cash flows are then reduced by their present value factor to reflect the discounting process. With the assumption of a large cash outflow to begin the project, future discounted cash flows are net against the initial outflow. The discounted payback period is calculated when the inflows equal the outflows.

Payback Period vs Discounted Payback Period
These two calculations, although similar, may not return the same result due to discounting of cash flows. For example, projects with higher cash flow toward the end of the project life will experience greater discounting due to compound interest. For this reason, the payback period may return a positive figure, while the discounted payback period returns a negative figure.

Internal Rate of Return (IRR)
The internal rate of return is a discount rate that is commonly used to determine how much of a return an investor can expect to realize from a particular project. IRR is considered one of the easier methods by which to develop an immediate idea of the percentage of return that will be returned in each alternative (Galli, 2017).

RESEARCH QUESTIONS

From the explanations of introduction, literature review, there are two research questions below:
Rq1: Whether the Jargas project is feasible to be implemented with a ramp up scenario up to the full capacity of the pipeline network at the price set by the government, the price is almost equivalent to subsidized LPG 3 Kg/cylinder (existing alternative energy supply for low-income resident)?
Rq2: Whether the Jargas project is feasible to be implemented with a ramp up scenario up to the full capacity of the pipeline network at commercial prices equivalent to non-subsidized LPG 12 Kg/ cylinder (existing alternative energy supply for general resident)?

METHODOLOGY

The quantitative method was used to analyze the investment opportunity in Jargas project. Capital Budgeting Method was used in order to calculate the time frame and profitability of the project. The capital budgeting method was used to analyze this investment using criteria of 1) Payback period, 2) Average return on investment, 3) Net Present value; 4) Profitability Index, 5) Discounted Payback Period, 6) Internal Rate of Return. Based on the result of the capital budgeting method then it is decided whether this project is feasible or not fulfilling the requirement of Company Project Standard. The objective of this study is to determine the feasibility of Jargas project. Therefore, the concept or literature review mentioned in chapter 2 is for the reader to understand what it is, where it comes from and how it is important to the business especially determine the feasibility of a project.

FINANCIAL ANALYSIS

Capital budgeting analysis is used to calculate investment feasibility of the City Gas Project in Indonesia for construction of household gas pipelines in Serang, Bogor, and Cirebon with length 180.791 meters, 13.666 households and investment amount to IDR 155.175.723.000. For this project, The Indonesian government offers competitive advantages for the PGN through:

1. Gas supply allocation

Based on a letter from the Ministry of Energy and Mineral Resources of the Republic of Indonesia No.2760 / 12 / MEM.M / 2018 concerning the allocation of natural gas prices and natural gas distribution network for households built by the government in 2018, the purchase price of gas at the wellhead is US $ 4.72 / MMBtu with a gas allocation each city is 0.2 MMSCFD.

2. Permit
   The Directorate General of Oil and Gas guarantees the ease in handling permits by preparing presidential regulations related to the gas network (Jargas) so that the central government is also supported by the regional government.
3. Gas price
   Selling price of natural gas through pipes sold by business entities to household consumers in the city distribution pipeline set by government maximum IDR 4500 per meter cubic (katadata.co.id, 2018) or US$ 7.5/MMBTU and the commercial selling price of gas equivalent to 12 kg cylinder non-subsidized LPG is IDR 141.000/cylinder (pertamina.com, 2018) or equivalent with US$ 15.86/MMBTU.
4. Pipeline capacity
   Based on technical data from the pipeline network design by using a pipe with a diameter of 180 mm, maximum pressure of 4 Bar and a Regulating Station Meter for clustering distribution networks, the network capacity in Serang is 0.32 MMSCFD, in Bogor it is 0.32 MMSCFD and in Cirebon it is 0.32 so the total pipeline network capacity in this project is 0.96 MMCFD.

Financial Assumption

For the depreciation expense, this study is using straight-line depreciation method for 20 years of useful life, based on Regulation of the Republic of Indonesia Finance Minister Number 65 / PMK.06 / 2017 concerning depreciation of state property in the form of fixed assets in central government entities. The straight line depreciation method is the method of depreciation by the rate of stability calculation of each year into the enterprises' cost of business and production of the fixed assets involved in the business operation. The tax rate in Indonesia stands at 25% (tradingeconomic.com, 2018)

Capital Budgeting Calculation

Capital budgeting calculation based on criteria for the aspect of Payback Period, Return On Investment, Net Present Value, Profitability Index, Discounted Payback Period and Internal Rate of Return. Accepted criteria for PGN Project Feasibility are based on estimated returns (IRR) and present value (NPV) of the cash flow that will be issued and received. The discount rate used to calculate the present value of the customer's cash flow is based on the company's capital cost (WACC) obtained based on assumptions from the Trading Economics at the time of the evaluation. The discount rate used is 7.11% (Trading Economics, 2018). The volume of gas calculated by the ramp-up pipe utilization scenario from 0.28 to 0.96 MMSCFD with selling in US$/MMBtu.

Table 1. Capital Budgeting Method Calculation Result at government selling price.

No	Capital Budgeting	Result	
1	Payback Period (year)	-	Not acceptable
2	Return On Investment	-5%	Not acceptable
3	NPV (IDR)	(158,405,683,144.66)	Not acceptable
4	NPV Index / Profitability Index	-102%	Not acceptable
5	Discounted Payback Period (year)	0	Not acceptable
6	IRR (%)	-14.77%	Not acceptable

Table 1 shows that the Payback Period and Discounted Payback Period cannot be calculated. ROI of the project is -6. The NPV is negative with NPV Index resulted to -102%. IRR calculation result is -14.77 Based on all capital budgeting criteria of Payback Period, Discounted Payback Period, Return on Investment, NPV, NPV Index and IRR, the Jargas Project can be concluded not feasible.

Table 2. Capital budgeting method calculation result at the commercial selling price

No	Capital Budgeting	Result	
1	Payback Period (year)	12.66	Acceptable
2	Return On Investment	6%	Acceptable
3	NPV (IDR)	1,015,691,262,-	Acceptable
4	NPV Index / Profitability Index	1%	Acceptable
5	Discounted Payback Period (year)	19.89	Acceptable
6	IRR (%)	5.97%	Acceptable

Table 2 shows that the Payback Period 12.66 years, ROI of the project is 6%. The NPV is positive with NPV Index resulted to 1%. Discounted Payback Period 19.89 years, IRR calculation result is 5.97% Based on all capital budgeting criteria the Jargas project at the commercial price can be concluded feasibly.

RESEARCH LIMITATION

This research is limited to Jargas project in Indonesia at Serang, Bogor and Cirebon period 2018-2038. The data were undertaken are from technical and economic data. The research just focused on financial feasibility based on capital budgeting.

CONCLUSION

The Study shows the feasibility result of City Gas Project in Indonesia for construction of household gas pipelines in Serang, Bogor, and Cirebon for ramp-up scenario up to the full capacity of the pipeline network at the price set by the government equivalent to subsidized LPG 3 Kg/cylinder, the project is not feasible to be implemented because, in term of Capital Budgeting, the study found that the project will give a negative return. But in accordance with Republic of Indonesian Law Number 22 of 2001 concerning Oil and Natural Gas Article 3C, that the implementation of oil and gas business activities is aimed to guarantee the efficiency and effectiveness of the availability of oil and natural gas as a source of energy. Government Regulation Number 79 of 2014 concerning Article 18 National Energy Policy, that the government and/or the Regional Government are in accordance with their mandatory authority carry out energy diversification and National Energy Security for substitution of fuel oil with gas in the household sector. Presidential Regulation of The Republic of Indonesia Number 56 of 2018, Concerning Second Amendment to Regulation of President Number 3 of 2016, Concerning Acceleration Of National Strategic Implementation, project number 109: Construction of Natural Gas Networks for Households. Construction of a gas distribution pipeline for households is one program national priorities that aim to diversify energy, reduce subsidies, the supply of clean and cheap energy and complementary kerosene conversion programs to LPG to accelerate the reduction of petroleum use. Natural gas utilization in order to reduce the use of petroleum has a direct impact on the magnitude subsidy. Based on that it is recommended to execute the Jargas project at the price set by the government.

And the outcome shows for ramp-up scenario up to the full capacity of the pipeline network at commercial prices equivalent to non-subsidized LPG 12 Kg/cylinder is feasible to be implemented because, in term of Capital Budgeting, the study found that the project will give a positive return. This study can give insight for managers in the oil and gas industry especially in PGN about the Jargas project feasibility. Therefore, the managers can make a better decision for developing new gas pipeline design, new technology and scheme price for low or general income household with the purpose to increase the market share and profitability.

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