Thames Water

Smarter ways out of water poverty

Our study investigates how water efficiency interventions can lower water bills for people on a low-income.

December 2021

No-one will be left behind

We believe that nobody should be left behind, regardless of their circumstances. And that those who struggle to pay their bills are helped in every possible way.

As we invest in a more resilient network and rise to meet our net zero carbon pledges, it's likely that bills will rise to meet these investment needs. So, how will we support our customers who struggle to balance their household budget? Part of the answer lies within a massive opportunity for the water industry – building on water efficiency programmes to deliver both sustainability and affordability outcomes.

In water stressed areas universal metering is a key enabler to more sustainable water use. London and the wider South East gets less rainfall each year than Rome, Istanbul and Sydney. While metering increases the focus on efficient water usage, it can have an adverse impact on low income, higher than average occupancy, households.

There's a lot policy makers can do to ensure sustainable water usage. This, in turn, will reduce water bills. These measures include building homes with water efficient fittings and using grey water recycling or rainwater harvesting. Also, creating standardised water efficiency labelling to help people choose low water appliances would encourage innovation in the marketplace.

Behaviour change is hard to embed and currently, water companies are the only major sector pushing and delivering water efficiency. Despite water efficiency interventions by a water company being constrained by funding capacity there are opportunities to make an impact.

With over half a million smart meters and an ongoing water efficiency programme Thames Water has a unique data set. This study aims to quantify the opportunity for water efficiency to support customers who find it hard to balance their budget.

We hope it will enable the water industry as a whole to make the most of opportunities for efficiency to deliver both sustainability and affordability outcomes.

Warren Buckley
Retail Director

Why we did this study

The CCW Affordability review made the following recommendation:

> Companies should, wherever possible, take appropriate action, tailored to a customer's individual needs, with the aim of preventing financial difficulty. One opportunity to take action is to ensure that water efficiency forms part of their affordability strategies by linking messaging and identifying options to provide targeted and enhanced interventions, to take advantage of emerging technologies.

Following on from this, we agreed to write a study that would seek to forge a stronger link between water efficiency and affordability strategies. This study identifies ways of providing enhanced interventions and rolling out emerging technologies.

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Executive Summary

Our study looks at the opportunity to utilise water efficiency enablers to deliver affordability outcomes. Using data from Thames Water's smart meter network and water efficiency audits - known as Smarter Home Visits (SHVs) and our key water efficiency activity - we can measure the impact on household bills. We don't look at tactics to promote switching to metering to reduce bills, instead we focus on reducing demand of customers already on a meter.

While there are no emerging technologies in water efficiency that can be retro fitted cost effectively by a water company, there is evidence to show that existing interventions are effective and sustainable. More can be done within building regulations to support water efficient homes, but this is outside the scope of this study.

We show that customers with affordability indicators do have opportunities to significantly reduce their water bill using water efficiency measures delivered from a SHV, but only if they are consuming greater than 500 litres per day (L/d). This is equivalent to a bill greater than £520. Customers can benefit with a bill reduction of between 8%-17%, equivalent to a saving of between £40 and £166 a year.

10% of these customers will further benefit from a wastage fix averaging 229 L/d or £200 per year. This does not include the additional energy savings of £18 - £77 a year by reducing demand for hot water.

On average, these combined savings are £135 a year and last for 3 years and counting – with no sign of tailing off yet.

For customers with debt from previous years, or those on payment plans below their current charges (which will lead to an accumulation of debt), a SHV can give business benefits of £100 over 3 years in reduced bad debt charge, as well as increased customer affordability.

According to the 2021 CEPA study, 147,000 customers in the Thames region are in 'water poverty' *. With 50% of these metered, usage shows that between 10-30% of water poverty customers use more than 500 L/d, so water efficiency interventions can make a meaningful difference to their bills and lives.

Currently, only 14% of households take up our offered interventions. This reduces the scale of the opportunity to 2,000-6,000 customers, or 1-4% of the total unless we can increase engagement levels. We are aiming to increase engagement levels to 25% by introducing an online booking service and door knocking.

It's important to remember that resolving water poverty does not solve overall poverty and holistic support is still needed. To this end, our SHV advisors are trained to recognise other needs and make referrals for support.

The potential to increase targeting using this insight is huge. We currently only do SHV on smart metered households, but there's good reason to target 'dumb' meters too with the added benefits of bad debt charge savings – 100% engagement would mean £5m of bad debt benefits over 3 years for Thames Water. SHV referrals could be embedded into the 'struggling to pay journey' and collaboration with Energy could create a highly targeted water and fuel poverty intervention that would increase engagement rates significantly.

Smart meter data can also show customers using less than 50 L/d. This is potentially an unhygienic amount of water which might suggest affordability or safeguarding concerns. 3,000 customers out of 560,000 are using this low volume of water daily, and 50% of these were using over 100 L/d before they were switched to a water meter. We don't know for sure if this low usage is due to water rationing or another factor. Further research could be done to see if this data is effective at targeting customers in need of affordability support.

*Water bill divided by net household income = 5%. Net household income = Gross household income less housing costs

Key findings

- From our research and interviews with water efficiency experts there are no emerging affordable new technologies that can be put in homes to reduce demand. The most effective practical interventions are an in-home water efficiency visit which combines advice on behaviour, as well as the installation of simple devices such as tap aerators, dual flush converters, water-efficient shower heads and shower timers as well as fixing internal plumbing leaks, and communicating with customers about behaviour changes, leaks and high usage through digital communications.
- Since 2018, Thames Water has been running a household incentive scheme which monitors customers' water use using their smart meter and rewards them for reducing their usage and being efficient. This has reduced customers' water use by around 5%.
- There are new ways of engaging customers through digital channels using more regular smart meter readings, but these have not been implemented yet. This could include routine engagement about usage and leakage.
- Water efficiency interventions are effective when aimed at households using over 500 litres per day (L/d). At this level, there is consistent unnecessary consumption and/or water loss. Below 500 L/d the opportunity to reduce demand is significantly reduced.
- When using over 500 L/d water demand savings in the range of 9%-15% can be made. This corresponds to Thames Water dual service bill reductions of 8%-17%, with a weighted average of 10% equivalent to £40 to £166 a year, £79 as a weighted average.
- Additionally, 10% of homes using over 500 L/d that have a SHV are found to have a continuous flow of water from internal wastage, such as a leaky loo. The average wastage consumes 229 L/d, equivalent to £200 a year.
- In total, water bill savings are £40-£366 a year, with average savings for both SHV and wastage at £99 a year.
- 54% of water saved comes from heated water. Reducing demand for hot water can save a household £18-£77 a year (based on At Home with Water from the energysavingtrust.org.uk), with the average being £36. While this doesn't impact the water poverty calculation, it will provide welcome additional savings to increasing energy bills.
- Together, these average savings of £135 are sustained for at least three years – and counting.
- These savings are found across all housing types and all indicators of deprivation, including households receiving a social tariff, with prior year debt and the index of multiple deprivation. In general, there was a 4% above average demand reduction in the lowest three deciles of the deprivation index.
- Decile 1 is under-represented – but we believe this is only a London issue. Only 2% of London's communities (LSOAs) are in England's Decile 1. In addition, there are many low-income properties in London that can't be metered due to common supplies, for example 85% of Thames Waters social tariff recipients are unmetered, many of them living in Local Authority or Social Housing accommodation.
- There is evidence that low income households do not prioritise spending any of their budget on fixing dripping taps or leaky lows - with 39% of continuous flow repairs carried out during a SHV falling in the bottom three IMD deciles and over 70% in the bottom five.
- Including fixed wastage and hot water reductions, the higher end low-income households using over 1,000 L/d could make savings of £443 a year. At the lower end, a household using 500 L/d could save £58 a year. Below this threshold of 500 L/d, or a metered bill of £520, there are no significant savings that justify the cost of the water efficiency visit however, digital communications may still be cost efficient and reduce water usage to a lesser extent.
- In the Thames Water region, there are 369,000 out of 1,830,000 metered households consuming over 500 L/d (20%). Using indicators such as prior year arrears and the Index of Multiple Deprivation we estimate the range of homes using over 500 L/d and in water poverty to be in the range of 15,000 to 54,000.
- Take up rate of SHVs is 14% of targeted households, when it's part of the transition to metered billing. Applying this take up rate equates to a range of 2,000 to 8,000 households taking up a SHV and being taken out of water poverty – 1-5% of the total.
- 4,200 of the 560,000 smart metered properties have usage between 10 and 50 L/d consistently. 491 of the 4,200 properties previously used over 100 L/d before being metered. 1,400 of the 4,200 properties are in decile 1-3 and 7% had prior year debt.

Making a meaningful impact on our customers' bills

Our study shows that water efficiency interventions can have a significant impact on our customers' bills. The challenge now is to increase engagement with customers using over 500 L/d.

Potential applications of the insight include:

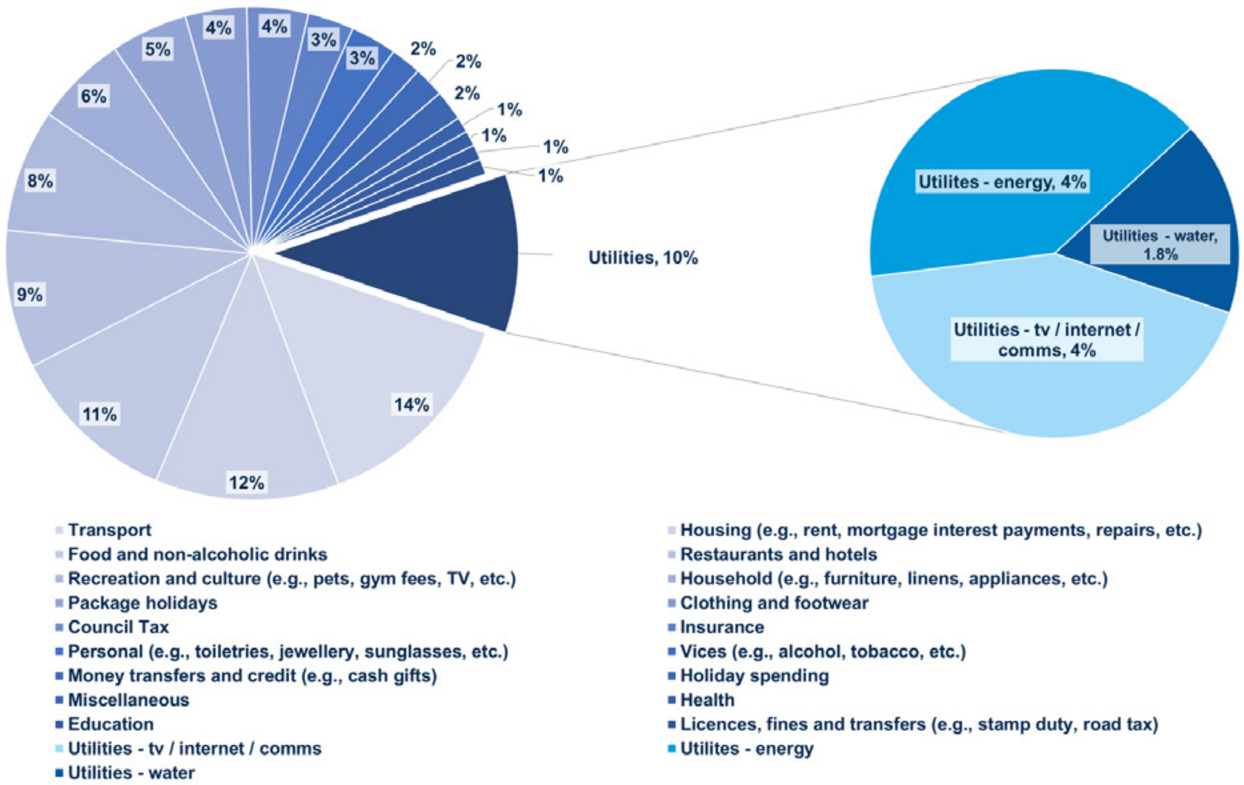
- Proactive targeting for a water efficiency visit using prior year debt and consumption data, with communications focused on financial savings. Reducing demand for customers with prior year debt will reduce a water company's bad debt charge, which would fund the costs of a water efficiency visit.
- Collaborating with Energy and targeting properties with Energy Performance Certificates (EPC) of band D or below for a combined water and energy saving visit. This will increase the value of an intervention for a customer. Apart from flats (which are typically difficult to install a flow meter into), there are 10 million homes in England and Wales with an EPC rating of D or below – a huge opportunity.
- Embedding the water efficiency audit process into customers seeking support to pay their bill. This is a chance to create effortless journeys that link together propositions and increase engagement.
- Working with local trusted partners who provide debt advice to raise awareness of the benefits of a SHV.

Getting into the detail

Surprisingly, no definitive research has yet been published about the scale and opportunity of crossing over affordability and water efficiency strategies.

Typically, water bills are a small component of household bills. ONS data shows, on average, £514 is spent on water bills – equivalent to 1.8 % of total household expenditure and 2 % net of housing costs.

Figure 1 – Proportion of yearly budget spent on utilities



However, in low-income households this net figure can rise to become an unsustainable household cost. Water bills that are 3 % or 5 % of net income are used as 'water poverty' benchmarks, and the recent CEPA analysis commissioned by Water UK suggests that 6.5 % of England and Wales households have a water bill greater than 5 % of net income after the application of interventions such as social tariffs.

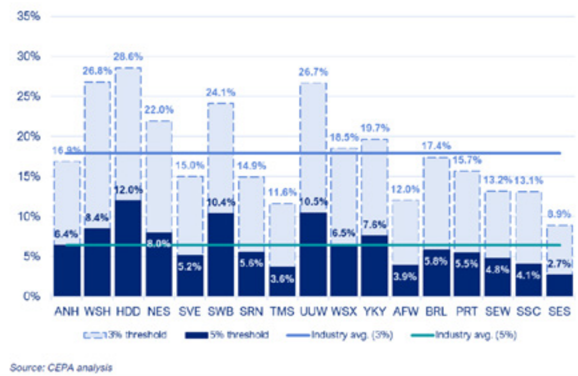
In this study it's more useful to consider the level of water poverty before social tariff intervention, as reducing demand will also reduce cross subsidies and therefore average bills. In the Thames Water billed region this 'pre intervention' figure from this analysis is 147,000 at the 5 % threshold.

Table 1 – Estimated (post-intervention) water poverty incidence by bill to income ratio in 2019/20 (source: CEPA analysis)

Company	Water poverty incidence (threshold definition, %)					
	2%	**3%**	**4%**	**5%**	**6%**	**7%**
Industry	35.0 %	17.9 %	10.5 %	6.5 %	4.1 %	2.7 %
England	34.1 %	17.4 %	10.2 %	6.3 %	4.1 %	2.7 %
Wales	49.9 %	27.2 %	14.8 %	8.7 %	4.6 %	3.2 %

There are variations by region.

Figure 2 – Estimated water poverty incidence by company 2019/20



Water efficiency

The main water efficiency intervention methods

- The primary water efficiency interventions offered this AMP are SHVs, wastage repairs, a water efficiency calculator and an incentive scheme
- The bulk of demand reduction delivered by household water efficiency is through SHVs
- Emerging technologies. Digital engagement utilising smart meter data is the key emerging technology which could deliver both water efficiency and wastage demand reduction. Technologies such as rainwater harvesting are less cost effective than the proven water efficiency interventions when considered as a retrofit option. We review new water efficiency devices such as tap aerators and engaging shower timers as they are developed, and we'll be trialling an engaging shower timer with our customers this AMP

Table 2 – Water efficiency initiatives that support household water consumption reduction

Name	Description	Average measured demand reduction	Scale	Cost per litre of water saved*
SHVs	In-home water efficiency visit including tailored behaviour change advice, follow on top tips report, installation of water efficiency devices and identification of internal leaks. Targeted at households with >500 consumption.	~70-75 L/d and 90 L/d where targeted	~25,000 per year Limited by volume of high users	£0.92
Wastage (internal leak) repairs	Return visit from a plumber to repair internal leaking tap or toilet identified during a SHV.	~229	~2,500 per year Limited by volume of SHVs	£0.18
Water efficiency calculator	Online water and energy efficiency calculator which benchmarks customers' water use to an average, gives them tailored advice on their water use and quantifies the benefit of recommended changes. Also recommends water efficient devices suitable for the customer's home and behaviour which are then sent to the customer.	~6%	~5-6,000 per year Customer driven	£0.15
Incentive scheme	Household incentive scheme which monitors customer's water use using their smart meter, engages with the customers monthly, and rewards customers for reducing their water use and maintaining efficient use.	~5% continuous saving	~5-10,000 new sign ups per year Limited by volume of smart metered customers and customers opt in uptake	£1.89
Customer engagement and campaigns	Geo-targeted campaign to areas that forecast supply and demand risks. This is worked out through smart meter, supply and weather data. It's supported by an always-on campaign across our owned channels and our education programme. Data analysis trials are taking place to try to use smart meters to measure demand reduction achieved by campaigns.	Currently unknown	As required by supply demand situation	Unknown

*These change with rate adjustments and changes in data on measured savings but are included to give an indication of the business case for each activity.

Digital engagement utilising smart meter data is the key emerging technology which could deliver water efficiency and wastage reduction in a cost-effective way. We already offer smart metered customers the option to sign up to an incentive scheme, run by Green Redeem, which rewards them for reducing their household water use and keeping their consumption efficient.

We are planning to trial installing innovative shower timers in customers' homes to assess the demand reduction and cost benefits of including these in our SHVs.

The timing of SHVs

SHVs are timed to be when a customer has moved to a smart meter, is thinking about their newly metered situation and consuming more than 500 L/d. The water use audit assesses behavioural use of water and provides customised feedback based on data. The incentive scheme creates an ongoing feedback mechanism and customers are encouraged to opt in to it.

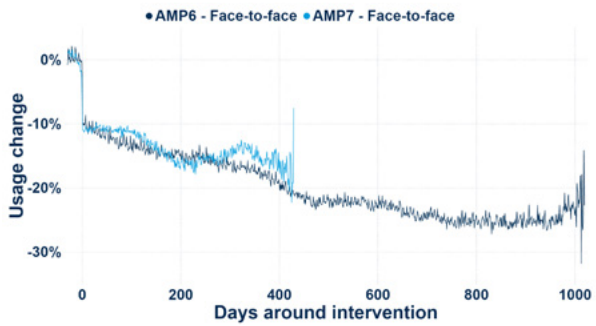
Longevity of savings from SHVs

Data shows that the benefits from a SHV where customers are using less than 500 L/d disappear very quickly. However, those using over 500 L/d the savings are at least 2.6 years and growing, see figure 3. Some of this change will be driven by the change of billed basis as well as the water efficiency intervention but further data is required to assess this.

This shows that either the devices installed are sustaining savings, or behaviour changes are simple to adopt as the norm. Wastage savings are, of course, permanent benefits.

This split of savings between behaviour change, wastage fixes and device installation is not yet fully understood, but we're gathering additional data to get under the skin of it. Northumbrian Water has shared feedback from their research that shows that savings are driven in the ratio of 2/3rds device installation and 1/3rd behaviour change. This is good news as it supports the view that savings can be sustained.

Figure 3 – Lifetime of SHV savings to high usage households



The business case on water efficiency grounds only

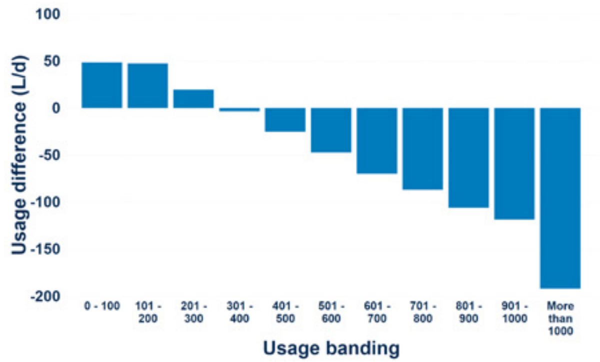
Water efficiency is a key component of our current Water Resource Management Plan, offsetting the need for less efficient new resource options. It's comparable with metering and leakage as a demand reduction intervention.

Household water efficiency contributes to Thames Water's per capita consumption and security of supply performance commitments within AMP7.

What impact can water efficiency measures make on household usage?

Thames Water's water efficiency programme has evolved from offering a SHV to every property moving to a smart meter, to targeting recruitment at properties using over 500 L/d. Average savings have increased from 40 L/d when untargeted to 74 L/d when targeted to over 500 L/d. The table below shows the savings made, split by overall consumption, where there's a clear correlation of savings increasing from 23 L/d in the 400-500 L/d usage band to savings of 191 L/d when using over 1,000 L/d. Showing these figures as a proportion of demand, the SHVs savings don't increase significantly around the average of 11%, the 400-500 L/d band increasing from 9% to 14% in the over 1,000 L/d band.

Figure 4 – Difference in water usage from AMP7 SHVs split by usage banding



Wastage savings identified in SHVs

10% of SHVs identify an internal leak, such as a leaky loo or tap. As these leaks have continuous flow, this is significant and repairing them reduces this flow by an average of 229 L/d per property. These savings are not included in the SHV savings. As long as the leak was one that the customer could not have reasonably known about, they can claim for a leak allowance for that loss of water. Thames Water's policy allows a customer to recover the cost of water lost because of a leak in their pipework for up to two years.

Table 3 – Average savings from wastage fixes at different leak locations

Location of the leak	Number of fixes	Saving per property fix (L/d)
Toilet	1582	237
Multiple locations	304	277
Kitchen tap	210	139
Basin tap	143	137
Bath tap	54	290
Other	49	242
Total	2342	229

Segmenting the data by deprivation index shows that deprived customers have received greater benefits from these wastage repairs compared to affluent customers, with 39 % of repairs falling in the bottom three deciles and over 70 % in the bottom five.

Figure 5 – Average continuous flow saving from a wastage fix split by IMD decile

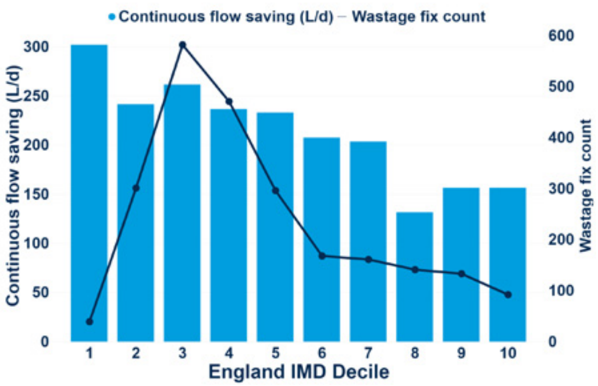
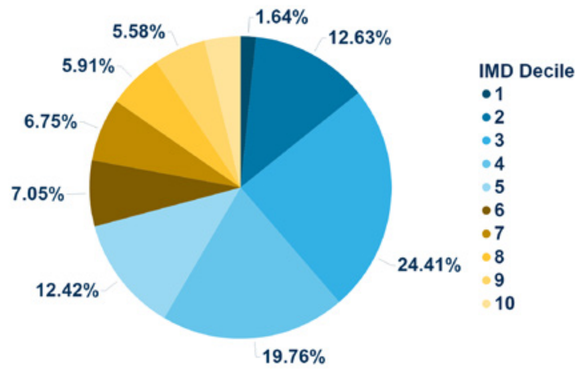


Figure 6 – Proportion of wastage fixes split by IMD decile



Average savings for properties over 500 L/d

As a weighted average, 90 L/d can be saved from SHV interventions when visits are delivered to households with consumption greater than 500 L/d. This has been calculated by estimating the average savings by usage band for all properties using more than 500 L/d.

The average savings from wastage are 23 L/d. The wastage figure is calculated by applying the average 10 % of properties having a wastage saving of 229 L/d.

The total weighted average is 113 L/d.

Water Saving Calculator – potential savings from self help

Data captured from the water savings calculator shows significant opportunities for bill savings from water and energy reductions. Bill reductions, calculated from the Water and Energy Efficiency app from April 2020 – November 2021 show:

- An average total saving of £379 if all recommendations are acted upon. This is made up of water and energy savings:
  - An average £156 energy bill reduction
  - An average £223 water bill reduction

Unfortunately, we have previously been unable to track the actual water efficiency impact of customers using the calculator as no customer data was captured. Since embedding water efficiency device orders into the calculator in 2021, we have started to analyse the impact of customers using the calculator. Initial data shows around a 6 % reduction in water use when compared before and after consumption, indicating customers are making savings from a combination of the behaviour change advice and devices.

When compared to the SHV measured water demand reduction average of £65 (74 L/d), this shows a difference between theoretical and actual savings, which means customers don’t act on all the recommendations from a SHV.

Turning water savings into bill savings

Using our charges scheme for a combined water and waste bill, we can translate water efficiency reductions into actual bill reductions. Standing charges of £85.52 a year are a significant proportion for low water users, and less of a proportion for higher users. Variable charges are £2.39 per 1,000 litres. In 2021, the average Thames Water bill was £419.

With significant water efficiency measures above 500 L/d, this equates to a bill of £520 in the Thames Water region.

Table 4 – Cost of water, based on daily consumption

Bill Value (per year)	Daily consumption (L/d)	£ / year per litre / day
£100	17	6.02
£200	131	1.52
£300	246	1.22
£400	361	1.11
£500	476	1.05
£600	590	1.02
£700	705	0.99
£800	820	0.98
£900	934	0.96
£1,000	1,049	0.95

The table below shows the increased amount of savings possible from SHV interventions as a bill increases in value, with savings on an annual bill from 5% to 17% as consumption increases.

Table 5 – Household cost savings possible from reducing water usage after a SHV

Bill value (per year)	Daily consumption (L/d)	SHV demand saving (L/d)	SHV bill saving (£/ year)	% bill saving
£100	17	None		
£200	131	None		
£300	246	None		
£400	361	23	£20	5%
£500	476	46	£40	8%
£600	590	68	£59	10%
£700	705	85	£74	11%
£800	820	108	£94	12%
£900	934	128	£112	12%
£1,000	1049	191	£166	17%

With the weighted average saving of 91 L/d this translates to £79 from a SHV.

Further savings from using less hot water

Where water savings come from the use of hot taps – for example, from fitting an aerator to a hot tap or shower head, there are additional savings to be made.

Our data shows that on average 54% of SHV water savings are heated water. This breaks down to 44% of the water savings coming from a hot tap and 10% from an appliance that heats water (such as a washing machine or dishwasher).

The cost of heating 1 litre is £0.002 (Based on At Home with Water energysavingtrust.org.uk) without taking into account the recent increases in wholesale gas prices. The table below shows how incremental savings are made against the size of a water bill.

Table 6 – Household hot water cost savings possible from reducing water usage after a SHV

Bill value (per year)	Daily consumption (L/d)	SHV demand saving (L/d)	Hot Water Savings (£/ year)
£100	17	None	0
£200	131	None	0
£300	246	None	0
£400	361	23	£9.23
£500	476	46	£18.47
£600	590	68	£27.30
£700	705	85	£34.13
£800	820	108	£43.36
£900	934	128	£51.39
£1,000	1049	191	£76.69

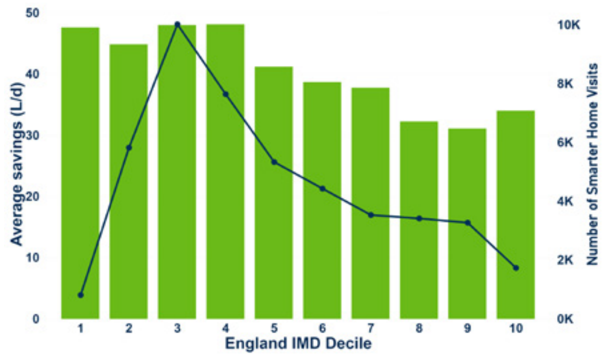
Wastage repairs savings

Continuous flow wastage has been found at 10% of households targeted for a SHV. With an average consumption of 229 L/d, this equates to an annual bill of £200. If these savings were distributed over every household using over 500 L/d this would be 23 L/d, or the equivalent of £20 a year.

Do water efficiency interventions work for low-income groups?

We wanted to check that savings from SHVs were not biased to affluent segments, and that these bill reductions really benefit lower income households. Segmenting the water efficiency savings by deciles of the Index of Multiple Deprivation shows that savings in the bottom six deciles are above average, showing that SHVs do work for low-income groups.

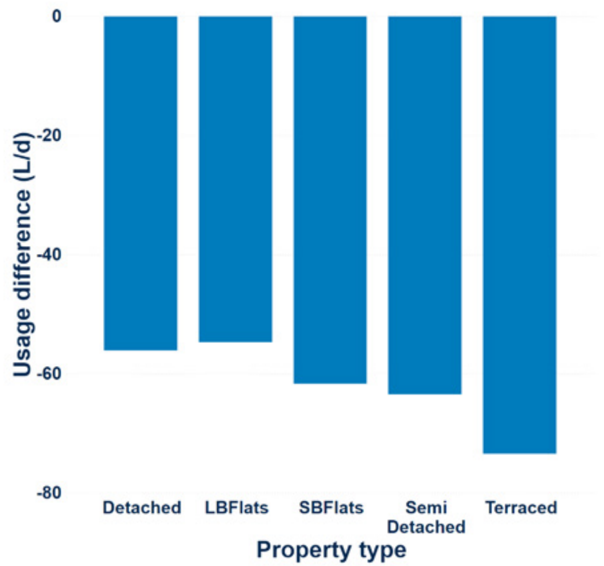
Figure 7 – Average water usage savings from all face-to-face SHVs and the total number of Smarter Home Visits split by IMD decile



Savings are also made across a range of housing types

All housing types, including flats with no outdoor space, can show savings from a Smarter Home Visit.

Figure 8 – Average water usage difference from AMP7 face-to-face Smarter Home Visits from AMP7 split by property type – Note: LBFlats and SBFlats stand for Flats in large blocks (five or more flats) and Flats in small blocks (less than five flats)

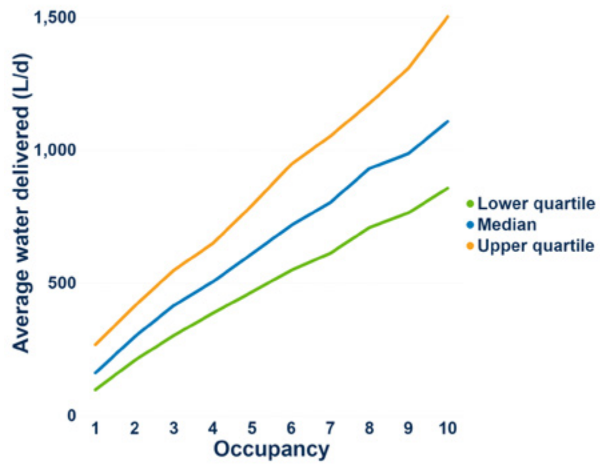


Occupancy drives household usage

Occupancy is the main driver of household usage. Our occupancy data is limited but is held for properties where we've done a Smarter Home Visit. Segmenting usage data by occupancy shows a very clear relationship, as shown in the graph. It shows the range of savings that could be made at different occupancy levels when moving from upper quartile to median, for example. As occupancy increases, the opportunities for water efficiency savings also increase, shown by the increasing gap between upper and lower quartiles.

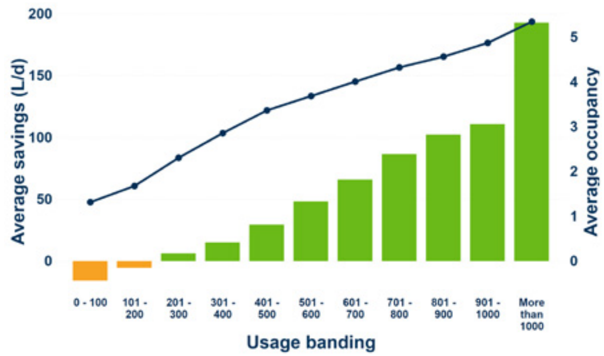
In low-income households, if there is high occupancy then water efficiency savings can be made – for example, a tap aerator will reduce the flow for all users.

Figure 9 – Relationship between occupancy and household water delivered



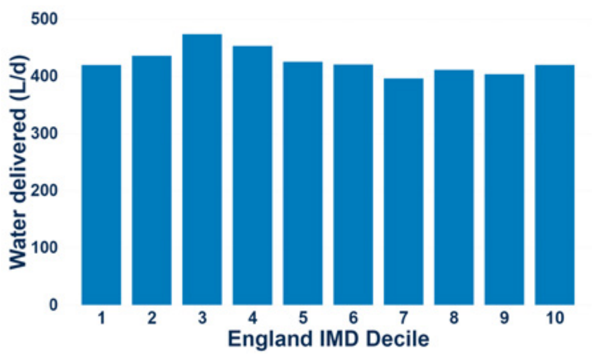
Occupancy data is limited for targeted purposes as there is no supporting open source data. Instead, overall demand is a good indicator of where savings can be made. The average occupancy of properties using over 500 L/d is four people. Occupancy data for our SHVs shows that in the more affluent areas the occupancy reduces to 3.7, compared to 4.3 for the more deprived areas. Occupancy is a key driver of high household water use. The graph shows the direct relationship between occupancy and SHV savings, both increasing in-line with usage.

Figure 10 – Savings made from all face-to-face Smarter Home Visits and average occupancy split by usage banding



Looking at usage across IMD deciles, there's no obvious trend that links deprivation to usage of water. The main driver of usage is occupancy.

Figure 11 – Water delivered to smart metered households split by IMD decile



Can water efficiency interventions take people out of water poverty?

Reducing the size of a bill can increase the threshold for water poverty. Using a figure of 30% of net income spent on renting accommodation (source: Statista, HomeLet Rental Index), then we can calculate how the threshold for water poverty increases as bills are reduced through water efficiency interventions. In London a figure of 35% for rental costs would need to be used.

The table shows how water efficiency measures lower the gross income threshold for water poverty based on the 5% definition, by 9% for bills over £500 and over 20% for a large bill over £1,000, where bill reductions make the threshold for water poverty £23,000 instead of £28,000. Additionally, there is an upper range of savings for the 10% of households that have a wastage fix, making the threshold £18,000. (This excludes the additional savings of reduced energy costs from a reduction in hot water usage).

Table 7 – How gross income threshold for water poverty could change after a Smarter Home Visit

Initial Bill size	Gross income threshold for 5% water poverty	Gross income threshold for 5% water poverty after SHV reduces bill	Gross income threshold for 5% water poverty after SHV and wastage fix reduces bill
£400	£11,429	£10,856	£5,142
£500	£14,286	£13,140	£7,426
£600	£17,143	£15,449	£9,735
£700	£20,000	£17,883	£12,169
£800	£22,857	£20,168	£14,453
£900	£25,714	£22,527	£16,812
£1,000	£28,571	£23,815	£18,101

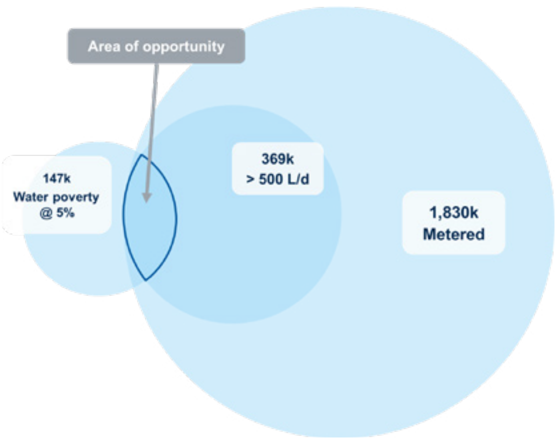
The scale of our opportunity

To understand the potential application for water efficiency interventions, it's important to estimate the scale of the incidence of metered properties, water consumption over 500 L/d and water poverty. Households using water above an upper usage threshold of 5,000 L/d have been removed, as this often includes meters feeding multiple properties. There will be residential properties above this threshold, and multiple properties below it, but there's little difference in volumes around this threshold figure.

There are 369,000 properties using over 500 L/day. That's about 20% of the 1,830,000 metered properties.

Water poverty is more difficult to establish. Across our billed 3.8m households, the 2021 CEPA study commissioned by Water UK estimated that, before affordability interventions, 147,000 households are in water poverty at the 5% threshold.

Figure 12 – Area of opportunity to target Smarter Home Visits



If customers in water poverty were distributed in-line with averages (50% metered, and 20% using over 500 L/d), it would mean that 15,000 households, or 10% of customers using over 500 L/d were in water poverty.

But it's important to remember that water poverty is just one metric. What we're aiming to achieve is meaningful support for households that struggle to pay their water bill. Therefore, the scale of this opportunity is better expressed as a range using different indicators.

Two methods are used to estimate the water poverty element:

- Corresponding the Index of Multiple Deprivation (IMD) deciles to the average income levels from ONS income data
- Using accounts with prior year debt

Using the Index of Multiple Deprivation method

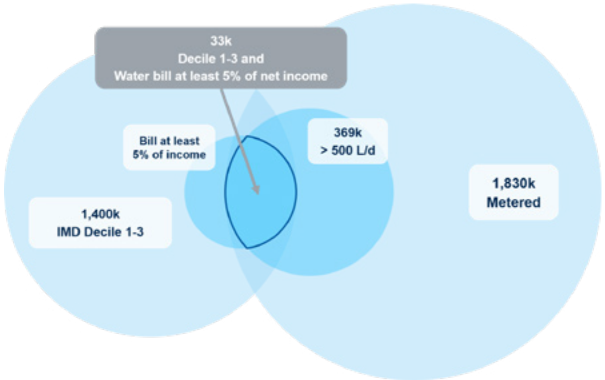
Using the IMD and average household income method there are few households in water poverty with income associated with decile 4 and above. Decile 1-3 has 112,000 households using over 500 L/d in the Thames region (scaling up to compensate for the 28% of properties that we could not match to the IMD deciles). Then, by segmenting usage into 100 L/d bands and comparing that to the average salary decile, there are 33,000 properties above the 5% threshold, and 93,000 above the 3% threshold.

We see a 56% reduction in water poverty at the 5% threshold and a 40% reduction at the 3% threshold post SHV. For properties in deciles 2 and 3 with a wastage issue, fixing that wastage issue and having a SHV takes them out of water poverty at 5%. We can't estimate volumes of households without more complex modelling.

Table 8 – How a SHV and wastage fix can bring households out of the water poverty thresholds in the deciles 1-3

Decile	Average HH income	# of HH	Scenario 1 - No SHV or Wastage fix				Scenario 2 - Post SHV				Scenario 3 - Post SHV and Wastage fix			
			Bill size	% of income	HH in water poverty at 5%	HH in water poverty 3%	Bill post SHV	% of income	HH in water poverty at 5%	HH in water poverty 3%		% of income	HH in water poverty at 5%	HH in water poverty 3%
1	£14,547	2314	£500	5.3%	2314	2314	£460	4.9%	0	2314	£260	2.7%	0	0
		1544	£600	6.3%	1544	1544	£541	5.7%	1544	1544	£341	3.6%	0	1544
		1056	£700	7.4%	1056	1056	£626	6.6%	1056	1056	£426	4.5%	0	1056
		589	£800	8.5%	589	589	£706	7.5%	589	589	£506	5.3%	589	589
		446	£900	9.5%	446	446	£788	8.3%	446	446	£588	6.2%	446	446
		1228	£1,000	10.6%	1228	1228	£834	8.8%	1228	1228	£634	6.7%	1228	1228
2	£23,795	13236	£500	3.2%	0	13236	£460	3.0%	0	0	£260	1.7%	0	0
		8705	£600	3.9%	0	8705	£541	3.5%	0	8705	£341	2.2%	0	0
		5725	£700	4.5%	0	5725	£626	4.0%	0	5725	£426	2.8%	0	0
		3986	£800	5.2%	3986	3986	£706	4.6%	0	3986	£506	3.3%	0	3986
		2558	£900	5.8%	2558	2558	£788	5.1%	2558	2558	£588	3.8%	0	2558
		6961	£1,000	6.5%	6961	6961	£834	5.4%	6961	6961	£634	4.1%	0	6961
3	£29,455	19418	£500	2.6%	0	0	£460	2.4%	0	0	£260	1.4%	0	0
		13220	£600	3.1%	0	13220	£541	2.8%	0	0	£341	1.8%	0	0
		9093	£700	3.7%	0	9093	£626	3.3%	0	9093	£426	2.2%	0	0
		6193	£800	4.2%	0	6193	£706	3.7%	0	6193	£506	2.6%	0	0
		4371	£900	4.7%	0	4371	£788	4.1%	0	4371	£588	3.1%	0	4371
		12078	£1,000	5.2%	12078	12078	£834	4.4%	0	12078	£634	3.3%	0	12078
Total		112719			32759	93301			14381	66845			2263	34816

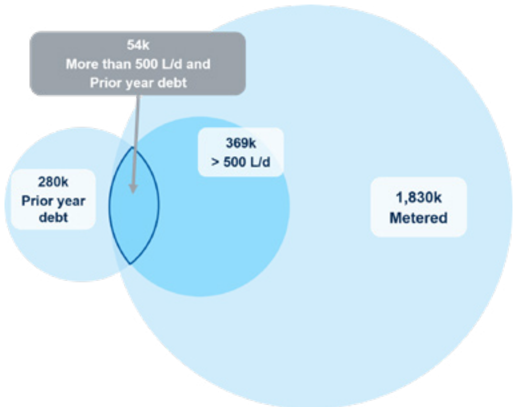
Figure 13 – Metered properties using more than 500 L/d in Decile 1-3 and with a water bill of more than 5 % of net income



Using the prior year debt method

Matching billing data against households consuming greater than 500 L/d identifies 53,500 households with prior year debt. This represents 15 % of high users. Putting this in context, there are approximately 280,000 accounts with prior year debt in total, representing 7 % of the total property base.

Figure 14 – Metered properties using more than 500 L/d and with prior year debt



So, this range of methods produces a range of answers, all in the same order of magnitude:

- 15,000 – pro rata
- 33,000 – metered usage and median income
- 54,000 – prior year debt

This gives a range of 10 % to 30 % of our households having the potential to be removed from water poverty through water efficiency interventions. Moving metering penetration from the current 50 % to 75 %, our estimated peak of metering penetration, increases that range proportionally from 15 % to 45 %.

NEA's view is that this was too high as households in financial hardship often ration their use of services to support paying their bill. However, 500L/d is not an unusual amount of water, especially for high occupancy households. And the cost of water reduces the incentive to ration compared to energy. We need to refine this method using more data.

Please note – these calculations don't include additional benefits to households in reducing energy bills as this doesn't enter the water poverty calculation.

Increasing engagement

While 15,000 – 54,000 households have the potential to be taken out of water poverty, not all households will engage with us or produce savings. We're unable to segment by water poverty data, but when taking a customer through a compulsory change on a metered basis, we find that only 14 % of households take up the offer of a SHV. Using current engagement levels, this reduces the number of households to a range of 2,000 – 8,000. We are aiming to increase engagement levels to 25 % by introducing an online booking service and door knocking.

Citizens Advice and National Energy Action support the view that £405 of savings to a household in financial hardship over three years is a meaningful contribution. In these households, even pennies can make the different between a balanced and a negative budget. For context, these savings equate to 13 % of the reduction to Universal Credit of £1,025 a year. That said, it would seem that this is still not enough to make more people engage.

Attempts to jointly undertake energy and water efficiency audits have been of limited success as they have not been jointly targeted at both high water usage and fuel poverty. However, with the definition of fuel poverty now driven by the energy efficiency of the property there are opportunities to explore using data for joint targeting of properties.

At Thames Water, we have moved from a blanket approach of SHVs to all newly metred properties, to those using over 500 L/d. If we can move to those using over 500 L/d and those with affordability challenges and those with fuel poverty indicators, benefits can then be maximised. These benefits would create more incentive for households to engage.

Water efficiency affordability benefits for companies

Traditionally, water efficiency measures are targeted in water stressed areas where benefits come from improving the security of supply and offsetting or complementing leakage activity such as repair and maintenance. Water companies have delivery incentives for reducing per capita consumption. This business case for water efficiency activity can be expanded by considering affordability bad debt charge benefits. If the consumption, and therefore bill, of those who can't afford to pay their bill in full can be reduced, then the bad debt provision for this customer can be reduced by the same amount.

There are 53,000 customers with prior year debt who use >500 L/d and have not had a SHV yet. Additionally, 10 % of these households will have a wastage of 229 L/d that can be fixed.

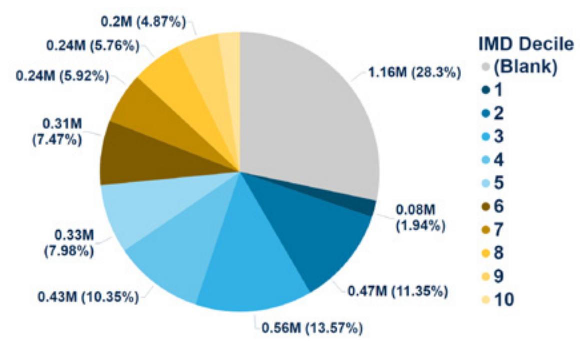
Assuming that the savings will last for three years and the customer would not have been able to pay their bill, the bad debt charge impact savings can be modelled to be £100 per household. If 100% of households engaged, this would create benefits of up to £5.2m over three years for Thames Water alone.

While we have evidence of efficiency savings lasting for three years, it's not clear how long a customer may be behind with their water bill. Citizens Advice and NEA were not aware of any research on how long properties remain in financial hardship. Unfortunately, our data is not able to yield this insight at this stage. However, stakeholders agreed that three years was intuitively correct for households in financial hardship. When targeted correctly, these savings offset the cost of £65 per visit.

Does metering reach low-income households?

When looking at households using over 500 L/d, there's an under representation of IMD decile 1. This is due to only 2% of London being within decile 1. While we could not match every household to the IMD data, this reflects in our analysis in Figure 15. This doesn't mean that there's no financial hardship in London. Housing costs, which are disproportionately higher in the area than the rest of the country, are related to approximately only half of the 9.3% weighting in the IMD.

Figure 15 – Household properties split by IMD decile



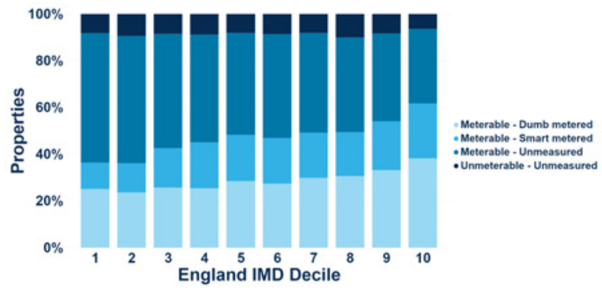
We were concerned that most of our low-income households would be living in accommodation with shared supplies, such as blocks of flats, that can't be metered cost effectively. This is because individual service pipes are not readily accessible. This may reduce the potential for water efficiency interventions to reach low-income households. For example, 85% of our 180,000 directly billed social tariff recipients are not metered. This figure is distorted, though, as 56% of that 180,000 are residents in local authority and social housing accommodation, which are typically flats that can't be metered.

In our water stressed area, we aim to have maximised our metering penetration by 2035, with an estimated 75% of properties on a measured billing basis. The balance would have metering for flow monitoring, but not billing. However, other parts of England and Wales already have, or are expected to have, a higher penetration, as much as 95%. London's large number of housing blocks due to land value distorts our figure.

Figure 16 shows the meter penetration by IMD decile. The 'un-meterable' proportion is under-represented, as our data shows 'non surveyed' properties as 'meterable – unmeasured' until a survey has been completed. But it's clear that there's twice as much meter penetration in the least deprived decile compared to the most deprived.

In conclusion, London's housing stock may prevent us reaching low-income households with meters, and other city centres may also have the same issue. But there's still a significant volume of households that will be struggling to pay their bill and be metered.

Figure 16 – Meterable households split by IMD decile



Can we see self-disconnection or rationing?

A phenomenon of 'self- disconnection' has been observed in energy users, especially in pre-payment meter users where insufficient cash is available to pay for energy consumption, leading to cold homes as heating or lighting is not switched on, despite still being connected to the network.

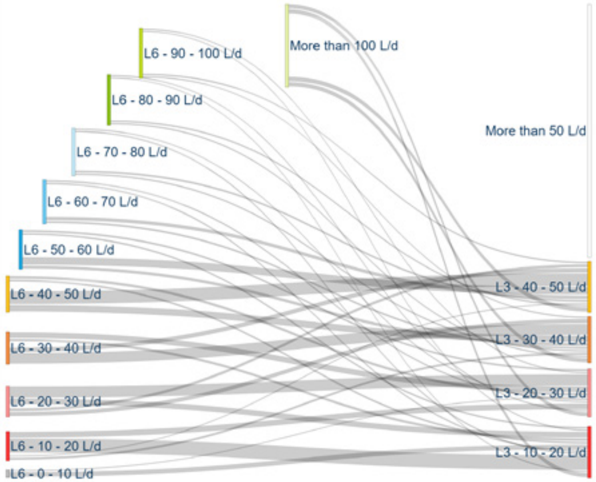
We wanted to explore if our smart meter data could observe a similar behaviour in customers who are billed on a metered basis but have excessively low amounts of usage. It was felt that 'self-disconnection' was unlikely due to the need to drink water. Additionally, this phenomenon would be masked in the data by vacant properties or faulty meters. Therefore, we focused on low usage that could be considered as unhygienic.

We used a figure of 50 L/d as a threshold - according to the World Health Organization, between 50 and 100 litres of water per person, per day are needed to ensure that most basic needs are met and health issues don't arise.

We used a Sankey diagram to show average usage of smart metered customers over the previous six months compared to the last three months. This allowed us to see users consistently using less than 50 L/d. Current demand less than 10 L/d has been excluded to leave out outliers of faulty meters or vacant properties. Properties with a leak, or a wastage issue, creating a continuous flow have also been removed.

This showed there were 7,900 properties in this situation, which is 1.4% of the 570,000 smart metered properties.

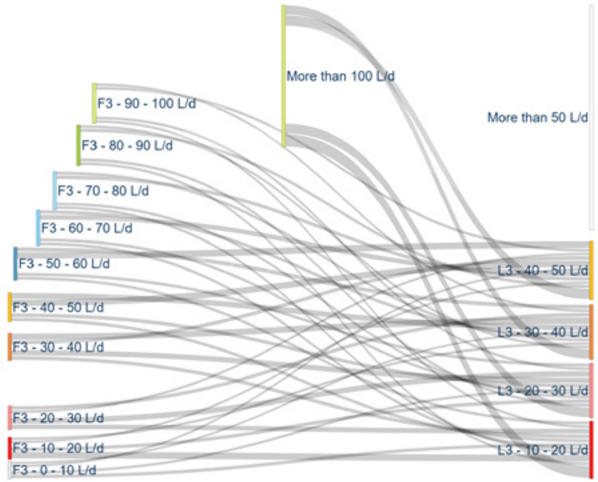
Figure 17 – Change in water usage for properties from the last six months to the last three months – Note: Links to 'More than 50 L/d' have been hidden



The hypothesis is that being metered drives this behaviour of low usage. To look for evidence for this, we produced a similar chart. But, instead of the average usage over the last six months on the left we used the data captured before customers moved to a billed basis. The meter is active for three months before customers receive the first communication clarifying what their bill would be if they were billed by consumption. Therefore, this first three months represents unobserved 'normal' behaviour compared with water usage on a billed basis.

This shows that 1,900 (24%) of the same 7,900 customers from the previous chart were using over 100 L/d before being billed on a metered basis.

Figure 18 – Change in water usage for properties in the first three months of installing a meter to the last three months (post switching to metered bill) - Note: Links to 'More than 50 L/d' have been hidden



Filtering out properties where there is zero usage on a regular basis, suggesting that the low daily average usage is due to partial residency, then this 7,900 reduces to 4,200 properties.

Of these 4,200 properties, 235 had prior year debt. One third (1,400) were in deciles 1-3.

There could be many reasons for this low usage, in addition to affordability drivers. Further investigation is still needed, but ultimately only customer engagement will discover if this data can be used to efficiently target affordability support.

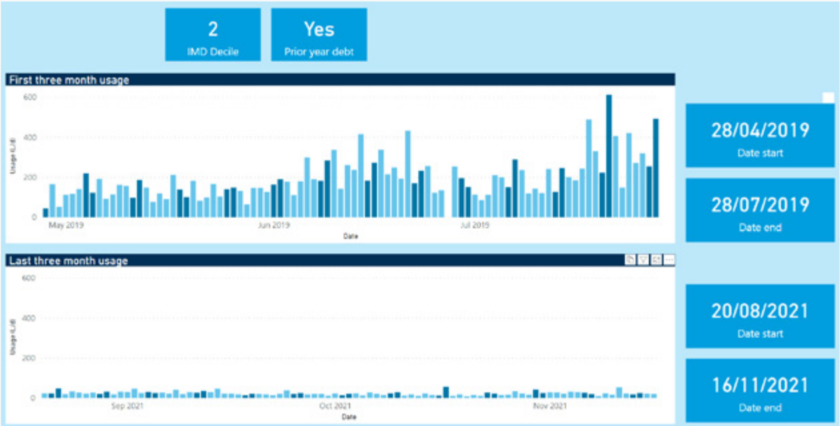
Water efficiency messaging is not targeted at low usage customers, but customers will be aware of their measured billed status.

Four examples of daily usage comparing first three months and last three months are shown below with a hypothesis of the impact.

Scenario 1

Reduced occupancy?

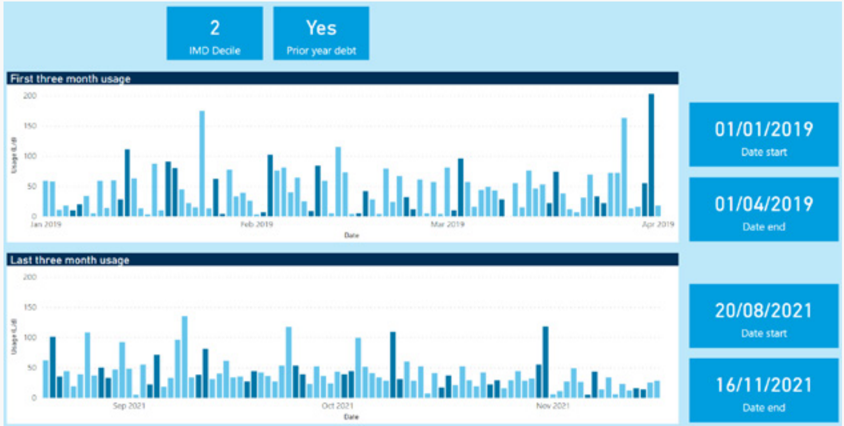
Figure 19 – Scenario 1 – potential reduced occupancy since meter was installed



Scenario 2

Rationing due to concerns over costs, or just efficient use of water?

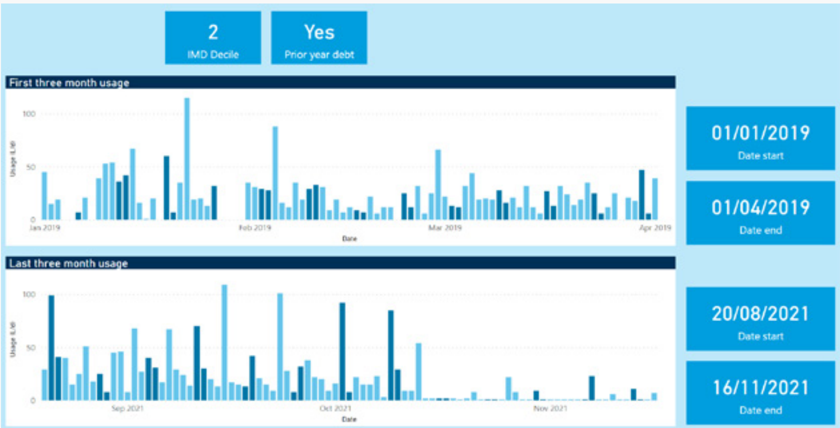
Figure 20 – Scenario 2 – Potential rationing or efficient use of water since swapping over to metered bill



Scenario 3

Partial occupancy, with a small leak, showing reduced average demand, but no days of zero usage

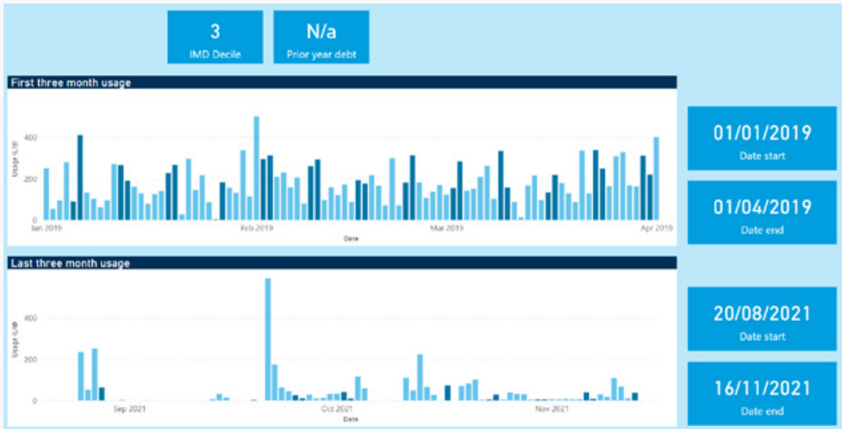
Figure 21 – Scenario 3 – Partial occupancy with potential unaccounted wastage



Scenario 4

Partial occupancy, with 40 % of days at zero, reducing average demand

Figure 22 – Scenario 4 – Partial occupancy with 40 % days at zero reducing demand



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