Using Acorn segmentation to understand domestic water consumption

Highlights

- Acorn data informs an accurate consumption model
- Partnership with CACI to evolve innovative demand models
- Using big data for leakage detection
- Reducing carbon consumption through predictive data techniques
- Sharing best practice in a 10+ year working relationship

About Scottish Water

Scottish Water looks after Scotland's most precious natural resource. From source to tap, they keep customers supplied with world class water. The public water and waste water organisation is responsible for providing water and wastewater services to 2.56 million household customers and 152,806 business premises.

Sustainability is a major focus: Scottish Water's strategic plan supports Scotland's ambitions for renewable energy generation and carbon reduction.

The Challenge

Scottish Water has been working with CACI for over ten years to deliver accurate models that help predict and review household water consumption.

Martin Walton, Asset Planner at Scottish Water explains the challenge: "There are hardly any domestic water meters in Scotland. So we have had to find other ways to stratify our customer base. Using Acorn data, we have built and refined models over the years that give us a clear view of how water is being used. We need this information to help us reduce water consumption by monitoring and controlling leakage, testing and maintaining network assets and influencing consumer behaviour."

The Approach

Acorn data is often associated with marketing, product development and service planning and optimisation. But for Scottish Water, it's the foundation of a sophisticated model that determines expected usage in locations across Scotland. The insight helps operations and engineering teams to prioritise their activities and pinpoint key areas for investigation.

Scott Young, Leakage Delivery Team Leader at Scottish Water, describes the approach: "In terms of water supply, Scotland is divided into over 3,000 areas, each with a district meter. We inform supply / demand analysis within these areas using our Acorn model. We compare district meter flows to those within the Acorn model to see whether actual water usage is similar to the projected household demand for that area. When there's a difference, we can investigate whether this is because of unrecorded usage, network anomalies or leakage."

Martin Walton adds, "The modelled per household consumption dataset has proved to be a very accurate predictor of consumption for the domestic properties we supply."

Email: info@caci.co.uk | Web: www.caci.co.uk

Scottish Water
Trusted to serve Scotland

CACI

The Results: An accurate usage prediction model based on data evidence

Scott Young says, "With the Acorn data, we've been able to break down demand by area to understand the opportunity for leakage reduction. Using big data in the digital space is quite a radical change from the traditional mainstream approach to leakage detection. Now, we can identify areas of concern with a high degree of accuracy, even in areas with plastic pipes, where traditional soundings to find leakage are less effective."

"We look at the typical usage profile based on zone control groups that we measure and sample from; we build out models for every area using detailed data from Acorn. This combined approach produces a very accurate flow pattern and a strong benchmark comparator. We refine the model further by taking into account factors that influence peaks and troughs or that could be causing leakage.

"The data modelling also helps us to spot issues with valves at the district boundary. When anomalies appear in area flow measurements compared to the model, we can see where a district is breached and water is leaving. We confirm this by checking data relating to adjacent districts, where that water may be going. These are priority issues to fix so it's really valuable to identify them quickly."

"When I send a team out on the ground to locate and fix a problem identified via the Acorn data model, we have a very high degree of confidence that we'll find it where we predicted. That means we can detect and stop leaks more quickly and efficiently."

"We have had tremendous support from the CACI team throughout our long working relationship – it's been stronger than ever during lockdown. Demand profiles have changed wildly in this period and we've accelerated our learning, working together virtually with this influx of new data. CACI's data scientists are profiling experts and they share sector knowledge with us as well as providing modelling expertise. Our partnership directly supports Scottish Water strategy and operations, helping us work towards carbon neutral status and improve sustainability as well as delivering value for customers."

Martin Walton, Asset Planner

The Future: Supporting carbon neutral goals with pressure management

Scottish Water has pledged to be carbon neutral by 2035. Leakage is a part of the carbon neutrality drive. With this focused, data-led approach to tackling of leakage, Scottish Water will reduce embedded carbon consumption in the production and treatment of water.

There's an opportunity to change customer behaviour as well. Martin Walton explains: "There's no direct financial incentive for customers to conserve water in Scotland, because they aren't metered. This can be a factor in areas with unusually high demand.

"Generally, the Scottish public is proud of our water network – we're building on that, making people feel it's a matter of pride to use water responsibly and make the most of a precious resource. We can prioritise areas for communications campaigns where the demand model shows excessive domestic consumption.

"We're also trialling advanced dynamic pressure management technologies. Using the Acorn demand patterns and a hydraulic model (a digital simulation of the water network) we can adjust water pressure in each district, letting through enough water at the right time to meet specific local demand without allowing excessive use. This makes a difference to reducing water wastage and hence carbon consumption in target areas, with no discernible impact for customers."