

# WATER INDUSTRY INSIGHTS



**Mike Butler**

Technical Manager

[michael.butler@rpsgroup.com](mailto:michael.butler@rpsgroup.com)



**Hossein Rzaei**

Technical Manager

[hossein.rezaei@rpsgroup.com](mailto:hossein.rezaei@rpsgroup.com)

**NATURAL  
RESOURCES**



The future of Water  
Balance Calculation



# THE FUTURE OF WATER BALANCE CALCULATION

An innovative approach that has the potential to change the way leakage is calculated for in future.

Water Balance Calculation is a complex issue – consumer behaviour means that consumption can vary significantly on a daily basis, particularly in response to weather but also other random events. As a result, there has never been a particularly accurate to calculate it – until now.

During a recent hackathon held by Anglian Water, Sutton and East Surrey Water, and Welsh Water, an RPS team of 8 industry experts and analysts took property, district metering, and customer smart meter data and combined it with daily weather data. Looking at new and innovative ways to use bespoke RPS Waternet® software, they were able to import this data and quickly review the technologies and data available, including localised smart metered data to determine daily consumption across all smart metered properties. The team then subsequently developed methodologies to extrapolate daily consumption for unmetered properties based on property classifications and weather, and to predict future consumption and leakage profiles accounting for changes in weather.

In the future, this new method of calculation using Waternet® has the potential to change the way leakage is calculated forever – benefitting both the environment and water company purses.

## The methodology – how to calculate more accurate water balance

By taking the property, district metering, and customer smart meter data, combining it with daily weather data, then importing it to fit with our industry standard software, Waternet®, the new solution to Water Balance Calculation was created.

To get the most robust assessments we selected DMAs and time periods with the most complete data free from errors, gaps and infilled values. Our shortlist provided DMAs with customer smart meter penetration ranging from 30% to 80%. There were notable improvements in accuracy where meter penetration was highest.

By replacing average consumption estimates by property type (derived using UKWIR best practice) with individual property nightlines from smart meters for application in leakage calculations, we determined near real time water balances that are more accurate and reliable, resulting in more stable nightline profiles.

Using localised smart metered data and appropriate property classifications, we developed methodologies to calculate daily consumption for unmetered properties, and to predict future consumption and leakage profiles accounting for changes in weather.

With the potential to re-calibrate relationships on a daily basis and respond to near real time changes in consumption on a localised basis there has never been a more robust strategy for estimating unmeasured consumption and determining daily leakage estimates.

## Benefits of this approach

During the hackathon, RPS demonstrated that a property nightline calculation could be carried out for each area on a daily basis using near real-time data, resulting in significantly more stable nightlines with clearly identifiable leakage events which were supported by historic repair records. In addition, by using the weather data, a better estimate of the water use at unmeasured properties is gained – this is something that historically has never been done before yet has huge benefits both environmentally and commercially. As a result, water companies can have increased confidence that a rise in the night flow is due to a leak breaking out and not consumption, thereby responding more quickly and efficiently than in the past and reducing false targeting.

The enhanced data and improved predictive capabilities also have the potential to provide early warning and planning opportunities in response to weather forecasts, while also accounting for historic nightline trends.

The use of Waternet® to directly retrieve and process data from a range of sources means that water companies can, in future, have rapid access and ease of visualisation of new leakage events and consumption hotspots using thematic maps. The additional inclusion of confidence ranges per DMA based on meter penetration and the statistical robustness of unmetered estimates will ensure that companies can confidently prioritise and target leakage detection effort.