Pioneering smart water meter management in Costa Rica

Optimization of water meters management in Heredia driven by the BuntBrain WaterMeters software tools

esph

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DreamingMinds

1/   The situation

Heredia is a province in the north-centre of Costa Rica. The capital, Heredia, is a municipality ten kilometres to the north of Costa Rica´s capital, San José. The city of Heredia is home to one of the largest colleges in Costa Rica, the National University of Costa Rica, which accepts many international students. The province contains several areas of great environmental significance, including the Braulio Carrillo National Park.

ESPH provides public lighting, telecommunications, electricity, and water to the cantons of Heredia, San Isidro, San Rafael and Barva, within the province of Heredia.

The company is highly committed to protecting the environment and to innovation and has pioneered the application of digital solutions.

The relationship between ESPH and BuntPlanet began in 2018 through a European Union Horizon 2020 SME Instrument financed project, which fell within the EU's "Action for climate, environment, resource efficiency and raw materials" programme.

The aim of the project was to improve the hydraulic performance of the ESPH water distribution network and to optimize the management of customer meters throughout the network, to avoid commercial losses due to sub-metering. From a social perspective, it was critical to limit water price rises by improving management efficiency through the application of artificial intelligence and big data.

The project achieved very positive results leading to a renewal of the collaboration between BuntPlanet and ESPH, in March 2022, for a five year term.

2/   The challenge

The new challenge for BuntPlanet was to perform an analysis of the status of some 75,000 water meters in Heredia, from a metrological perspective, as a base from which to build upon the optimization strategies initiated three years previously:

- To determine average metering error levels and the optimal error level to aim for.
- To estimate the level of investment needed to optimize metering error - and the potential return on this investment.
- To identify the water meters where replacement was highest priority, from an economic perspective.
- To draw up a meter replacement plan for the following year.
- To determine which water meters were over- or under-sized.
- To identify those water meters which displayed an abnormal consumption level or had stopped working.

This analysis would form the basis of a plan for the replacement of selected water meters during 2021.

3/   The solution

The BuntBrain Water Meters software module has monitored and optimized the performance of the water meters in ESPH since 2018. The analysis performed by the software in December 2020 determined the following:

- The average measurement error level was 7.5%.
- Over 16,000 meters should ideally be replaced to reduce the error level to 6.3%, estimated as the optimal level from an economic point of view.
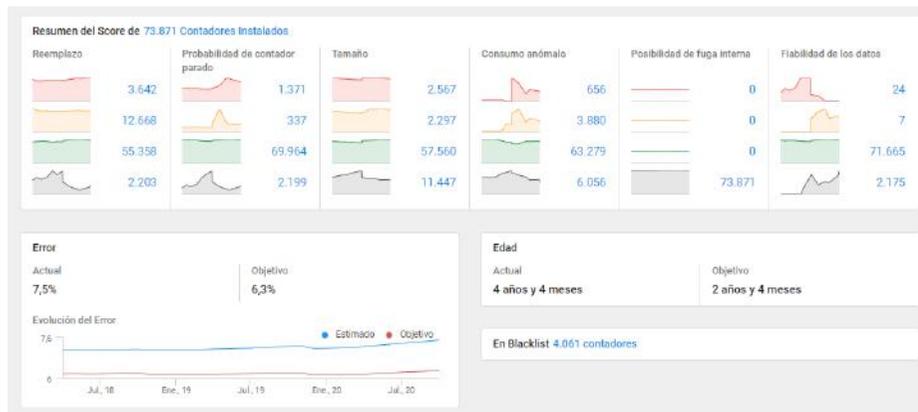
During 2021, 7,500 meters identified according to the criteria specified by the BuntBrain WaterMeters tool, were replaced. The result was an 8% reduction in average measurement errors and a 10.6% reduction in the levels of meter under-registration.

The meters replaced in line with the criteria specified by the BuntPlanet software tool showed up to 5-times higher revenues than meters replaced using the previous replacement criteria, which had been based mainly on meter age.

The software tool is now integrated into ESPH's day-to-day operations, helping the water utility not only to replace meters at an optimal rate, but also to monitor the performance of the various brands of water meters, as the following image demonstrates.
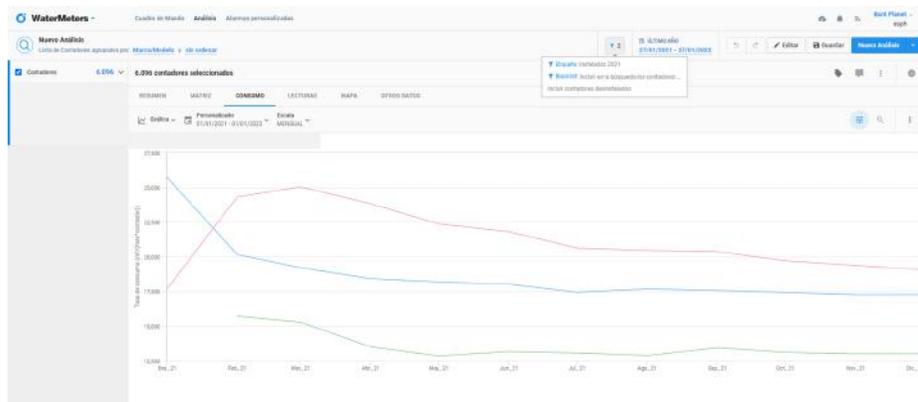
Each of the lines represents the water registered by one of the three main water meter brands, each of the same size, installed at Heredia.

4/ The benefits

The key benefits for ESPH during the period between December 2020 and December 2021 were:

- Error reduction of 8%. Average metering error levels dropped from 7.5% to 6.9% over the period.

- Meter under-registration was reduced by 10.6%.

- The volume of metered water measured increased by 8.5% for customers where meters were replaced.

- Meters replaced according to the criteria specified by the BuntBrain Water Meters tool recorded up to 5-times higher revenues than meters replaced using the previous criteria.

- Simple comparison of the relative performance of meter types and brands.

- Transparent, replicable, and easier monitoring of KPIs related to water meters.

5/ Project brief

- Province: Heredia (Costa Rica).

- Population served: 251,540.

- Number of customers: 75,095.

- Case Study period: From December 2020 to December 2021.

6/ Solutions

- BuntBrain WaterMeters.

7/ Results at a glance

- Meters replaced in line with the criteria specified by the tool recorded up to **5-times higher revenues** than meters replaced using the previous replacement criteria, which had been based mainly on age.

- A reduction in metering error levels from 7.9% to 6.9% in one year.

- A 10.6% reduction of meter under-registration.

- Clear proof that advanced algorithms can contribute to optimizing the water meter replacement process, from an economic perspective.

8/   End customer

ESPH

9/   Distributor

STE

10/ Links

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