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INCREASING BLOCK RATE TARIFFS AND WATER CONSERVATION: A CASE STUDY OF INDIVIDUALLY METERED DWELLINGS IN MULTI-STOREY BUILDINGS IN THE FEDERAL DISTRICT, BRAZIL.

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INTRODUCTION

Law number 11.445 of January 2007 establishes national guidelines for basic sanitation and the federal policy on basic sanitation. This law also provides among its thirteen fundamental principles: universal access to the service; efficiency and economic sustainability; and the adoption of measures to promote responsible water consumption (BRAZIL, 2007).

In addition, Law 442 of May 1993 establishes that the monthly volume of water to be billed may not be less than 10m³ per unit of consumption for all categories of consumption.). According to the ADASA Resolution number 14 (DISTRITO FEDERAL, 2011), the objective is to cover the minimum cost necessary for ensuring the provision of services in adequate quantity and quality. . Data provided by the concessionaire of these services indicate that 45% of active households fall within the minimum billing (DISTRITO FEDERAL, 2016).

Individualized metering is another subject analyzed in this study. The Federal District has a law imposing this obligation since 2005 (DISTRITO FEDERAL, 2005), and recently, in 2016, a national law was published reinforcing this obligation (BRAZIL, 2016). District Law 3,557 of 2005 was regulated by ADASA Resolution n.15 of 2011 (DISTRITO FEDERAL, 2011).

OBJECTIVE

Through the data provided by the service provider, this study intends to simulate what is happening today and, if unfair charges are verified, to propose a specific change in the text of the resolution.

Since the adoption of the individual metering is considered to enable fair charges, because each user pays for their own consumption, the specific objectives of this study are:

i) to verify if this fairness is evident in any residential type and for any amount of water consumption;
ii) to verify if the service provider, in the examples above, always receives more with individual metering; and
iii) to check if the residual, as charged today, penalizes units that consume less than 10 m³.

METODOLOGY

The study analyzed 12 buildings in locations with the same income range (medium-high), but with very different characteristics: i) studios; ii) one or two bedroom apartments; iii) luxury apartments. Therefore, the consumption varied widely.

These buildings were evaluated for a period of 36 months (June 2013 to May 2016) and tariffs were estimated based on the volumes measured by both the Master water meter (GH) and the Individual water meters (IH) and on tariffs for May 2016. Thereby, it was possible to compare the amount that would be charged without individualized metering and the cost with the individualized meteri*is positive) by the inscription of a meter that meets the common area of the condominium."* Through the sum of these individual values (apartment and common area) with the value of the residual, we reached the value received by the concessionaire after the individualized metering, which, therefore, could be compared to the value measured by the master water meter.

To calculate the monetary value of the residual, first we divided the volume measured in the master water meter by the number of consuming units. With this value, the consumption band and the value charged for it are discovered, which allows the entire volume of the residual to be multiplied by the value of the band previously foundng. Even though the value metered in the shared hydrometer was charged separately, as part of condominium maintenance costs, the study used the data based on the amount charged per apartment, as a way of facilitating comparison (both in the amount charged by sharing the master water meter and in the individualized metering). It should be remembered that all buildings studied have individual meters.

The methodology is based on the average volume per consumer unit in these 36 months and in its conversion to current tariffs (May 2016 tariff). As a result, we obtained a value per apartment and a value for the common area. As discussed earlier, this common area was distributed among the residents and, for the purposes of this study, it was added to individual bills. In addition to these values, it was necessary to calculate the residual, which, according to Resolution 15, consists of "... *the difference between the volume measured in the master water meter and the sum of the volumes measured in the individual water meters must be billed (when the difference*.

RESULTS

The results will be presented in 3 groups, according to the average consumption presented.

- 1st GROUP - studios, with consumption up to 10m³
- 2nd GROUP - buildings with 1 or 2 bedrooms, with consumption between 11 and 20m³
- 3rd GROUP - luxury standard buildings, with consumption over 21m³

Two buildings were removed from the analysis because the first only had 9 months of measurement and only ¼ of the apartments were occupied, and the second had negative residual value.

The rate charged in May 2016 is listed in table 1 below:

Residential tariffs 2016		
Consumption bands (m³)		Aliquot (R$) price per m3
1	0 up 10	2,65
2	11 up 15	4,92
3	16 up 25	6,28
4	26 up 35	10,15
5	36 up 50	11,2
6	> 50	12,27

Table 1:*Rate per consumption band*

Table 2 presents 7 columns that condense the result of the study.

The first of them brings the number of apartments per building. The second takes the average consumption in m³ of the building, dividing the volume measured in the Master water meter (GH) by the number of individualized metering (including those of the common area). The amount paid for this average (as if it were not individualized metering) of the previous column is in column 3 and was obtained by dividing the amount that would be paid by the Master water meter, by the number of apartments. The fourth column shows how many (%) consumer units pay the most today for individualization. The fifth column shows the value that would be obtained by reading the general hydrometer (GH). The sixth column, the value obtained by the individualized hydrometres (IH) was added to the residue (R) and the common area (AC), comparing the result with the fifth column. The last column brings the value obtained by the individual hydrometre added to the common area, removing the residue, also comparing the result with the fifth column.

BUILIDING – n° APARTMENTS	AVERAGE CONSUMPTION	GH/apart R$	%AP (pay more GH/apart	GH (total) R$	IH+RCA (total) %	IH+CA (total) %
BUILDING 1 – 133 ap.	6,64m³	R$53,40	100%	R$ 7.102,20	+27,43%	+13,68%
BUILDING 2 – 238 ap.	4,38m³	R$53,22	100%	R$ 12.666,36	+21,855	+19.03%
BUILDING 3 – 29 ap.	6,14m³	R$54,82	100%	R$ 1.589,78	+21,24%	+9,53%
BUILDING 4 – 144 ap.	7,19m³	R$54,37	100%	R$ 7.829,28	+25,69%	+23,21%
BUILDING 5 - 96 ap.	12,85m³	R$82,83	60,42%	R$ 7.951,95	+22,55%	+12,21%
BUILDING 6 – 60 ap.	18,39m³	R$147,20	60%	R$ 8.832,00	+12,44%	+0,42%
BUILDING 7 – 36 ap.	20,68m³	R$183,20	61,11%	R$ 6.594,48	+14,61%	+9,62%
BUILDING 8 - 48 ap.	23,83m³	R$221,98	66,67%	R$ 10.655,04	+19,66%	+8,38%
BUILDING 9 – 24 ap.	27,32m³	R$286,35	50%	R$ 6.872,40	+11,25%	+10,31%
BUILDING 10 – 36 ap.	25,85m³	R$271,59	55,56%	R$ 9.777,24	+14,47%	+2%

Table 2: Study results

CONCLUSION

- As all the buildings provided a profit when compared to the method of shared billing (without individualized bills), and all, without exception, if they ignored the residual, would also generate profit to the service provider, we may conclude that: i) the current tariff structure for consumption below the minimum does not promote the rational use of water; ii) the tariff structure after the individualized metering adds extra costs to the tariffs as a result of the residual, being users with consumptions below 10m³ the most affected; and, iii) the progressivity in the tariff value fulfilled its function in the study, because even in cases where the billed volume was smaller than that of the master water meter, the billed value was higher.
- As a result of the findings, it is recommended that the reading mode of the water meter be replaced by an alternative technological model, such as remote reading or telemetry, which has the advantage of providing greater data reliability, because it reduces the errors of reading to practically zero, besides identifying leaks and frauds quicker. The greatest benefit of this practice according to this study would be the reduction of the volume found in the residual and of the amount to be paid by the water meter of the common area of the building.
- In order to reduce the value of the residual, it is suggested to change the text in Article 23 of Resolution 15/2011, so that where it says that the "... difference between the volumes measured in the master water meter and in the volumes measured in the individualized water meters " (not adjusted to the minimum), should be changed to the "... difference between the volumes measured in the master water meter and the billed volumes of the individual water meters" (adjusted to the minimum). With this change, the buildings with consumption below the minimum will no longer pay the residual.
- With regard to the collection of a minimum volume of 10m³, further studies should be carried out in order to promote rational water consumption without compromising the principles of universal access to service, efficiency and economic sustainability.

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