

Water System Operator Is Cutting NRW Losses Down To Size

When the aging city-owned water distribution infrastructure in Araguaína, Brazil, (pop. 183,000) reached a level of 47 percent non-revenue-water (NRW) loss, the city's contracted utility operator, [BRK Ambiental](#), knew that something needed to change. With such a massive challenge, they concluded that their best approach was to divide and conquer. Here is the story of how they are breaking their problems down to size with a solution that is on pace to pay for itself.

As the largest private company in Brazilian water and sewage services, BRK Ambiental serves more than 15 million customers in more than 100 municipalities. Thanks to a sound strategy, good communication, plus methodical analysis and response, the utility management company has been able to reduce Araguaína's overall NRW losses to 35 percent and earn positive reactions from customers, employees, and investors alike. Preliminary work started in mid-2019, the initial solution was functional by the beginning of 2020, and the utility is more than halfway to its targeted goal.

Navigating A Maze Of 'Hidden' Water Losses

As bad as the 47 percent loss of treated drinking water was, the worse news was that many leaks went undetected until local users complained about low water pressure. That was because leaked water was finding its way into adjacent stormwater drainage systems and rarely surfacing to reveal the underground leak locations. That lack of visibility sometimes delayed repairs by a day or more, causing the system to run out of water before it could be repaired.

The Value Of Taking A Closer Look

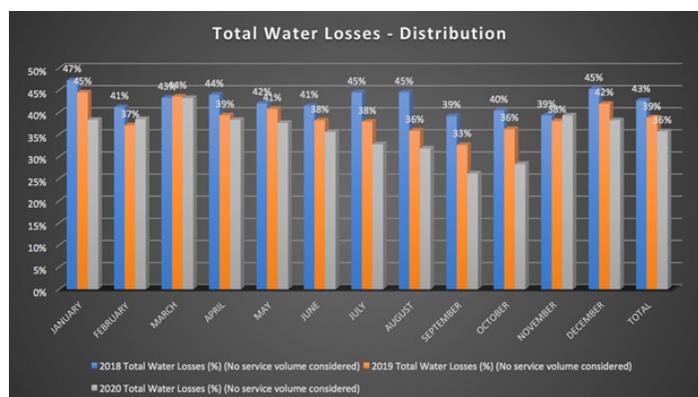
One of the earliest goals was to prove to BRK Ambiental's internal and municipal audiences that monitoring smaller zones could make a big enough difference to have the solution pay for itself. This had been shown in other [district metered areas](#) (DMAs). The plan focused on three key elements.

1. **The Importance Of Hydraulic Modeling.** Due to the size and complexity of the project, BRK Ambiental worked hand-in-hand with its technology consultants at Accell (an Itron distributor), starting with development of a hydraulic model to define the behavior of the existing infrastructure. That initial important step was beneficial for:
 - **Understanding critical reference points** to support a pressure monitoring/DMA management strategy.

- **Sizing flow meters** to monitor major zones in the system.
- **Pinpointing optimal locations** for pressure sensors to identify leak locations quickly.

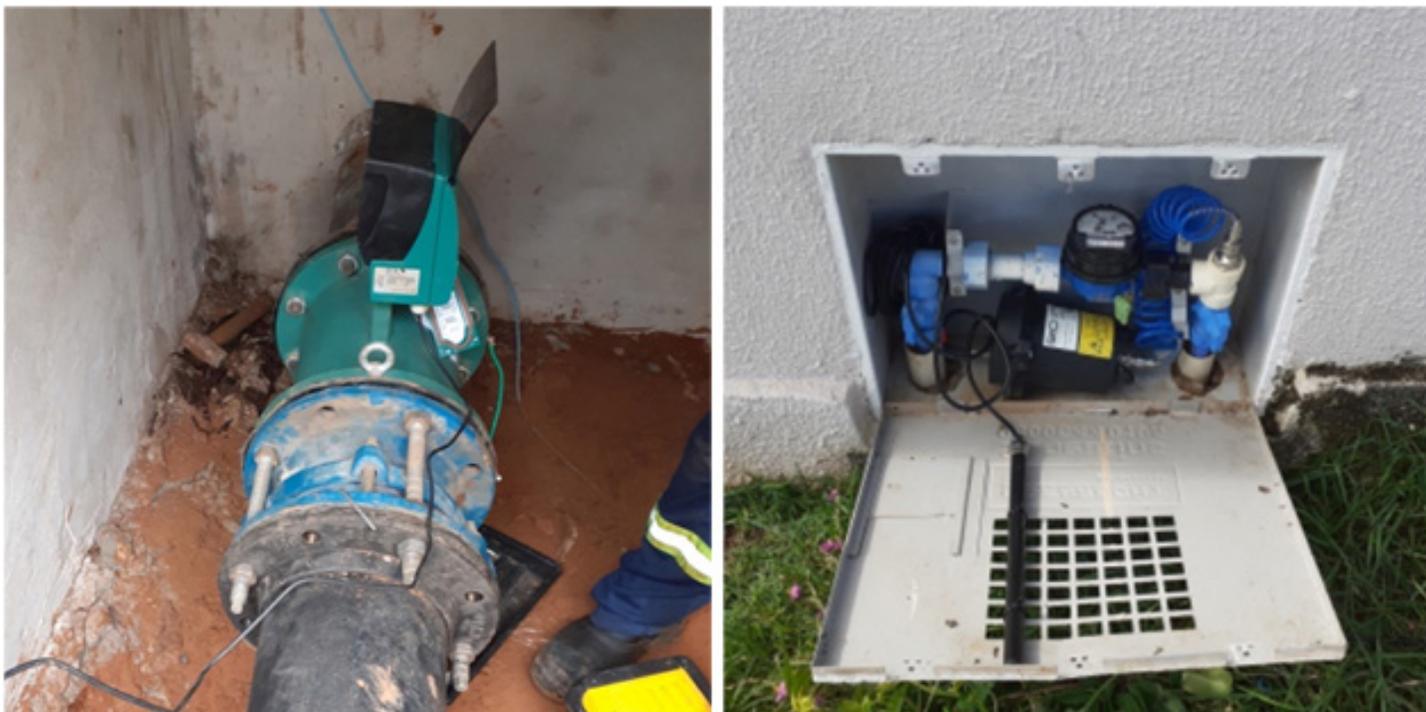
Feedback from the initial installation of pressure sensors and flow meters was used to calibrate and enhance the hydraulic model and to refine alarm settings and operator responses. Using the preliminary hydraulic model and the Itron Water Operations Management ([WOM](#)) solution during the early phases, the utility was able to start refining its approach while remaining components were still being installed.

2. **Local Insights On Local Problems.** Due to differences in old vs. new infrastructure and a hilly terrain representing up to 260 feet (80 meters) of altitude change, managing pressure by local neighborhoods is critical. More localized monitoring enables greater control over low pressure that generates customer complaints and high pressure that intensifies leak rates.
3. **Bottom-Line Results.** Less than two years into a three-year program, BRK Ambiental has reduced NRW losses due to leaks by nearly a quarter — from 47 percent down to the current 35 percent (Figure 1). The system is currently on track to pay for itself and meet the 25 percent NRW goal before the contractual deadline.



Graph courtesy of BRK Ambiental

Figure 1. Coordinating all flow and pressure data through the central WOM solution gives utility operators capacity to document and analyze day-to-day details as well as overall system performance.



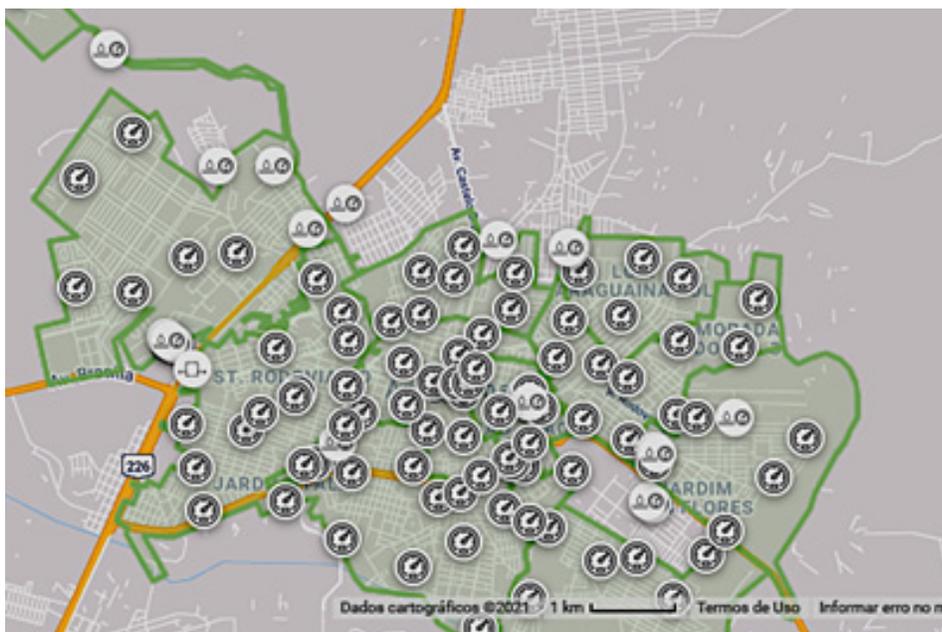
Photos courtesy of BRK Ambiental

Figure 2. By using bulk flow metering on 10 DMA inlets (left) and equipping a select number of consumer meter sites with pressure sensing capabilities for sub-DMA pressure monitoring (right), the utility operator has better insight into the system's most problematic zones. By providing better monitoring, system operations analysis helps in identifying and repairing targeted areas before customer complaint calls are received.

Concentrated Focus Pays Broad Dividends

As executed, the pressure monitoring network views the system as a series of smaller, more manageable zones. This helps BRK Ambiental strike a balance between the annoying low water pressure areas and excessive high-pressure areas that put stress on an aging, leaking infrastructure, by using:

- Focused Monitoring.** Because the distribution system was previously divided into 11 large pressure zones serving 72,000 account locations, it was hard to isolate specific leak locations. The utility upgraded about 150 customer locations with added pressure detection capabilities to detect pressure changes in adjacent coverage zones averaging around 320 service connections. By focusing on small zones in areas of older infrastructure, the utility accounts



Graphic courtesy of BRK Ambiental

Figure 3. The WOM solution provides a graphic overview of 10 district metering areas (DMAs) and 150 pressure monitoring points, distributed throughout Araguaína. Monitoring each zone, with event alarms, provides the ability to analyze current and historical conditions.

for 80 percent of its total water loss while monitoring only 58 percent of all service connections (Figure 2).

- Focused Analysis.** All pressure sensors, data loggers, macrometers (zone meters), and pressure relief valves in the system connect to the [WOM](#) solution that organizes, integrates, and analyzes system-wide data to enable refined performance and reduced water losses (Figure 3). This helps operators track how the system is operating relative to the hydraulic model and comply with the regulatory agencies' reporting requirements.
- Focused Response.** By establishing pressure and flow alarms within focused areas, BRK Ambiental can identify leak locations on a more timely basis (Figure 4). They are then able to correlate actual pressures against incoming customer complaints to ensure that repairs are prioritized according to system conditions. This enables a proactive response instead of reactively dispatching crews without any proof or knowledge of the problem.
- Customer-Focused Results.** The ability to identify and locate new leaks quickly has enabled BRK Ambiental to respond to events even before customers notice a loss in pressure. This has led to a reduction in customer complaints. As the



Graphic courtesy of BRK Ambiental

Figure 4. Setting an alarm for when minimum nighttime flow values (red line) exceed historic norms highlights abnormal flow events that can indicate an underground pipe burst.

"When I moved here, we experienced water shortages very often. I would get home late from work and there would be no water to do laundry... Over the past years, BRK improved the service in my neighborhood. We have water 24/7 now. Now, I get home and I can do my laundry, because there is water."

BRK Ambiental Customer Testimonial

pressure sensors for monitoring localized zones are housed next to consumer water meters, the company used local media, Facebook, and Twitter to assure those consumers that the sensors would have no impact on the individuals' water costs or privacy.

Looking toward the future, BRK Ambiental's

[Water Operations Management solution](#) is providing a robust remedy for visibility into the complex water distribution system. The solution has also encouraged active engagement among personnel involved in making essential day-to-day decisions. Based on success to date, the project is expected to pay for itself and start generating added revenue by the end of 2022. ■