LUMEN ET VIRTUS

Distributed water supply: A didactic analogy

https://doi.org/10.56238/levv15n39-014

Zedequias Machado Alves[1] and Lilian de Oliveira[2]

ABSTRACT

The scarcity of natural resources is a recurring problem in modern daily life. Much has been done to find solutions that generate the least environmental and social impact. Among the various challenges to face the scarcity of resources, this work presents in a playful way the issues involving the scarcity of water resources in a given region and the solutions found by the society of its surroundings. The work addresses the importance of the solutions presented to meet the needs of all. The format of the problem and the solutions presented is based on the text "The fable of the roast pigs". The issue of water scarcity is addressed, and any similarity with the scarcity of energy resources and the use of Distributed Generation (DG) is mere coincidence, or not.

Keywords: Distributed Generation, Scarcity of Resources, Environment, Society.

[1] Master in Energy and Sustainability
E-mail: zedequias.alves@ifsc.edu.br
[2] Language and Literature Specialist
Email: prof.liliandeoliveira@gmail.com

INTRODUCTION

Due to population growth, a certain city has been suffering from the scarcity of water resources. Even with campaigns for the conscious use of water and the search for new sources, the region soon begins to suffer from cuts in the water supply. Initially the cuts were only a few hours, now they are days. This problem has been getting worse over the years and needs to be taken very seriously.

With less and less regular rainfall, one of the users of the water distribution system, already tired of facing the inconveniences resulting from water cuts in the region and waiting for an effective solution from the responsible agencies, decides to drill an artesian well on his land. The water table in the region is rich, with fresh and crystalline water and with a few meters drilled the user gets access to the long-awaited water.

Upon realizing the success of their artesian well and the amount of water available, the user decides to share the surplus of their water with the less fortunate neighbors of the resource. The user then looks for the Water Resources Distributor (DRH) and offers his artesian well for connection to the neighborhood's distribution network. The DRH, which had been looking for solutions for a long time, readily accepts what is offered and in exchange, for the water supplied to the neighborhood's distribution system, the user receives a discount on the tariff and credits to use in future consumption. It is a moment of great celebration and joy in the neighborhood.

Over time, the neighbors observing what happened realize that the colleague has become self-sufficient in water consumption, therefore, he is saving because he no longer pays the DRH for his consumption. Everyone knows the quality of the region's groundwater, but they have never invested in artesian wells because it is a relatively high investment. The possibility of becoming self-sufficient and the savings generated begins to become interesting, some neighbors then decide to do the same as their pioneer colleague. The DRH, still with difficulties, allows the new connections to its system to help the rest of the city to face the problem of water scarcity in the region.

In view of the above, this work brings the course of the situation and the actions taken to meet the interests of those involved.

REGULATION

With the growth in the interest of users of the DRH system in becoming self-sufficient, using their own water resources through artesian wells and making the surplus available to the DRH network, the Agency Responsible for the Use of Water Resources (ARURH) sees the need to regulate the practice.

To avoid problems with the users' pipes and their connections, limits are established for the maximum power of the water pump used by the user in the extraction and connection of the artesian

well to the DRH system. Minimum quality issues of the equipment used are established. The need for a professional responsible for the connection is also established, and this person designs the system and approves the connection with the HRD.

The need to measure the water consumed and also the water supplied to the DRH system is verified, with this the conventional water meters are replaced by bidirectional meters. It is established that, for each liter of water supplied, the user will receive the equivalent amount in consumption credits, and the credits may be discounted within a period of up to five years.

CHALLENGES ENCOUNTERED

By offsetting one liter of water supplied for one liter of water consumed, users with Distributed Water Supply (FDA) size their systems so that the average water supplied in the interval of one year is equivalent to the average of their consumption. In this way, the amounts spent on water consumption are practically nil and compensate for the investment made with the drilling of the artesian well and equipment.

The consumption of water by users is not something constant, during the day the vast majority are outside their homes and their consumption is almost nil. But at dusk, users are at home and usually take a shower as soon as they get home from work, which is the time with peak water consumption in the residence.

Intermittent consumption generates problems for DRH, during the day there is more water available in its pipes than consumption and this generates regions with high pressure in the pipes. During the evening and especially at night, with the peak of consumption and also limitations in the DRH reservoir, it is often not possible to meet the flow of water demanded, having regions of low pressure in the pipes.

Some users, with and without the installation of FDA systems, begin to question water quality. Since the responsibility for water quality lies with the DRH, however, often the water injected into the system by users with FDA is not of good quality.

DRH compensates the user with ADF "only" for the water made available, with the minerals consumed or supplied being disregarded. Thus, for better efficiency and productivity of the installed systems, users with FDA provide as little minerals as possible to the DRH system, even if they need to consume a certain amount of minerals.

With the limitations in water storage at times of high supply, DRH reduces the risk of water scarcity at times of low consumption. However, the risk remains for times of peak consumption and low water injection into the system by consumers with FDA.

COSTS OF THE WATER DISTRIBUTOR

DRH has a fixed cost of 100 currency units per month. This cost is to maintain its technical and administrative staff and supplies necessary for the water supply. The average cost has increased due to the need to change the pipes in certain regions. However, the collection has been reduced since consumers with FDA have almost zero cost even using the services of the DRH.

To maintain its financial health, the DRH is forced to pass on its fixed cost to the tariffs of consumers who do not have the FDA facility, and these are the only ones responsible for maintaining revenue since users with FDA have their bills with almost zero values due to the established compensation format. The increase in the cost of water for consumers makes the installation of FDA a more attractive investment for those who have not yet joined the service.

If the pricing policy and forms of compensation of users with the FDA does not change, in the long run, only users who are unable to afford to install the FDA will have to bear the full fixed costs of the DRH, with the costs increasing and the revenue decreasing.

ARURH realizes the need to review its regulation, considering that the cost for the acquisition of water is different from the cost for supply and there is no way to maintain the compensation of a liter of water inserted in the system for a liter consumed. The companies responsible for drilling artesian wells and supplying equipment for the FDA facility see ARURH's attitude as an affront to the right of consumers to use their available water resources. For this reason, they accuse ARURH of insane taxation of the use of water resources belonging to consumers.

SOLUTIONS PRESENTED BY EXPERTS

Experts point to the importance of consumer collaboration with the FDA in the region's water security. Even though it did not fully solve the problem, the risk of water scarcity before consumers with FDA was greater than it is today.

Solutions are presented to keep the pressures of the pipes within acceptable limits, to maintain water quality issues, solutions for storing surplus water during the day, enabling use at peak times. However, all alternatives require investments and with DRH revenues dwindling, solutions become new challenges.

Most of the solutions presented by the experts encounter technological or financial resource limitations. In a majority consensus, it is admitted that the commitment to water security belongs to everyone and that the distribution of the costs involved only to usurers without FDA systems installed is not the best solution. Therefore, it is necessary to arrive at an economically viable model, allowing users with installed ADFs to continue to collaborate with the water supply to the region, and it is unfeasible for them to continue to compensate for all the water supplied to the DRH system.

FINAL CONSIDERATIONS

When analyzing the problem presented, the water scarcity, as well as the possible solution and the collaboration of consumers with the FDA, it is perceived the need to weigh the responsibilities and costs involved. Consumers also have to be held accountable for the quality of water they supply to the system, as well as the costs involved. DRH has operating costs, but it has to measure the way it passes on these costs to its consumers. There are also issues that need to be debated and that have not been addressed in this text, such as the collection of taxes by government agencies.

In addition to the agents primarily involved, consumers and DRH, it is important to mention that over time other agents have emerged, such as: companies excavating artesian wells, suppliers of hydraulic pumps, installers of FDA systems, among others. With the new agents, new interests have also emerged that go beyond the problem of water scarcity. ARURH has been postponing the elaboration and application of new rules, to meet diverse interests, the longer it takes to present the solution, the more agents will emerge and the more complex the solution will become.

REFERENCES

1. Unknown author. (n.d.). *A fábula dos porcos assados*. Revista Jurídica Consulex. Available at: https://bibliotecadigital.fgv.br/dspace/bitstream/handle/10438/14731/A%20f%C3%A1bula%20dos%20porcos%20assados%20-%20Revista%20Jur%C3%ADdica%20Consulex.pdf

APÊNDICE A: SYNTHESIS OF THE TEXT "THE FABLE OF ROASTED PIGS"

The fable tells that because of a fire that occurred in a forest, some pigs that were there were roasted by the fire. Before this happened, men ate the meat raw but enjoyed it very much when they tasted the roasted meat. This situation made the men realize a technique and concluded that it was necessary to set fire to the forest when they wanted roasted meat. For this feeding procedure, a distribution of activities was organized that different individuals would be responsible for performing during the event.

But this practice did not always bring the expected result, as some factors made the procedure difficult. The animals did not always remain in place, sometimes they burned too much or were partially raw, in addition to other climatic interventions or the vegetation itself. So, on one occasion, a certain individual concluded that there was a solution to solve all problems. All you had to do was pick the pig, kill it, clean it, cut it properly and place it to roast over the coals on a metal frame. However, the idea presented was not well accepted by the leader of the group, and the other people would be dismissed since their tasks would be unnecessary and this would cause a great inconvenience.

The solution of a problem eliminates the difficulties of the problem. However, it may present other difficulties in the current solution. The present fable shows that many problems are difficult to solve because there is great resistance on the part of people in the process of adapting and readapting to new ways of living and accepting the evolution that occurs over time with a given society.