Acceptance Analysis of PDAM Sleman's Water Tariff Based on Revenue and Wilingness to Pay Projection

Made Widiadnyana Wardiha[1,*], Istiarto[2], Fatchan Nurrochmad[2]
[1]Ministry of Public Works and Housing
[2]Department of Civil and Environmental Engineering, Universitas Gadjah Mada, Yogyakarta, INDONESIA
Jalan Grafika No 2 Yogyakarta
*Corresponding authors: made.wardiha@puskim.pu.go.id

ABSTRACT The Regional Water Company (PDAM) of Sleman provides clean water to the community and charges a tariff for each cubic meter of water sold to customers. Minister of Home Affairs Regulation No. 71 of 2016 states that PDAM tariffs requiring a review every year on November. Most recently tariffs set by PDAM Sleman was in 2016 therefore it requires a recalculation. Besides requires tariff recalculation, it is necessary to analyze the tariff acceptance from the service provider and service recipient's point of view. Calculation tariff method utilized a formula based on the Minister of Home Affairs Regulation No. 71 of 2016. Acceptance analysis from profit point of view conducted by calculating the projection of water sales revenue, the profit to earning assets ratio, and the willingness to pay (WTP) projection of customers. Revenue projections were obtained by multiplying tariffs with the water sold volume. The WTP projection is carried out using the inflation method based on the WTP of PDAM Sleman customers from the 2007's research. PDAM Sleman tariffs based on calculations resulted low tariffs of IDR3727.48, basic tariffs of IDR4659.36, and full rate of IDR9460.17. Based on the WTP analysis, the tariffs are feasible from the the service recipient's point of view, which are the PDAM customers, because it is still affordable by customers for their average water consumption. Nevertheless, from the point of view of the service provider, which is PDAM Sleman, the tariffs are not feasible because the profit ratio of 0.31% is still much lower than the fairness profit ratio as 10% amount. Therefore, it is necessary to make tariff adjustments to increase profits. The adjustment strategies such as by determined tariffs only based on consumption blocks without breaking down based on customer group categories and adjusting the range of second and third consumption blocks.

KEYWORDS Water Tariff; Calculation; Profit; Willingness to Pay; Earning Assets

1 INTRODUCTION

The Regional Drinking Water Company (PDAM) of Sleman, as a business company whose function is to organize clean water supply to the communities (Bupati Sleman, 2019), distributing water to customers and earns income from the tariff charged to the customers. The tariff charged is calculated utilizing a formula from the Minister of Home Affairs Regulation Number 71 of 2016 and resulting basic tariffs, low tariffs, and full tariffs. These three types of tariffs are then arranged in a tariff table which is broken down according to customer groups and consumption blocks (Menteri Dalam Negeri Republik Indonesia, 2016). Basic tariff is water rate that determined from business cost divided by production volume minus standard water loss. Low tariff is water rate that determined from basic tariff minus subsidy. Full tariff is water rate that

determined from basic tariff plus subsidy and profit.

Before the tariff is determined, the proposed tariff should be evaluated by the supervisory board and disseminated to customers through the mass media (Menteri Dalam Negeri Republik Indonesia, 2016). In the District Secretariat Service Note of Sleman Regency in March 2016 it was stated that the proposed tariff from the PDAM Sleman was evaluated by the supervisory board by considering the people's ability to pay and consideration of the profit projection that could be obtained. In addition, this proposal was also requested for approval from customer forum representatives through socialization with the Customer Forum Association (IFP), based on Sleman Regency Regulation Number 10 Year 2020

about Regional Drinking Water Company of Sleman. However, the disadvantages in this evaluation are the profit to earning assets ratio has not been calculated yet and and the acceptance analysis based on customers' willingness to pay projection has not been done so far. The profit to earning assets ratio is one of the considerations in determining tariffs which shown the reasonable profit ratio obtained by PDAM in order to improve services (Menteri Dalam Negeri Republik Indonesia, 2016). Whereas willingness to pay (WTP) is a reference for determining tariffs which describes the willingness of the community to pay such tariffs (Damayanti and Sudrajat, 2017).

According to Minister of Home Affairs Regulation Number 71 of 2016, PDAM tariffs are recommended to be reviewed every year on November. Most recently water tariff set by PDAM Sleman was in 2016. Therefore, it is necessary to calculate the current tariff and conducting evaluation based on revenue projections, the profit to earning assets ratio, and also the customer's WTP projection. With a comprehensive analysis, it is expected that the proposed tariff capable to provide improved arguments to the supervisory board and customer representatives.

2 METHODS

This study consists of four stages which are the calculation of tariffs, calculation of income projections, calculation of WTP projections, and analysis of tariff acceptance based on the profit to earning assets ratio and WTP.

The tariff calculation is carried out using the formula from Minister of Home Affairs Regulation Number 71 of 2016 as listed in Appendix 1 Table A1.1. Data needed in the calculation including the volume of produced water, volume of water sold, water loss amount, business costs, and inflation factor. Data on the volume of produced water, volume of water sold, and water loss amount were obtained from the PDAM Sleman technical report in 2018. The business cost data was obtained from the PDAM Sleman financial report in 2018. The inflation

factor using the inflation rate of Yogyakarta City in 2018 which is 2.66% (Badan Pusat Statistik Kabupaten Sleman, 2019).

The income projection calculated after figuring out the basic, low and full tariff which will be multiplied by the volume of water sold in the low tariff customer group and the full and particular tariff customer group. The formula utilized is listed in Appendix 1 Table A1.1. The profit to earning assets ratio can be determined by dividing profits, which obtained from the reduction of projected income by total business costs, by the value of the earning assets known from the calculation of tariffs.

The WTP value that will be used in the analysis is not obtained by primary data collection, but it is utilize with projections based on secondary data from the results of previous study. Saptono (2007) once conducted a WTP study for PDAM Sleman customers. The WTP value will be converted from 2007 to 2019 using the inflation method in which the value of money in the following year is the value of the previous year's money multiplied by the inflation rate in the previous year. The formula used is:

$$GP_t = \left(\frac{IR_t}{100} \times GP_{t-1}\right) + GP_{t-1} \qquad (1)$$

where: IRt is inflation rate at t year / period; GPt is general price at t year / period; GPt-1 is general price at t-1 year / period.
Source: (Insukindro, 1995)

The analysis of tariff acceptance conducted by comparing the profit to earning assets ratio with the determinant of reasonable percentage of profit obtained by the PDAM, that is the profit to earning assets ratio as 10% amount. In addition, acceptance is also seen from the WTP projection value compared to the average water account to be paid by the customer based on the calculated tariff. The average water bill paid is calculated by multiplying the tariff by the volume of water based on the specified consumption block, consist of first block with a range of 0 – 10 m³/month, second block with a range of 11 – 20 m³/month, and third block with a consumption range more than 21 m³/month.

3 RESULTS AND DISCUSSION

3.1 Tariff and Revenue Projection

The tariff calculation details are listed in Appendix 1 Table A1.1. Based on the calculation results, the basic tariff value is IDR4659.36; low tariff is IDR3727.48; full tariff is IDR9460.17. Based on the calculated tariff value, the revenue projection derived from the water sales can be projected as listed in Table 1.

The revenue projection from water sales is IDR38,020,593,869.18 with a possible profit of IDR249,268,166.54. This profit ratio to earning asset is 0.31%. This ratio is much lower than the reasonable profit ratio target as 10% amount (Menteri Dalam Negeri Republik Indonesia, 2016).

The reasonable level of profit can be compared with the level of profit of PDAM at another regions, one example is PDAM Magelang Regency. PDAM Magelang Regency has the advantage in the form of a large potential spring water with discharge reaching more than 9400 liters / second (USAID Indonesia, 2006). The treatment costs at PDAM Magelang Regency are low so that it allows the PDAM to set a low price for its customers. However, despite setting a low tariff, based on the 2006 financial condition analysis report, the profits obtained by PDAM Magelang in 2001 – 2006 were around 4 – 6% of earning assets. Planning scenario for 2007 – 2013 targets a profit ratio 13 – 17% of earning assets. Therefore, PDAM Sleman's profit projection from the water sales at the calculated tariff is still reasonable to be improved. Although PDAM revenue is not only from water sales, but due to it is the main activity of PDAM, the profits from the main activity must be ensured reasonable.

Table 1. Calculation of revenue projection form water tariff of PDAM Sleman

Num	Description	Unit	Notation	Formula	Calculation result
1.	Low tariff	IDR/m^3	LT	(from calculation result at Appendix 1 Tabel A1.1 number 3.g)	3,727.48
2.	Sold water volume at low tariff customer group	m^3/year	SVLT	Historical data	3,957,391
3.	Revenue from low tariff	IDR/year	RLT	RLT = LT × SVLT	14,751,114,445.62
4.	Full tariff	IDR/m^3	FT	(from calculation result at Appendix 1 Table A1.1 number 4.k)	9,460.17
5.	Sold water volume at full and particular tariff customer groups	m^3/year	SVFPT	Historical data	2,459,732
6.	Revenue from full tariff	IDR/year	RFT	RFT = FT × SVFPT	23,269,479,423.56
7.	Total revenue projection	IDR/year	TRP	TRP = RLT + RFT	38,020,593,869.18
8.	Total business cost projection	IDR/year	TBCP	TBCP = TBCY[1]	37,771,325,702.64
9.	Profit/loss	IDR/year	P/L	P/L = TRP − TBCP	249,268,166.54
10.	Earning assets	IDR/year	EA	(from calculation result at Appendix 1 Table A1.1 number 4.e)	81,209,340,350.13
11.	Ratio of profit to earning assets	%	RPEA	RPEA = [(P/L) / EA] × 100%	0.31%

[1]TBCY obtained from calculation at Appendix 1 Table A1.1 number 1.c.

Feasibility of the tariff can also be seen from the comparison of the average tariff to indicate whether the tariff meeting the target of full cost recovery or not. Cost recovery is a priority in tariff

determination to yield sufficient revenue to cover the production costs (Lopez-Nicolas et al., 2018). Tariff that are not full cost recovery will cause PDAM experiencing difficulties to allocating investment for service improvement that will lead to the decline of quality service (Indayani, 2013). There are two provisions in Minister of Home Affairs Regulation Number 71 of 2016 concerning full cost recovery tariffs, which are the minimum average tariff equal to the basic costs to cover operational costs, and the average tariff that covers the full costs for developing drinking water services.

The average tariff can be calculated by dividing the total tariff revenue by the water sold volume. Consequently, based on tariff revenue data and water sold volume data in Table 1, the average tariff is obtained:

average tariff =

$$\frac{\text{IDR38,020,593,869.18}}{(3,957,391+2,459,732)\text{m}^3} = \text{IDR5,924.87 /m}^3$$

The average tariff value is higher than the basic tariff (IDR4,659.36), but lower than the full tariff (Rp9,460.17). Therefore, this tariff is feasible to cover operational needs, but it is not feasible yet to obtain revenues that can be utilized to develop drinking water services.

3.2 Tariff Feasibility based on Willingness to Pay

Research on WTP of PDAM Sleman customers was conducted in 2007 (Saptono, 2007). This study took 400 samples of prospective household customers of PDAM Sleman as respondents. The results of this study listed in Table 2.

The WTP value in Table 2 can be compared with the current conditions by adjusting the currency value utilizing the inflation method. Calculations with the inflation method use inflation data in Indonesia from year 2007 to 2019 using Equation 1 and the results are shown in Table 3. Based on the calculations in Table 3, the 2019 adjusted WTP values are as listed in Table 4.

Table 2. Willingness to pay of PDAM Sleman customers at 2007[1]

WTP (IDR)	Percent of Respondent (%)
< 30,000.00	29
30,000.00 – 40,000.00	55.1
40,000.00 – 60,000.00	14.5
> 60,000.00	1.4

[1](Saptono, 2007)

Table 3. Adjustment of currency value from 2007 until 2019 based on inflation rate per year

Year	Inflation rate[1]	2007's currency value		
		IDR30,000.00	IDR40,000.00	IDR60,000.00
2007	6.59	30,000.00	40,000.00	60,000.00
2008	11.06	33,318.00	44,424.00	66,636.00
2009	2.78	34,244.24	45,658.99	68,488.48
2010	6.96	36,627.64	48,836.85	73,255.28
2011	3.79	38,015.83	50,687.77	76,031.65
2012	4.3	39,650.51	52,867.34	79,301.02
2013	8.38	42,973.22	57,297.63	85,946.44
2014	8.36	46,565.78	62,087.71	93,131.56
2015	3.35	48,125.74	64,167.65	96,251.47
2016	3.02	49,579.13	66,105.51	99,158.26
2017	3.61	51,368.94	68,491.92	102,737.88
2018	3.13	52,976.79	70,635.72	105,953.57
2019	2.72	54,417.76	72,557.01	108,835.51

[1](Badan Pusat Statistik, 2020)

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Calculation example: 2007's currency value is IDR30,000.00; 2008's inflation rate is 11.06%; 2008's currency value is IDR30,000.00 × (1 + 11.06%) = IDR30,000.00 × (1 + 0.1106) = IDR33,318.00.

Table 4. Adjustment of PDAM Sleman customer's WTP at 2019 based on 2007's WTP

WTP (IDR)	Percent of Respondent (%)
< 54,417.76	29
54,417.76 – 72,557.01	55.1
72,557.01 – 108,835.51	14.5
> 108,835.51	1.4

If it is assumed that the percentage of respondents is similar, then the majority of respondents stated that they are willing to pay for water in the amount of IDR54,417.76 – 72,557.01. To discover the value of the WTP position in which range of consumption blocks, calculation to estimate the water accounts paid by customers was conducted based on the calculated tariff as listed in Table 5. The calculations in Table 5 assume the water consumption in first block charged by low tariff (IDR3,727.48), second block charged by basic tariff (Rp4,659.36), and third block charge by full tariff (Rp9,460.17). The calculation results shown that the WTP value of Rp54,417.76 – 72,557.01 is in the second consumption block (11 – 20 m³/month).

Table 5. Estimation of PDAM Sleman customer's water account per month

Tariff Type	Consumption blocks (m³/month)		
	0 – 10	11 – 20	> 21
Customers' water account value	Rp37,274.80	Rp41,934.16 – 83,868.40	> Rp93,328.57

WTP as amount IDR54,417.76 – 72,557.01 per month, if divided by the tariff used as in Table 5, then the WTP value obtained is appropriate for water consumption of 13.7 – 17.6 m³/month. The average water consumption of Sleman PDAM customers in 2018 – 2019 based on technical report data is approximately 16.21 m³/month with average water consumption dominantly in the consumption block range of 11 – 20 m³/month which is 91.41% as shown in Figure 1. If compared to the data, the tariff applied has facilitated the

customer's WTP based on the adjustment of the average level of water consumption. If the tariff set is higher, then the customer will consume lesser amount of water to pay with the same WTP value or paying higher price for water consume equal to average water consumptions (16.21 m³/month).
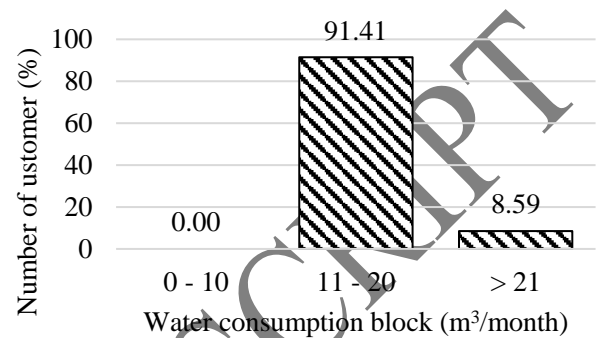

Figure 1. PDAM Sleman customers percentage based on average of water consumption level.

3.3 Discussion

Drinking water tariffs charged to PDAM customers are determined by stages that initiated by tariff calculation, tariff feasibility analysis, evaluation by the supervisory board and customer group representatives, and eventually will be established into regulation by the head region. Tariff feasibility analysis needs to be perform in order the established water tariff is beneficial to all parties (Istichori, Wiguna and Masduqi, 2018). The design of water tariffs requires a balance in terms of financial independence for service providers, in this case PDAM, justice for low income households, and economic efficiency for the community (Nauges and Whittington, 2017). Asides from financial independence factor, the water conservation aspect is also a concern so that tariffs were designed in order the community practiced water saving (Whittington, 1992). Based on the financial aspects, justice for low income households, and conservation aspects, tariff design called increasing block tariff (IBT) is well known, which is the tariff goes higher along with increasing of water consumption and establishment of low water tariff for basic needs consumption with the aim to subsidize low income households (Whittington, 1992; Klassert et al., 2018; Lopez-Nicolas et al., 2018). This IBT

tariff were applied by PDAM in Indonesia, including PDAM Sleman.

Tariff feasibility analysis can be done in several ways including comparing the tariff applied with the theoretical tariffs from the calculation results (Indayani, 2013), using break-even point analysis to assess the feasibility of revenue from the tariff applied (Mauliyah, 2016), or based on the water supply investment feasibility which is assessed from net present value (NPV), internal rate of return (IRR), and payback period (PBP) (Istichori, Wiguna and Masduqi, 2018). Besides the methods mention before, a feasibility analysis by utilizing income projections and WTP can also be used based on Minister of Home Affairs Regulation Number 71 of 2016 as well as several studies that have been utilized WTP as a tariff analysis reference (Lopez-Nicolas et al., 2018; Suratin, Triakuntini and Herdiansyah, 2019). This study conducting a feasibility analysis based on revenue projections, profit to earning assets ratio, and customer's WTP projection to determine the acceptance of tariffs from the service providers and service recipients' point of view.

Based on the analysis of income projections and the profit to earning assets ratio, the tariff of PDAM Sleman based on the calculation is not feasible because the calculated tariff only has a profit ratio of 0.31%, while the reasonable profit to asset ratio is 10%. Nevertheless, if analyzed were based on the customer's WTP projection, this rate is reasonable. Therefore, the calculated tariff that resulting a low tariff (IDR3727.48), basic tariff (IDR4659.36), and full tariff (IDR9460.17) is feasible and acceptable from the viewpoint of service recipients or PDAM Sleman's customers, but not feasible yet from the perspective of the service provider. This condition needs to be considered by PDAM Sleman because if profits are remain low, than PDAM will experiencing difficulties to develop services through new piping network investment or maintenance of the existing pipe network (Indayani, 2013).

The profit to asset ratio as amount of 0.31% is likely to be even lower if it is view from the tariff structure of the Sleman PDAM that has already been applied. The tariff structure varies not only based on the consumption block, but also based on the groups and categories of customers in each group as shown in Table 6. Based on Table 6, the determined tariff will be rearranged so it will make possibility for the customer to receive lower tariff from the basic tariff. This will cause an income decreasing to PDAM Sleman, thereby the profits will be reduced.

Table 6. Drinking water tariff of PDAM Sleman at 2016[1]

Num	Customer Groups	Consumption Blocks		
		0 – 10 m^3 (IDR)	11 – 20 m^3 (IDR)	> 21 m^3 (IDR)
1.	Group I			
	General social	2,650.00	2,650.00	2,650.00
	Particular social	2,650.00	2,650.00	2,650.00
2.	Group II			
	Household A1	3,250.00	3,400.00	3,600.00
	Household A2	3,400.00	3,700.00	3,900.00
	Household B	3,500.00	4,000.00	4,500.00
	Government institution	3,500.00	4,000.00	4,500.00
3.	Group III			
	Small commercial	6,250.00	6,500.00	7,500.00
	Small industry	7,500.00	8,500.00	9,500.00
4.	Particular Group			
	Big commercial	8,100.00	9,250.00	10,500.00
	Big industry	8,500.00	9,750.00	11,000.00
	Airport	8,500.00	9,750.00	11,000.00

[1](Bupati Sleman, 2016)

For that matter, the tariff structure necessarily considering the revenue projections that possible to obtain in order to support the profits increasing. Alternative adjustments that can be done amongst others:

a) Establish a tariff structure that is merely differentiated based on consumption blocks, without breaking down or detailing for each group of customers.

b) Adjustments consideration for the second and third consumption blocks range based on the average data of customers' water consumption level. Alteration for the second and third blocks range does not violate the Minister of Home Affairs Regulation Number 71 of 2016 which only regulates the first block range. Therefore, if it is view from the average of water consumption level as amount of 16.21 m^3/month, the range of the second block could be 11 – 15 m^3/month, while the third block will be exceeding 15 m^3/month. The addition of consumption blocks is also possible because in some countries, consumption blocks can be divided between two to four blocks (Fuente, 2019).

4 CONCLUSION

PDAM Sleman's tariffs based on calculations utilizing the formula from Minister of Home Affairs Regulation Number 71 of 2016 resulted low tariffs of IDR3,727.48, basic tariffs of IDR4,659.36, and full tariffs of IDR9,460.17. Based on WTP projection analysis, these tariffs are feasible from point of view of the service recipients, which are PDAM Sleman's customers, because it is still affordable by customers for water consumption as amount of average water usage. Nevertheless, from the point of view of the service provider, which is PDAM Sleman, these tariffs are not feasible because the profit ratio as amount of 0.31% is still far lower than the fairness profit ratio as amount of 10%. Therefore, it is necessary to adjust tariffs to increase profits amongst others by determined tariffs only based on consumption blocks without breaking down according to customer group categories and adjusting the range of the second and third consumption blocks.

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APPENDIX 1

Table A1.1 Tariff calculation formula based on Minister of Home Affairs Regulation Number 71 of 2016

Num	Description	Unit	Period	Notation	Formula	Calculation
1.	Basic cost					
	Operational & maintenance cost	IDR/year	2018	OMC	Operational & maintenance cost amount	14,958,981,739.50
	Depreciation / amortization cost	IDR/year	2018	DAC	Depreciation / amortization cost amount	5,491,188,003.90
	Loan interest cost	IDR/year	2018	LIC	Loan interest cost	25,315,797.00
	Other operational cost	IDR/year	2018	OOC	Administration cost amount excluding depreciation/amortization, allowance account receivable and loan interest	16,317,155,899.93
a.	Total business cost	IDR/year	2018	TBC	TBC = OMC + DAC + LIC + OOC	36,792,641,440.33
b.	Multiplying by inflation factor	%/year	2018	I	$(1 + I)$	1.0266
c.	TBC estimation at tariff period (Y)	IDR/year	2019	TBCY	$TBCY = TBC \times (1+I)^{Y-X}$	37,771,325,702.64
d.	Volume of produce water	m³/year	2018	VPW	Historical data	10,133,194
e.	Standard water loss level	%/year	2018	SWLL	20%	20.00%
f.	Standard water loss volume	m³/year	2018	SWLV	SWLV = SWLL × VPW	2,026,638.80
g.	Basic cost	IDR/m³	2019	BC	$BC = \dfrac{TBCY}{VPW\text{-}SWLV}$	4,659.36
2.	Basic tariff					
a.	Basic cost	IDR/m³	2019	BC	(from calculation result number 1.g.)	4,659.36
b.	Basic tariff	IDR/m³	2019	BT	BT = BC	4,659.36
3.	Low tariff					
a.	Basic tariff	IDR/m³	2019	BT	(from calculation result number 2.b.)	4,659.36
b.	Sold water volume at low tariff customer group	m³/year	2018	SVLT	Historical data	3,957,391
c.	Subsidy percentage	%/year	2019	SbP	Subsidy policy of local government	20.00%
d.	Subsidy	IDR/m³	2019	Sb	Sb = SbP × BT	931.87
e.	Total subsidy	IDR/year	2019	TSb	TSb = Sb × SVLT	3,687,778,611.41
f.	Average subsidy	IDR/m³	2019	ASb	$ASb = \dfrac{TSb}{SVLT}$	931.87
g.	Low tariff	IDR/m³	2019	LT	LT = BT − ASb	3,727.48
h.	Minimum salary of province	IDR/month	2019	MSP	BPS[1] data	1,570,922.73
i.	Low tariff limitation based on MSP	IDR/m³	2019	LTLP	$LTLP = (4\% \times MSP) / 10$	6,283.69

Num	Description	Unit	Period	Notation	Formula	Calculation
j.	Low tariff limitation based on MSP (considering administration & maintenance bill)	IDR/m³	2019	LTLP2	LTLP2 = [(4% × MSP) − (5000 + 7500)] / 10	5,033.69
k.	Minimum salary of regency	IDR/month	2019	MSR	BPS[1] data	1,701,000.00
l.	Low tariff limitation based on MSR	IDR/m³	2019	LTLR	LTLP = (4% × MSR) / 10	6,804.00

Table A1.1 Continued

Num	Description	Unit	Period	Notation	Formula	Calculation
m.	Low tariff limitation based on MSR (considering administration & maintenance bill)	IDR/m³	2019	LTLR2	LTLP2 = [(4% × MSR) − (5000 + 7500)] / 10	5,554.00
4.	Full tariff					
a.	Basic tariff	IDR/m³	2019	BT	(from calculation result number 2.b.)	4,659.36
b.	Current assets	IDR/year	2018	CA	Current assets components amount	10,185,927,385.32
c.	Long-term investment	IDR/year	2018	LTI	Long-term investment components amount	-
d.	Fixed assets	IDR/year	2018	FA	Fixed assets components amount + its depreciation	71,023,412,964.81
e.	Earning assets	IDR/year	2018	EA	EA = CA + LTI + FA	81,209,340,350.13
f.	Profit level	IDR/year	2019	PL	PL = 10% × EA	8,120,934,035.01
g.	Sold water volume at full and particular tariff customer groups	m³/year	2018	SVFPT	Historical data	2,459,732
h.	Average profit level	IDR/m³	2019	APL	$APL = \dfrac{PL}{SVFPT}$	3,301.55
i.	Total subsidy	IDR/year	2019	TSb	(from calculation result number 3.e.)	3,687,778,611.41
j.	Average cross subsidies	IDR/m³	2019	ACSb	$ACSb = \dfrac{TSb}{SVFPT}$	1,499.26
k.	Full tariff	IDR/m³	2019	FT	FT = BT + APL + ACSb	9,460.17

Note: Y = tariff period (2019); X = cost realization period (2018); [1]BPS = badan pusat statistik (statistics central bureau)