# DETERMINATION OF TARIFFS FOR TRANSPORTING NATURAL GAS (TOLL FEES) ON PIPE SECTION X BY ANALYZING THE SENSITIVITY OF THE COST OF SERVICE PARAMETERS

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#### ABSTRACT

Indonesia has large enough gas reserves to meet household and industrial needs. It's just that, the price or the existing gas-related system is not maximal yet. One of the things that can ease the burden on the state is the use of household gas networks, some people are still hesitant to use it even though the price is relatively cheap compared to LPG. In determining the gas price, one of the components that has an effect on determining the gas price is the toll fee through pipes to be channeled. So the authors aim to conduct this research in order to educate and maximize solutions for energy dependency, for example the location I took is located in North Sumatra Province, with a pipeline stretching 156.5 km from X1 to X3. With OD 16 "along 18.5 km and existing OD 12" along 138 km. The maximum capacity of the two pipes is 150 MSCFD and 75 MSCFD, and the average volume that flows is not up to 10%. The construction of the pipe requires a cost of \$ 42,391,716 USD, and nearly 55% of the total is pipe material including fittings, coatings, and others. With an average annual revenue of \$ 11.561943 this project alone should have been able to return on investment for less than 5 years. With tariff analysis, the amount can be optimized with volume by reducing a few dollars per MSCF, to \$ 7.49 making it more economical.

Keywords: Natural Gas Network, Cost of Service, Toll Fee

### ABSTRAK

Indonesia memiliki cadangan gas yang cukup besar untuk memenuhi kebutuhan rumah tangga dan industri. Hanya saja, harga atau sistem terkait gas yang ada belum maksimal. Salah satu hal yang dapat meringankan beban negara adalah penggunaan jaringan gas rumah tangga, beberapa orang masih ragu untuk menggunakannya walaupun harganya relatif murah dibandingkan dengan LPG. Dalam menentukan harga gas, salah satu komponen yang berpengaruh pada penentuan harga gas adalah biaya tol melalui pipa yang akan disalurkan. Jadi penulis bertujuan untuk melakukan penelitian ini dalam rangka mendidik dan memaksimalkan solusi untuk ketergantungan energi, misalnya lokasi yang saya ambil terletak di Provinsi Sumatera Utara, dengan pipa sepanjang 156,5 km dari X1 ke X3. Dengan OD 16 "sepanjang 18,5 km dan OD 12" sepanjang 138 km. Kapasitas maksimum kedua pipa adalah 150 MSCFD dan 75 MSCFD, dan volume rata-rata yang mengalir tidak sampai 10%. Konstruksi pipa membutuhkan biaya \$ 42.391.716 USD, dan hampir 55% dari total adalah bahan pipa termasuk alat kelengkapan, pelapis, dan lain-lain. Dengan pendapatan tahunan rata-rata \$ 11,561943 proyek ini saja seharusnya dapat mengembalikan investasi selama kurang dari 5 tahun. Dengan analisis tarif, jumlahnya dapat dioptimalkan dengan volume dengan mengurangi beberapa dolar per MSCF, menjadi \$ 7,49 sehingga lebih ekonomis.

Kata Kunci: Natural Gas Network, Cost of Service, Toll Fee

### PRELIMINARY

Energy is the biggest commodity needed by all people to carry out activities and move the wheels of the economy, both micro and macro in nature. However, the existence of this energy the longer the price is more expensive. The energy whose dependency value is still very large until now is oil and gas. Indonesian people often accept idolatry that our country is rich in natural resources, but not in reality. One of the government's efforts in overcoming this energy scarcity is to move the use of fuel oil into gas fuel. The tariff for transporting natural gas, or commonly referred to as toll fees, is a fee charged by the regulator to certain business entities on the basis of the use of shared gas network facilities owned by the business entity building the gas pipeline. The business activities of supplying gas pipeline infrastructure or gas transportation business activities through pipelines are natural monopoly business activities, while natural gas supply and commercial activities are potential activities to be competed (Purwanto, 2014).

#### **LITERATURE**

This transmission or distribution pipeline is a vital facility for natural gas to reach the community. The exploitation of natural gas transmission pipelines is a natural monopoly business. So that an arrangement is needed so that there is no abuse of power to dominate the market by industry players and can harm consumers (KEMA, 2010). There are two goals that should be achieved in regulating tariffs by regulators according to Graham (Shuttleworth, 2008), namely:

a. Regulators should determine tariffs that allow investors to get capital back for efficient investments

b. The method of determining tariffs should encourage the development and operation of efficient deangan networks by business actors.

The following are the regulations that apply in the transportation of natural gas through transmission pipes to achieve the two objectives above (KEMA, 2010):

a. Rate of Return Regulation, the regulator sets tariffs for transport service providers every one or two years. The tariff determined can cover all production costs of

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the transportation service provider business and the return on capital that interests investors. The regulation of this model is usually set in conditions that are difficult to obtain data for estimated tariffs. Usually forecasting of costs including depreciation is based on last year's data with adjustments to inflation.

b. Cap Regulation, in this model the tariff or profit is determined first. These rates or benefits do not change over a period of time, usually 3 to 5 years. Thus investors or transportation service providers will try to make efficiency or reduce costs. This regulatory model requires sufficient data to estimate tariffs in the coming period.

Both regulations are applied in various tariff systems such as distance, postage / entry exit, or zone. Simply put the pipe rental rates can be formulated as follows (Menon, 2005):

All costs incurred will be replaced with a certain rate of return (rate of return) or with a cap regulation where profits or rates have been determined in advance. To determine the rate of return on investment, this is known as the IRR (Interest Rate of Return). IRR value is a calculation of the rate of return on investment that yields a NPV (Net Present Value) equal to 0 (zero). For Indonesia, the IRR = WACC policy was applied. The following is the WACC formula in accordance with BPH Migas regulation No. 8 of 2013:

WACC = CoD D/((D+E)) + CoE E/((D+E))

Debt and Equity are components of capital structure, while the explanation of debt is capital funding from loans. And equity is capital that comes from equity. As you know, the Cost of Debt is the interest on loan capital as follows:

$$CoD = i x (1-T) \tag{II.3}$$

In this formula, it is necessary to know that i (interest rate) is a loan interest rate, and T (Tax Rate) is a corporate income tax rate, the amount of which refers to the provisions of

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the laws and regulations in force in Indonesia. Below is the formula for cost of equity as follows:

 $CoE = Rf + \beta(BPMEM + ICRP)$ (II.4)

#### **RESEARCH METHODOLOGY**

The stages of this research method are: a. Determine the Cost of Debt value b. Determine the Cost of Equity value c. Calculates the value of the Interest Rate of

Return d. Determine the value of the pipe volume variant based on the original pipe material value

*e.* Calculate the cost of pipe material from minimum to minimum size

f. Knowing how much the toll fee

g. Knowing what factors are very influential in determining the size of the toll fee

#### Flow diagram



## **RESULTS AND DISCUSSION**

The tax rate in accordance with applicable regulations is 25% or if it is minimized by 0.25. Following is table 1 to find out the COD value of this project.

Table 1 Cost of Debt			
rata-rata I 5 tahun terakhir	Tax rate	COD	
5.69%	<u>25%</u>	4.09%	

From the results of the calculation of the cost of debt above, it can be seen that the value is 4.09% applicable this year. This tax rate is used in decimal places or 0.25 so that the interest rate calculation is multiplied by one minus the tax rate.

The value of Indonesia Country Risk Premium and Base Premium for Mature Equity Market can be accessed through online inventory, and calculated for the last 5 years so that the value for ICRP is 2.92 and BPMEM is 5.69. From these data we can calculate the COE values contained in table 2 below.

Table 2 Cost of Equity				
BPMEM	ICRP	Rf	Beta	COE
5.69	2.92	2.29	1.48	15%

From the calculation results above and the applicable formula obtained results from the cost of equity of 15%. These results can change throughout the year following economic conditions, from these results we can calculate the WACC value.

As is known IRR value in the applicable gas network project is the same as WACC. The value of debt and equity itself is obtained from 2019 PT Pertagas annual report, so after calculating the value of debt is 16.34% and equity is 83.66%. Here is table 3 of the WACC calculation

Tabel 3. WACC Calculation				
% Debt	% Equity	COD	COE	WACC / IRR
16.34%	83.66%	4.09	15	13.22%

From the calculation above according to the WACC formula in accordance with applicable regulations, it was obtained at 13.22% so that this value is used as a reference to the IRR

(Interest Rate of Return). From the calculation results, the results of the calculation of toll fees on the pipe section X as shown in table 4 below.

Table 4. Result of Toll Fee Calculation		
Year	IRR	2016
Nilai Basis Aset / CAPEX (USD)		\$42,391,716
Vol. Gas (MSCFD)	_	300
Vol. Gas (MSCFD) / Year	_	109500
Toll Fee		\$7.49
Revenue (USD)	_ 13.22%	\$819,815
O&M Cost	-	\$1,271,751
Iuran	_	\$20,495
Depresiasi (USD)	-	\$2,119,585
Earning Before Tax (EBT)	_	\$2,592,017
ΓΑΧ	-	\$684,004
Earning After Tax (EAT)	-	\$1, 944, 012

From the results of the calculation of the tariff above we can see that the amount of revenue in 2016 was \$ 819,815 in US Dollars. And the toll fee is \$ 7.49 USD. After that, you can calculate the maximum volume in the pipe section X as shown in table 5 below.

Table 5. Calculation of Maximum Volume

Volume (MMSCFD)	100%	
Pipe OD 16"	150	
Pipe OD 12"	75	
Volume Total	225	
MSCFD	225 <b>000</b>	
Volume / Year (MSCF)	82125 <b>000</b>	
Tott Fee	0.77	

From the results of the above calculation using the original pipe size and initial material value, then at 100% capacity in both pipes the toll fee value is 0.77 USD. After that, the calculation of the price of the pipe size variant with each toll fee is as shown in table 6 below.

Table 6. Calculation of Varian Pipe

(BEL-KIM) - (KIM-KEK)	TOTAL NBA	Toti Fee
20" - 16"	\$ 84,861,967	\$ 14.03
18" - 14"	\$ 74,312,242	\$ 12.48
16" - 12"	\$ 67,259,451	\$ 11.30
14" - 10"	\$ 55,455,616	\$ 9.48
12" - 8"	\$ 40,847,637	\$ 7.20

From the table above, we can see the respective tariff rates for the modified pipes. However, even with the smallest size the lowest value was 2.06 USD. The following is

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Figure 2 Graph of sensitivity between Asset Base Values that have been modified from the smallest to the largest pipe prices. Following is Figure 2 a sensitivity analysis between volume and toll fee





From Figure 2 above it can be concluded that the greater the volume flowing in the pipeline, the lower the toll fee. That way the price of gas in the end user can be reduced. The following is Figure 3 Graph of sensitivity between Asset Base Values that have been modified from the smallest to the largest pipe prices.



Figure 3. Graphic Sensitivity of Capital Cost

From the graph above it can be concluded that the largest Asset Base Value with a pipe size of 20 "-16" obtained a toll fee of \$ 14.03. This means that the greater the Asset Base Value or the greater the pipeline built, the greater the toll fee.

#### CONCLUSION

From the results above it can be concluded that:

1. In Table 1 can be seen the cost of debt value of 4.09%

2. In table 2 can be seen the value of cost of equity of 15%

3. In table 3 you can see the IRR (Interest Rate of Return) value of 13.22%

4. In table 4 it can be seen that the results of the cash flow obtained a toll fee of 7.49 USD for the condition of real volume

5. In table 5 it can be seen that the maximum total volume of existing pipelines is 82,125,000 MSCF and the toll fee is 0.77 USD 6. In table 6 we get the price of the pipe material and its toll fee, with a size of 12 "-8" toll fee of 7.20 USD

7. From figures 2 and 3 above, it can be concluded that the effect of falling toll fee prices is largely determined by the amount of volume that flows.

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