Baringa

Report prepared on behalf of

Ofwat | Water Efficiency Fund

Learning from experience:

What the rollout of smart metering in energy can teach us about smart metering in water

SEPTEMBER 2024

About Baringa

We set out to build the world's most trusted consulting firm – creating lasting impact for clients and pioneering a positive, people-first way of working. We work with everyone from FTSE 100 names to bright new start-ups, in every sector. You'll find us collaborating shoulder-to-shoulder with our clients, from the big picture right down to the detail: helping them define their strategy, deliver complex change, spot the right commercial opportunities, manage risk or bring their purpose and sustainability goals to life. As a Certified B Corporation®, we've proven that we've built social and environmental good into every bit of what we do.

Water Expertise:

Baringa has been providing specialist water advisory services for the past 15 years. We work across a range of clients on their major strategy and transformation programmes. We are supporting multiple water companies with their smart metering programmes, designing and embedding the capabilities and analytical approaches to deploy meters and harness the power of granular consumption to drive water efficiency savings.

Smart Metering Energy Expertise:

We have worked with a wide range of clients including the Smart Metering Implementation Programme at the Department for Energy Security and Net Zero (DESNZ), focusing on the design and mobilisation of the central governance structures, cost benefit analysis and the delivery of smart metering technology. We have supported most major energy suppliers with their smart programmes for over a decade, in roles including strategy, demand generation, deployment optimisation, customer service transformation and net zero proposition development. We also have extensive experience working with a range of other stakeholders such as the Meter Asset Providers, Meter Operators, communication providers, the Data Communications Company, and Alt Han Co.

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LEARNING FROM EXPERIENCE

Executive summary

1. Executive summary

This report was commissioned by Ofwat to provide insight into how part of the proposed £100m 'Water Efficiency Fund' in AMP8 (2025-2030) could be used to improve the outcomes from the rollout of smart water meters, based on lessons from the energy sector.

The aim of the fund is to "help stimulate a transformative, sustained and measurable reduction in water demand"[1]. This is within the context of us facing a severe water scarcity challenge: more than 4,000 additional megalitres per day (Ml/d) of water is needed by 2050 to meet demand in England and Wales, which is around 25% of the water currently put into supply.[2] The report is based on interviews with stakeholders from across the energy and water sectors, a review of existing literature and insight form Baringa's subject matter experts.

The key finding we have taken from the energy sector roll out, is that a level of centralised coordination and joint-investment is needed to help drive better outcomes from smart metering, given the scale and complexity of delivering infrastructure to every home and business in the country and the need to engage every consumer to enable the benefits.

Currently this level of central coordination does not exist for smart metering in the water sector (albeit an expectation has been set through Price Control Deliverables for water companies to coordinate). Each water company is individually trying to work out what use cases and benefits can be derived from smart, what technology solutions they need, what capabilities they need to develop, how to analyse data effectively, how to engage customers effectively, what internal system, processes and policies need to change and how to overcome technical and operational challenges. They are also each procuring individually and providing the supply chain with a proliferation of different requirements.

Lessons from energy suggest that there are benefits from: having a common agreement on the benefits and use cases of smart and the minimum technology and capabilities required; comparing performance and sharing best practice; and collaborating and investing in joint solutions to common challenges. Based on the Findings we have made 12 recommendations that can be grouped as follows (a description of each is provided in Chapter 4).

1 Ofwat accelerates action on water efficiency with new £100 million fund - Ofwat

2 A summary of England's draft regional and water resources management plans, Environment Agency (2023)

Recommendations

Central governance and coordination
to set and drive standards; share best practice; and identify and resolve common issues:

- Establish a smart delivery governance capability.
- Develop a sector-wide business case and roadmap.
- Establish and govern performance reporting.
- Establish Technical and Operational standards and guidance.
- Establish Benefits Realisation standards and guidance.
- Assess and mitigate supply chain risks.

National campaigns
to promote water efficiency, the role of smart meters and the consumer action required:

- Establish national campaigns to increase engagement.

Investment in joint-sector solutions and innovation:

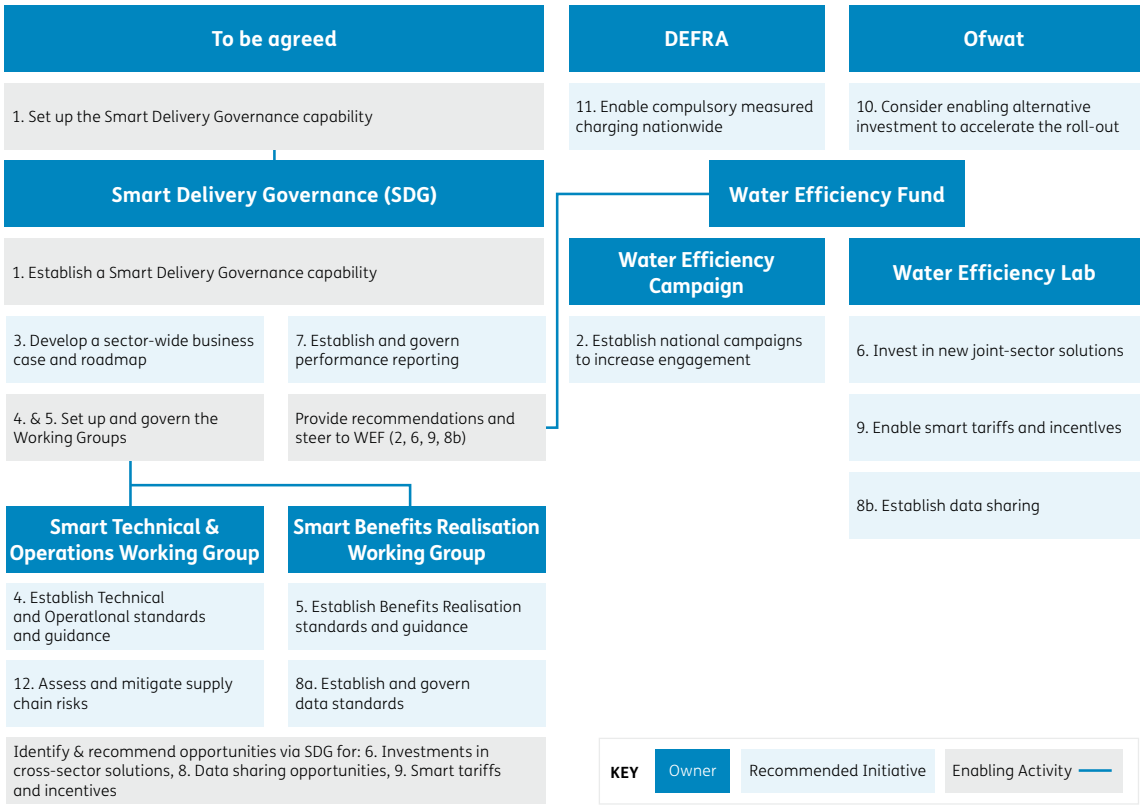
- Invest in new joint-sector solutions.
- Establish and govern data standards and data sharing.
- Enable smart tariffs and incentives.

Regulatory / Policy interventions for consideration:

- Consider enabling alternative investment approaches to accelerate the roll-out.
- Enable compulsory measured charging nationwide.

A potential governance model for the ownership and delivery of the recommended initiatives is provided below, but this will require further consideration as part of the next steps.

FIGURE 1: POTENTIAL GOVERNANCE MODEL FOR THE OWNERSHIP AND DELIVERY OF THE RECOMMENDED INITIATIVES



If these recommendations are to be taken forwards, there will need to be a further phase of work to define them in more detail, establish the terms of reference, estimated costs, funding paths and delivery mechanisms. We recommend that Ofwat works with other stakeholders such as Defra and the Environment Agency in the first instance to determine the appropriate next steps.

Aim and approach

2. Aim and Approach

2.1 Water Scarcity Challenge

The United Kingdom is facing a water scarcity challenge. Water companies in England and Wales are predicting additional water needs by 2050 of upwards of 4,000 megalitres per day (Ml/d) which is around 25% of the water currently put into supply in England and Wales. This is driven by the need to reduce unsustainable abstraction, increase resilience to drought, supply a growing population and adapt to the impacts of climate change. At least half of this capacity is expected to come from reductions to demand (increasing water efficiency and reducing leakage).[3] For more information on the water scarcity challenge please see Appendix A.

2.2 Water Efficiency Fund

In 2023, Ofwat's PR24 Draft Methodology announced the introduction of a 'Water Efficiency Fund' (WEF) of up to £100 million which aims to "help stimulate a transformative, sustained and measurable reduction in water demand in England and Wales, using a range of water efficiency approaches".[4] The intended outcome is to reduce water demand by unlocking both collaborative and innovative work that would not otherwise happen.

Ofwat published a high-level consultation in July 2023 which sought views from stakeholders on the aims of the fund, how to best target its use, potential eligibility and scope, how it should be implemented and operated, and timescales.[5]

In the consultation, Ofwat proposed that a key focus of the fund could be to target interventions based on insights from smart metering data. It noted that smart meters provide "higher resolution and more up to date data" that has the potential to "bring fresh insights into water use for companies and customers" and that could also "unlock different ways of communicating with customers and structuring tariffs".

3 https://www.gov.uk/government/publications/a-review-of-englands-draft-regional-and-water-resources-management-plans/a-summary-of-englands-draft-regional-and-water-resources-management-plans

4 https://www.ofwat.gov.uk/wp-content/uploads/2023/07/Scoping-the-Water-Efficiency-Fund-High-Level-Consultation_Final.pdf

5 https://www.ofwat.gov.uk/wp-content/uploads/2023/07/Scoping-the-Water-Efficiency-Fund-High-Level-Consultation_Final.pdf

2.3 Aim of report

Ofwat commissioned a short piece of work to understand the potential to use some funds from the water efficiency fund to improve the outcomes from the rollout of smart water meters. Ofwat asked Baringa to produce a report based on interviews with stakeholders and a literature review, in order to achieve the following objectives:

01	02	03	04
Learn from the deployment and use of energy smart meters to improve the shift to smart meters in the water sector, including whether there are steps for Ofwat to consider, to assist or improve the smart meter roll out	Understand the scope to increase the value provided by the shift to smart metering in the water sector	Understand the current expected benefits of smart metering on consumption / leakage	Develop recommendations on how the shift to smart metering in water could learn from experience in energy and advise on how the water efficiency fund could best support this area

In addition, we have sought to learn from experiences of smart metering in water so far, as several companies are already well underway with their programmes.

2.4 Approach

This report has been developed based on interviews with stakeholders from the energy and water sectors, a review of relevant literature and insights from Baringa's subject matter experts. We engaged with over 70 stakeholders from 48 organisations across the energy and water sectors and the supply chain. We would like to thank everyone involved for their engagement, insights and suggestions. A list of companies which contributed and the literature that was reviewed can be found in Appendix E.

Please note that in this report when we refer to Smart Meters we mean Smart AMI Meters (Advanced Metering Infrastructure) rather than AMR meters (Automatic Meter Reading) or visually read ("dumb") meters. AMI enables data (such as hourly reads) to be transmitted to the water company at a regular frequency, remotely and automatically, via a fixed or mobile communications network. We also refer to "Smart" as opposed to "Smart metering" when we are discussing more than just the physical meter, but the full system and capabilities involved.

2.5 Structure of this report

The report is structured as follows:

1. Report aim and approach

2. Summary of findings

3. Recommendations

4. Enabling the recommendations

5. Appendices:

A. Context and background

B. Benefits of Smart Metering

C. Lessons and findings from energy and water

D. Situation in energy and water

E. Sources and glossary

Summary of findings

3. Summary of findings

3.1 Commercial and Sourcing

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- In the early stages of the energy smart metering rollout there was a rush to secure supply chain capacity, which led to inefficiencies.
- Smart metering in energy is financed by Meter Asset Providers (MAPs), which enables switching and spreads costs.
- Common challenges have been addressed via collective sector procurement of shared infrastructure and services.
- The focus on meeting installation targets meant that there was less focus on end outcomes than there might have been.

Lessons from Water Smart Metering

- Water companies are concerned about supply chain capacity in the early years of AMP8.
- Some water companies are seeking a "data as a service" model to align commercial incentives to target outcomes.
- One water company said it was seeking an "Alternative Metering Service" provider that finances & operates assets, similar to the MAP model used in Energy.

Findings

There is a risk to benefits that:

- install targets will not be met in the early years of AMP8 due to supply chain constraints and a cost efficiency risk that prices may increase due to high demand.
- some companies may not have the commercial models, or capabilities, to drive the optimal outcomes from the supply chain partners.

There is a cost efficiency risk:

- due to each water company procuring separately and with different requirements, limiting economies of scale.
- if common challenges are not tackled through investments in joint-sector solutions, rather than each water company having to solve them individually.

There is a potential opportunity to accelerate benefits by rolling out higher volumes more quickly through leveraging an alternative financing model to smooth the impact on bills.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.1 Establish a smart delivery governance capability.
- 4.2 Establish national campaigns to increase engagement.
- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.10 Consider enabling alternative investment approaches to accelerate the roll-out.
- 4.12 Assess and mitigate supply chain risks.

3.2 Smart Metering Devices

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- Common standards, based on a centrally developed business case, have been key to driving benefits from Smart metering.
- Interoperability has enabled competition and additional use cases.
- Common standards have enabled economies of scale and a more efficient roll-out.
- The right balance is needed to avoid over-specification that can lead to complexity or risk stifling innovation.

Lessons from Water Smart Metering

- An absence of technical standards and no common set of use cases or business case assumptions has led to a proliferation of requirements.
- Lack of clarity over which communication functionality is deemed “Smart”.
- There is a lack of certainty in the optimal read and transmission frequency required to drive benefits.
- There is a lack of consensus on what additional functionality is required.
- Reliance on alarms to detect leaks can be less effective than analysing underlying read data.
- Battery-life is a critical determinant of whether target costs and benefits can be achieved.
- There are low economies of scale available to individual water companies in a global metering market.
- Managing a complex metering estate and keeping up to date with the latest technological development is proving challenging for water companies.

Findings

- There is a risk to benefit realisation and cost efficiency due to a lack of minimum standards for Smart Metering Assets.
- There is a risk to benefit realisation due to a lack of common understanding of the benefit drivers and use cases.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.1 Establish a smart delivery governance capability.
- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.7 Invest in new joint-sector solutions.

3.3 Communication Networks

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- Energy suppliers share a common set of communication solutions.
- Energy companies continue to experience significant challenges with meters failing to communicate or operate as intended.
- The sector co-funded a new company to deliver a technical solution for hard-to-reach meters.

Lessons from Water Smart Metering

- Selecting the right communication solution is vital to being able to deliver the full benefits of Smart, but some water companies are finding this a challenge due to lack of insight.
- Some water companies that have already installed Smart water meters are finding communications connectivity a challenge.
- Interoperability is desirable, but difficult to achieve in practice.

Findings

There is a risk to benefits that:

- water companies procure a communications solution that is not fit-for-purpose due to a lack of common standards and performance reporting.
- a high proportion of meters fail to transmit reads at the granularity and frequency required to enable benefits.

There may be an opportunity to reduce costs over the long term through joint procurement of comms solutions.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.5 Invest in new joint-sector solutions.
- 4.6 Establish and govern performance reporting.
- 4.10 Consider enabling alternative investment approaches to accelerate the roll-out.

3.4 Installation

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- A major challenge to achieving install targets is gaining customer consent and access to their property.
- Another major challenge has been securing the right amount of installer capacity in the right areas.
- A high proportion of installs are cancelled or aborted.
- A Code of Practice was established to set standards for customer service during an install.
- Increasing smart meter penetration in business properties has its unique challenges due to the difficulty with engaging the right person to grant permission and access.

Lessons from Water Smart Metering

- Smart meters can be rolled out quickly if installed externally street-by-street, but internal installs are proving problematic.
- There are concerns that a shortage of installers will cause delays and or drive price inflation.
- A significant minority of properties are uneconomical to fit a meter (such as joint supplies).
- A "communications first" approach can help drive greater customer engagement, but can also constrain the pace of roll out.
- Metering of Non-Household properties has additional challenges due to the wholesaler/ retailer roles being split.

Findings

There is a risk to benefits:

- that particularly in the early years of AMP8, planned install volumes will not be achieved (or not within budget) due to a labour market shortage and/or wage inflation.
- that install volumes will not be achieved due to a high proportion of jobs being cancelled or aborted.
- (and long-term costs) that planned install volumes will not be achieved due to the high proportion of internal installs.

There is a risk that some properties will never benefit from smart as it is not economically feasible to fit a meter (or else connect it to a communications network).

There is an additional risk to achieving Non-Household (NHH) install targets due to the challenges of being able to secure suitable appointments.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.12 Assess and mitigate supply chain risks.

3.5 Data capture and processing

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- Data standardisation has been essential for enabling competition, customer engagement and innovation.
- Common consumer protection standards have been defined, including a data privacy framework.

Lessons from Water Smart Metering

- Substantially more data needs to be stored and processed than today, which causes issues.
- Data standardisation is essential for the NHH market and Market Services Operator Limited (MOSL) have recommended how this should be achieved. These should be considered when developing household data standards.
- Many believe there should be similar minimum data standards for the Household market.
- There is common support for (controlled) data sharing to help drive benefits.
- Determining what constitutes compliant use of data has been a complex, costly task that each company is doing independently.

Findings

There is a risk to benefits:

- realisation if water companies do not invest in the appropriate technology and capabilities required to handle significant volume of data.
- if in the NHH market if data standards and data sharing are not established.
- if some water companies interpret data protection rules as meaning they cannot use granular data (and a cost impact of each company determining this independently).

There is a risk to benefits as well as a risk innovation in the HH market, if data standards and data sharing are not established.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

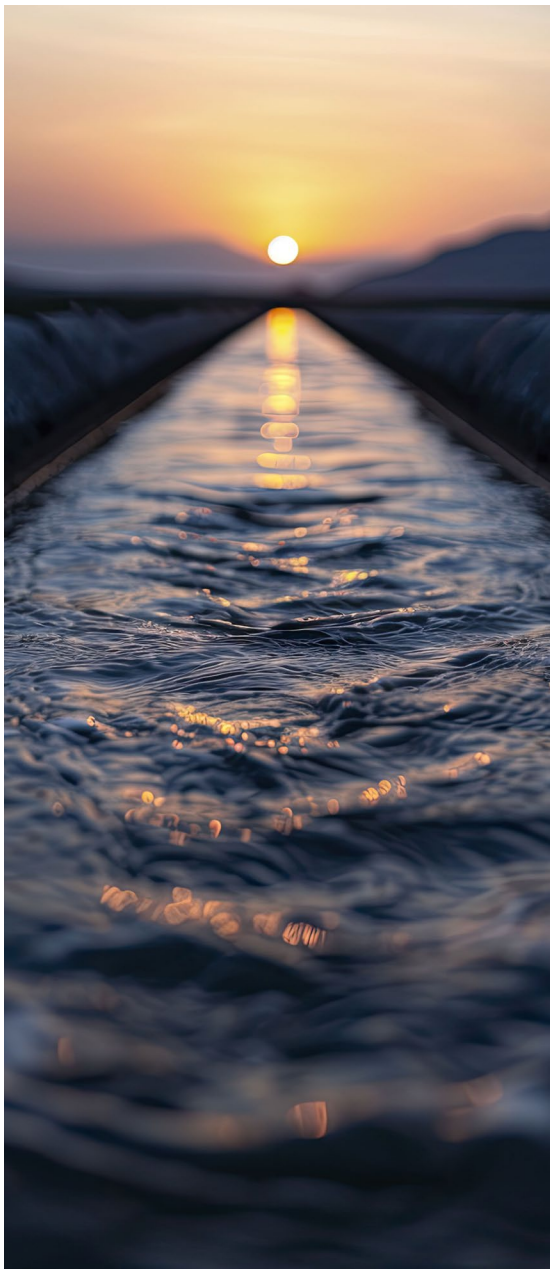
- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.8 Establish and govern data standards and data sharing.

3.6 Enablers to influence customer usage

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- The energy smart programme has focused on 4 key levers to drive the benefits – Direct feedback, indirect feedback, advice and guidance, and motivational campaigns.
- Smart metering has enabled new types of tariff that can help drive benefits.



Lessons from Water Smart Metering

- There is low awareness about the challenge of water scarcity and how smart meters can help.
- Stakeholders believe there is a need for national campaigns to promote the need for smart water metering and its role in tackling water scarcity.
- Lessons can be learnt from overseas.
- Engaging customers prior to install is important, but expectations need to be managed.
- One-to-one engagement with customers during the install is not cost effective for most installs.
- Proactive and continuous engagement of customers post-install is critical to nudge the behavioural change necessary to reduce water consumption.
- Providing customers with visuals of their usage and supporting this with advice is helping to improve water efficiency.
- Home water efficiency visits are highly effective when smart data is used to both target high 'value' properties and to inform the advice given.
- Companies are exploring new tariffs and incentives to help drive water efficiency, but for some this will be dependent on implementing new billing systems.
- The need for customers to opt-in to metered billing in certain areas is proving a barrier to improving water efficiency.
- Smart meters can be used to help assess the water efficiency of new products and services.
- The benefits of smart in the NHH market are significant and will require targeted engagement strategies.

Findings

There is a risk to benefits if:

- there is not an increase in consumer awareness of the water scarcity crisis, how smart meters can help, and the role consumers need to play in tackling it.
- companies do not engage customers effectively about the purpose and benefits of smart meters (ideally starting with the install journey).
- companies do not provide customers with regular insight about their usage along with advice and nudges to reduce usage (as near to real time as possible).
- companies do not provide direct and tailored advice to customers through targeted one-to-one interactions.
- companies do not provide customers with financial incentives to reduce water consumption (such as via new tariffs).
- companies are not able to move customers on to measured bills.
- insight is not used to both influence consumers to use more water efficient products and to influence manufacturers to improve the water efficiency of their products.
- companies delay the roll out of metering to NHH customers due to uncertainties around customer engagement roles and responsibilities between the wholesaler and the retailer.
- New Appointments and Variations (NAVs) do not install smart meters or provide demand reduction information for customers.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

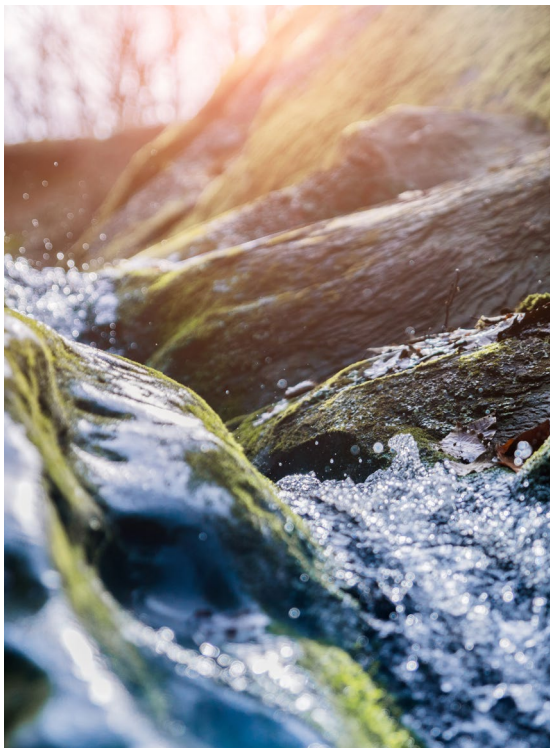
- 4.1 Establish a smart delivery governance capability.
- 4.2 Establish national campaigns to increase engagement.
- 4.5 Establish Benefits Realisation standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.8 Establish and govern data standards and data sharing.
- 4.9 Enable smart tariffs and incentives.
- 4.11 Enable compulsory measured charging nationwide.

3.7 Enablers to influence customer-side losses and leaks

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- No direct lessons as customer side losses and leaks are not a typical feature of the energy market.



Lessons from Water Smart Metering

- Distinguishing between customer side usage, losses and leaks causes complications and potentially unhelpful incentives.
- Customer side leakage (CSL) policies are different across the sector and stakeholders would welcome a consistent approach.
- Sophisticated analytics on data from smart meters is being used to identify customer-side leakage and losses.
- The volume of leaks and losses that can be identified by smart are substantially higher than historic levels, but traditional approaches to customer side leakage need transforming to enable the benefits.
- Leak allowances mean that customers do not pay for lost water for a period of time.
- New developments are not always as water efficient as they should be.
- Enabling NHH benefits is critical but has unique challenges the must be tackled.

Findings

There is a risk to benefits if:

- there is not a more consistent approach to measuring and responding to customer side loses and leakage and a revision to leak allowances. water companies do not invest in the full range of capabilities required to not only identify leaks and loses, but to help customers resolve them.
- water companies delay metering NHH customers.

There is an opportunity to accelerate benefits if developers are held to account for ensuring new homes are water efficient, using smart metering data.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.5 Establish Benefits Realisation standards and guidance.
- 4.7 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.8 Establish and govern data standards and data sharing.

3.8 Operating Model and Change

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- Smart has required huge investment in systems, people and processes, and a joined-up approach is required across different parts of an energy company is critical to success.
- Energy companies have tended to organise themselves in a way that prioritises meeting installation targets rather benefit realisation.
- Detailed management information and continuous improvement is critical to improving outcomes.

Lessons from Water Smart Metering

- Smart metering will require significant investment and transformational change within water companies to be successful.

Findings

- There is a risk to benefits if water companies do not deliver the level of transformation required.

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.4 Establish Technical and Operational standards and guidance.
- 4.5 Establish Benefits Realisation standards and guidance.
- 4.8 Establish and govern data standards and data sharing.
- 4.11 Enable compulsory measured charging nationwide.

3.9 Industry Regulation and Collaboration

Each of the following Lessons and Findings are section headings to more detailed descriptions in Appendix C.

Lessons from Energy Smart Metering

- The energy roll-out is coordinated at a national level by a delivery body – the Smart Metering Implementation Programme (SMIP).
- SMIP monitors and shares information to drive improvements and plays a convening role to bring stakeholders together to share best practice and resolve issues.
- There is a central cost benefit analysis for smart energy to inform decision making, which is periodically refreshed.
- Energy companies are obligated to deploy meters.
- Collective industry investment and collaboration has been critical to solving issues, setting standards and sharing knowledge.
- There has been some funding to drive innovation.

Lessons from Water Smart Metering

- There is no central coordinating programme for smart metering across the sector.
- There has been positive collaboration, but there is no formally governed and empowered convening body.
- The pace of the roll out is constrained by the budgets that water companies are able to spend within the 5-year AMP period.

Findings

- There are risks to costs and benefits due to a lack of a joined-up approach to smart metering across the sector.
- There is an opportunity to accelerate benefits if the roll out can be done more quickly, by removing the budget constraints of the AMP cycle through alternative financing approaches (but caution should be taken in year 1 given supply chain constraints).

Recommendations

These findings have informed the following Recommendations (described in Chapter 4):

- 4.1 Establish a smart delivery governance capability.
- 4.3 Develop a sector-wide business case and roadmap.
- 4.6 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.10 Consider enabling alternative investment approaches to accelerate the roll-out.
- 4.11 Enable compulsory measured charging nationwide.
- 4.12 Assess and mitigate supply chain risks.

Recommendations

4. Recommendations

Based on the Lessons and Findings summarised in the last Chapter 4 (and detailed in Appendix C), we have developed a set of recommendations for consideration. We recognise that several of these would ideally have been implemented before now given that several companies are already deploying smart at scale and most others have procured (or are in the process of procuring) solutions and services for AMP8, however similar interventions in energy (which also came after deployment had started) have proven effective at helping mitigate risks and driving performance. It should be noted that the scope of this piece of work did not include economic modelling or implementation planning, so before being taken forward each of the recommendations would need further scoping and assessment. The next Chapter, however, does provide an indicative view of how these initiatives might be managed and sequenced.

There follows a section on each recommendation, listed in the table below which summarises how they drive value by de-risking (or improving) the planned volume of installs, cost of installs or benefits per install.

FIGURE 2:

Value Driver>	Volume of meters	Cost per meter	Benefit per meter
1. Establish a smart delivery governance capability	Impacts all value drivers by driving performance and enabling all the other initiatives		
2. Establish national campaigns to increase engagement	More people will accept appointments/ provide access where required to fit meter		More people will understand water scarcity, the value of smart and how to use smart data to act
3. Develop a sector-wide business case and roadmap		Scrutiny of bottom-up costs will enable more accurate forecasting and decision making	Providing an understanding of use cases and benefits available will enable more effective investments
4. Establish Technical and Operational standards and guidance		Provides consistency of requirements to drive efficiencies and innovation in the supply chain	Provides clarity on what is required to maximise benefits in terms of functionality and service
5. Establish Benefits Realisation standards and guidance			Provides clarity on how to use the data and engage customers to maximise benefits
6. Invest in new joint-sector solutions			Enables solutions to be made available to all water companies that might not otherwise have invested
7. Establish and govern performance reporting	Provides performance insight and comparisons to enable companies to identify areas for improvement		
8. Establish and govern data standards and data sharing			Enables all water companies to benefit from shared insights and enables innovation by 3rd parties
9. Enable smart tariffs and incentives			More customers will choose to take action to save (even) more water due to financial rewards
10. Consider enabling alternative investment approaches to accelerate the roll-out	More meters would be rolled out in AMP8		More meters would mean more benefits in AMP8
11. Enable compulsory measured charging nationwide	Removes a barrier to installing in certain regions	Enables a more efficient roll out as can go street by street rather then waiting on sporadic permission	May result in more meters and therfore more benefits in AMP8
12. Assess and mitigate supply chain risks	May mitigate risk that planned install volumes are not achieved due to supply chain constraints	May mitigate risk of price and wage inflation due to supply chain constraints	May enable meter volumes and therfore benefit targets to be met

4.1 Establish a smart delivery governance capability

We recommend that a central Smart Delivery Governance (SDG) capability is established to steward smart water metering nationally, akin to Smart Metering Implementation Programme (SMIP) in energy. We believe this is essential given the complexity involved in both deploying disparate infrastructure at such a scale and in realising the benefits. Without central coordination many of the other recommendations will not be possible and there are material risks that the expected costs and benefits of smart will not be achieved, as detailed in Appendix C.

Further work is required to define the scope of the new function in detail, but we recommend that the following responsibilities are considered (which enable the other recommendations described in this section):

- Establish and govern a nationwide campaigning capability to increase engagement;
- Develop and maintain a sector-wide business case and roadmap;
- Establish and govern a Smart Technical and Operational Working group;
- Establish and govern a Smart Benefits Realisation Working Group;
- Establish and govern performance reporting;
- Establish and govern data sharing opportunities;
- Recommend and help manage investments in new joint-sector solutions; and
- Recommend and help develop policy and regulatory changes.

We anticipate that this would be an enduring team of permanent resources (augmented by temporary support when required) that would exist for at least 10 years until smart metering penetration and benefits realisation have reached an agreed level. The funding of this function could potentially be from the WEF (at least to set it up), but longer term there could be an opportunity for it to be funded by water companies with a pass-through mechanism built into the price review.

Next steps:

1. Define the proposed scope, governance and budget for the new function;
2. Determine options for resourcing and funding the new function;
3. Establish the new function;
4. Run the new function and manage the other recommendations.

4.2 Establish national campaigns to increase engagement

In order to reduce the risk that the expected benefits will not be realised due to lack of customer engagement in the use of smart data to improve water efficiency (and in accepting an install where access is required), we recommend that a significant proportion of the fund is allocated to raising awareness of the water scarcity crisis, how smart meters can help and what customers need to do to save water. This will require a campaigning capability to be established (by the Water Efficiency Campaign, with input from the SDG function – 4.1), which could involve procuring the services of a 3rd party provider, such as Smart Energy GB (SEGB) or a marketing agency.

It is vital that the campaigns are based on rigorous customer research and are seen by consumers as independent of the water companies, with a trusted voice and supported by credible 3rd parties such as the Environment Agency and the charity sector. The campaigns are likely to involve mass marketing/ advertising as well as partnerships with relevant organisations. The function should also provide water companies with content and collateral for local use.

As noted in our Findings (Appendix C 8.7.3), SEGB has performed this role in the energy sector, and whilst interviewees had mixed views about the effectiveness of some campaigns, particularly earlier on, SEGB's analysis suggests that up to 50% of customers in recent years have accepted a smart meter as a result of its campaigns. Whilst water is different (with a large proportion of installs being done without the need for customers accepting an appointment), customer engagement is vital to benefit realisation. It is also worth noting, though, that the budget for SEGB in 2023 was £38m[6], so the scope would need to be materially lower for water if it were to be funded by the WEF (£100m over 5 years to cover all initiatives).

Next steps:

We recommend that part of the fund (the Water Efficiency Campaign) is allocated to delivering the following (starting in parallel with establishing the SDG function – see 4.1):

1. Develop a set of requirements and delivery options for a campaigning capability;
2. Develop a business case to set the budget and target outcome measures;
3. Establish / procure the capability;
4. Govern delivery.

6 https://www.smartenergygb.org/media/av2bzr50/consumer-engagement-plan-and-budget-2023.pdf

4.3 Develop a sector-wide business case and roadmap

In order to reduce the risk that the expected costs and benefits will not be achieved due to inaccurate assumptions, or due to some water companies not delivering key use cases, we recommend that a sector-wide, bottom-up business case is developed. This should establish, supported by existing and new research as required, a set of use cases and benefit drivers that water companies should be expected to deliver. This can help drive best practice and inform performance reporting (see 4.7 below).

This would be a bottom-up model (as opposed to the standard top-down models used by Ofwat more broadly to determine cost allowances) that accounts for some of the complexities observed in practice which drive variations in smart meter costs (such as different install types). Such a model would need to be endorsed across the industry, and could inform, but would not bind, Ofwat funding decisions. A useful precedent here are common Cost Benefit Analysis (CBA) templates and standard assumption sets used by Ofgem under the RIIO framework for certain types of interventions as well as the latest CBA for energy smart metering in 2019.

Alongside the business case we recommend that a delivery roadmap is established across the sector that merges high-level plans from water companies to show the expected volume of meters that will be rolled out over time by location (e.g. quarterly volumes by region). This will help inform and to manage the expectations of stakeholders (such as Retailers in the NHH market) and customers. It could be further developed to include the timing of any expected sector-wide initiatives, such as marketing campaigns, innovation trials or technical upgrades. As such it will also help inform the supply chain and help identify where there may be risks such as labour shortages. It will also set a baseline to support regular performance reporting (see Recommendation 4.7 below).

Next steps:

We recommend that part of the fund is allocated to delivering the following (starting in parallel with establishing the SDG function – see 4.1):

1. Develop a sector-wide business case.
2. Develop a sector-wide change roadmap.
3. Develop insights and recommendations.
4. Establish governance for a periodic refresh.

4.4 Establish Technical and Operational standards and guidance

Establish a Smart Technical and Operational Working Group.

We recommend that a Smart Technical and Operational Working Group is established (by the SDG) function recommended above (see 4.1) to set technical and operational standards, influence policy, share best practice, find collective solutions to common issues and drive technical innovation. Whilst there have been informal groups formed previously, there has not been an independent, empowered group, with clear terms of reference. Several interviewees felt this made the groups often ineffective.

We recommend this group should be allocated a proportion of the water efficiency budget to commission projects to collate existing insight, carry out new research as required and develop collateral such as Codes of Practice and knowledge sharing guidance.

We would expect all water companies to be invited to have a representative in the group (this might include one person representing several smaller companies if deemed more efficient). We would also expect roles representing stakeholders such as consumers and businesses as well as certain 3rd parties acting as independent experts. The group should engage with members of the supply chain on a regular, structured basis.

To empower the group, we would expect it to have formal, periodic engagement with government and regulators to help inform policies and regulations. We would also expect it to define “Codes of Practice” where required, like those seen in energy, to which water companies are encouraged by the regulator to sign up.

We recommend the working group engages with MOSL and reviews the National Metering Strategy already developed for the NHH market to inform the standards for household smart metering to ensure consistency wherever possible:

The scope and terms of reference would need further work to be agreed, but we would expect the below areas of responsibility to be considered (informed by the use cases and benefit drivers identified in the Industry Wide Business case (see 4.3) and Benefits Enablement Working Group (see 4.5).

- **Establish minimum functional and technical standards for smart metering solutions.** This should be informed by the use case and benefit drivers agreed in the Sector-Wide Business Case (see 4.3) and will provide water companies with a common view of what they require from their smart technology to inform future procurement or changes to existing solutions where feasible. We also expect it to inform the supply chain regarding product development, innovation and performance improvement. This could include the following:

Setting Smart AMI as standard (rather than AMR – other than by limited and justified exception such as in extremely remote areas).

Minimum read and transmission frequency (e.g. reads recorded hourly and transmitted once per day).

Minimum communication success rate (e.g. X% of meters should provide X% of hourly reads within X days within any given month).

Minimum expected operational life of solutions, with targets set for improvements over time.

Technical and security standards (leveraging accreditations, infrastructure principles, and cyber security standards that already exist).

- **Establish an installation Code of Practice to define minimum operational standards for the deployment of smart meters, this may include guidance on the following:**

When meters should be installed externally vs internally.
What data that should be collected before and during the installation process (e.g. precise location data and details of materials surrounding the meter).
How to handle certain install scenarios (such as when an existing boundary box is damaged) to minimise jobs being aborted.
What information should be captured when an installation fails i.e. common reason codes.
What information should be provided to the customer at point of install or within a limited time period.
Support required for customers with certain vulnerabilities.

- **Develop, share and maintain best practice insight into how to tackle common technical and operational issues.** We recommend that the group identifies common issues and then shares knowledge of existing solutions from the experience of the group and engagement with stakeholders. This could include tackling issues such as:

Common causes of installs being cancelled or aborted.	Common causes of meters failing to connect to a comms network.
Common customer experience issues.	Common causes of billing issues related to metering.

- **Identify and recommend opportunities requiring joint-funding to help to de-risk or accelerate the benefits from smart.** We recommend that the Group identifies and prioritise these opportunities in consultation with stakeholders then makes a recommendation for funding (see 4.6).

We recognise that many companies have rolled out significant volumes of smart, but we still believe standards will still valuable as they will provide direction for potential changes to existing solutions as well as future procurements and replacement activities.

Next steps:

We recommend that part of the fund is allocated to delivering the following (starting in parallel with establishing the SDG team – see 4.1):

1. Define the terms of reference and then establish the Working Group.

2. Develop minimum functional, technical and operational standards.

3. Establish the mechanisms for knowledge sharing; capturing and prioritising issues; identifying opportunities to improve outcomes; and recommending initiatives for funding.

4. Convene and facilitate the Working Group on an ongoing basis.

4.5 Establish Benefits Realisation standards and guidance

Establish a Benefit Enablement Working Group.

We recommend that a Benefit Enablement Working Group is established (by the SDG team recommended above, see 4.1) to set standards, influence policy, share best practice and to maximise the benefits from smart metering solutions. We recommend this group should be allocated a proportion of the WEF budget to commission projects to collate existing insight, carry out new research as required and develop collateral such as Codes of Practice and knowledge sharing guidance.

We would expect all water companies to be invited to have a representative in the group (this might include one person representing several smaller companies if deemed more efficient). We would also expect roles representing stakeholders such as consumers and businesses as well as certain 3rd parties acting as independent experts.

To empower the group, we would expect it to have formal, periodic engagement with government and regulatory bodies to help inform policies and regulations. We would also expect it to define "Codes of Practice" where required, like those seen in energy, to which water companies are encouraged by the regulator to sign up.

We believe this should be separate from the Technical and Operational Advisory body (which is focused on helping get effective technical solutions developed, installed and operating) as it needs to focus on how to drive the benefits post-install. This requires a different set of capabilities and expertise focused on how to use smart data to engage consumers and businesses to drive improvements in water efficiency. The two groups would need to interact to ensure alignment.

The remit of the group could potentially be expanded to include all water efficiency initiatives (not just Smart), but this would need careful consideration to ensure prioritised focus on the biggest benefit drivers. The scope and terms of reference need further work to be defined (in conjunction with MOSL who have looked at some of these topics for the NHH market), but we would expect the below areas of responsibility to be considered (informed by the use cases and benefit drivers identified in the Industry Wide Business case – 4.3).

- **Establish minimum standards for the information that water companies must provide customers to help them manage usage** via a Code of Practice, this would need significant further work before being implemented, but it might include the following, for example:

Providing accurate bills;

Providing access to hourly reads online;

Monthly usage statements by email (or quarterly by post);

Comparison of average usage to benchmarks;

Advice on how to save water (which should be tailored where possible based on actual usage patterns);

Common definitions of what constitutes continuous flow or a leak (with levels of severity e.g. high, medium, low);

Specific standards for how to support vulnerable customers.

- **Develop, share and maintain best practice insight** into how best to influence customers to improve water efficiency and to tackle barriers to change. This should be data-led and informed by existing knowledge or new research, but could include, for example,

Insight into what forms of messaging and contact strategies work best to influence behaviour.

Insight into the changes that customers can make that have the largest impact.

Insight into how best to identify, diagnose and communicate customer side leakage and loses.

- Identify and recommend opportunities requiring joint-funding to help to de-risk or accelerate the benefits from smart metering. We recommend that the Group identifies and prioritise these opportunities in consultation with stakeholders then makes a recommendation for funding (see 4.6).

- **Establish a standard customer side leakage Code of Practice** to increase the efficiency and speed of leaks and losses being fixed. The Water Efficiency Lab (WEL) could support this area.

As described in the Findings (see 8.8.2), as smart meters are rolled out there will be an exponential rise in the number of leaks and continuous flows identified. Customers are already supposed to be responsible for fixing issues within their boundary, but different companies have different policies regarding if and when they will carry out a fix for the customer or on how long they give customers to fix the issue and still receive a leak allowance credit. Each company will need to spend time and effort adapting their policies.

A standard approach would avoid duplicative, costly effort and provide consistent expectations for customers across the country. We would expect the Code to result in customers being consistently held responsible for loses inside the property boundary other than by exception (such as customers with certain vulnerabilities) and a standardised time limit on leak allowances.

The Water Efficiency Lab (WEL) could support this area.

The above work will also inform water companies in what business change to undertake to maximise the benefits from smart metering. We also expect it to inform the supply chain regarding product development and performance improvement.

Next steps:

We recommend that part of the fund is allocated to delivering the following (starting in parallel with establishing the SDG team – see 4.1):

1. Define the terms of reference and then establish the Working Group;

2. Establish minimum standards for the information that water companiesmust provide customers to help them manage usage;

3. Establish a standard customer side leakage Code of Practice;

4. Establish the mechanisms for knowledge sharing; capturing and prioritising issues; identifying opportunities to improve outcomes; and recommending initiatives for funding;

5. Identify initial list of opportunities to improve outcomes through data sharing or new initiatives;

6. Convene and facilitate the Working Group on an ongoing basis.

4.6 Invest in new joint-sector solutions

We recommend that the SDG works with the two Working Groups (Benefit Enablement and Technical and Operational groups) to identify where new industry-wide solutions are required to either reduce the cost of smart, or de-risk or accelerate benefits, then facilitate this investment by considering options such as:

Engage the supply chain and encourage them to invest in developing solutions themselves through their product roadmaps.

Recommend that the WEF or Innovation Fund[7] runs a competition for bidders to develop solutions (or inform solutions via research, trials or data sharing).

Consider whether joint investment is required by water companies to develop a solution (as seen in energy with the formation of AltHan[8] to support specific issues).

Examples of the type of solutions that could be explored include:

- Solutions for properties or locations that are difficult / costly to install a meter (such as properties with join supply pipes).
- Solutions for properties or locations that are difficult / costly to connect to a communications network (such as meters in remote areas or in deep pits, under metal lids, inside basements etc).
- Solutions to overcome technical limitations (e.g. battery life issues that limit the life of the meter and ability to send data at a more granular or frequent level).
- Develop insight into how to identify and interpret common flow patterns (e.g. patterns that indicate a leaking toilet can differ from those that indicate a growing leak in a supply pipe) to help inform targeted customer journeys and messaging.
- Develop insight into what messaging is most effective with customers in persuading them to reduce usage or fix a given type of issue – and how this can differ depending on customer segment.
- Explore whether there is an viable case for utilising comms and infrastructure used in the energy sector, such as the WAN and HAN networks.

7 https://www.ofwat.gov.uk/wp-content/uploads/2023/07/Scoping-the-Water-Efficiency-Fund-High-Level-Consultation_Final.pdf

8 Alt Han: An organisation focused on developing solutions to help customers whose 'home area network' (HAN) – the meter, in-home device and communications hub, are too far apart – to connect with one another

Assessing the case for joint-investment in shared communications infrastructure.

A further consideration may be to explore joint procurement of communication infrastructure. As described in our Findings (see 8.3.3) in the energy sector communication infrastructure is procured centrally for the whole sector – this includes provision of a shared communications network as well the Data Communications Company (DCC) through which all meter data flows. Whilst we have not found strong support for the same scale of solution for water, some stakeholders believe that there could be opportunities for some form of joint procurement on behalf of some or all water companies that could save costs. For example, there could be economies of scale from sharing a communication network between adjacent companies.

Whilst the consensus from our interviews was that people considered it too late for this to be undertaken for AMP8 (since most companies have already procured or are in the process of procuring its own communications service), there could be merit in exploring opportunities for the future.

Next steps:

We recommend that part of the fund is allocated to delivering the following (starting in parallel with establishing the SDG team – see 4.1):

1. Establish governance for identifying recommendations (through the two proposed Working Groups) and then seek funding in collaboration with Ofwat and the WEF;

2. Agree initial list for assessment.

4.7 Establish and govern performance reporting

We recommend that standardised reporting is implemented across the sector to help mitigate the risk that planned benefits, install volumes or implementation costs are not achieved. This would require funding up front and then become an ongoing role for the SDG team. As in energy, this would allow relative performance to be compared to anonymised benchmarks, which would help water companies understand where there are opportunities for improvement. This would be combined with coordinated knowledge sharing (see 4.5) to help companies to improve performance.

Further work is required to define the appropriate metrics (leveraging learnings from energy), but we would expect them to include some or all of the below, informed by the industry wide business case (see 4.3) and the minimum standards defined by the two Working Groups (see 4.4 and 4.5):

Installation progress vs plan (split out by various dimensions such as HH / NHH, internal / external, new / replacement etc).

Proportion of meters providing regular reads via an AMI comms network (definition to be confirmed, but should consider minimum standards such as expectation that hourly reads are received next day for X% of days per month).

Proportion of customers with a smart meter that are on a measured charge and proportion of these that were billed on an actual smart read.

For installs requiring appointments, measures of booking success (e.g. appointments generated per customer contacted) and completion rate (e.g. proportion of appointments resulting in a successful install).

End-to-end installation completion rates (i.e. proportion of installs that were successfully completed as planned) with sub measures for each step of the journeys such as proportion of jobs that fail with high level reason e.g. no access).

Number of billing issues, complaints and Guaranteed Standards Scheme payments made related to smart installations (normalised relative to volume of installs).

Standardised water efficiency benefits reporting (smart specific and more granular than existing macro level PCC, business usage and leakage reporting, with standardised definitions), such as:

- Comparing usage in properties with and without smart and before and / after smart installed.
- Proportion of properties with continuous flow identified and also the proportion fixed within a period of time (e.g. after 2 weeks and 6 weeks).
- Comparing usage of home before and after home efficiency visits or other defined interventions.

Next steps:

We recommend that part of the fund is allocated to delivering the following (starting in parallel with establishing the SDG team – see 4.1):

1. Define the metrics, reporting and governance requirements in consultation with stakeholders.
2. Establish the mechanism for gathering the data and producing and publishing the reports.
3. Run a pilot scheme with selected water companies.
4. Implement across the sector.
5. Run a quarterly reporting process.

4.8 Establish and govern data standards and data sharing

We recommend establishing standards and governance for: a) data that water companies are allowed to use to support their own customers; b) data that must be shared for use by other parties and c) data for NHH customers that water Wholesalers must share with Retailers.

Establish common smart meter data standards for how water companies should use data to support their own customers.

We recommend that a Smart Data Usage Code of Practice is established to provide water companies with consistent guidelines for how they should use smart metering data for their own customers, with the aim of maximising benefits whilst remaining compliant with data privacy laws. This will require funding as it will involve consultation, including with other regulatory bodies and, potentially, legal advice.

As noted in the Findings (see 8.5.3) each water company is currently determining its own view of this which is leading to differences in approach and service provision, as well as adding cost and complexity to the smart programmes. A particular concern is whether companies need to seek customer permission to show a customer their own hourly usage or to use it in analysis. If permission is required, then this will reduce the benefits delivered by smart as a proportion of customers will not give permission, which will limit the level of insight available to drive outcomes.

Establish common smart data standards for how water companies must share data with other parties.

We recommend that a level of data sharing from water companies to other parties is enabled to support research, innovation, product development. As outlined in the Findings, there is no common communication infrastructure or data hub currently for water into which all reads flow (unlike in energy) and we are not advocating that one is established at this stage as we do not believe that it is necessary to share granular (e.g. hourly) reads from every meter. Instead, we believe there should be mechanisms to share data extracts for specific purposes.

We recommend that the Benefit Enablement Working Group develops a prioritised list of use cases which would benefit from data sharing across companies. This could include the following, for example:

- Macro level analysis of trends in water use at a national and regional level to inform future campaigns or other interventions.
- Macro level analysis of the impact of smart metering or other initiatives on water efficiency over time.
- Detailed analysis to identify correlations between water efficiency and other variables (from other data sources) such as demographics or property age / type, which could inform customer engagement strategies that can be shared with water companies.
- Targeted analysis to test the effectiveness of trials or initiatives outside the control of water companies (such as compliance with building regulations, new consumer product labelling or new products and services).

We recommend that the data is made available to users for free upon request (including as part of any innovation trials), provided they meet certain governance criteria. The exact data that needs to be shared would need to be defined through the governance process based on the use cases, but enablers need to be put in place in advance to make the data sharing as straightforward as possible. This includes: agreeing common data formats, privacy and cyber security standards, transfer mechanisms and governance.

To support this, we recommend exploring the use of Stream[9], which is led by Northumbrian Water and has members from most water companies. The group aims to standardise the process of publishing data to avoid fragmentation and ensure consistency. The goal is to maximise the trust and transparency of data to drive innovation. Stream takes data use cases and then determines the priority and access through their governance processes, then works collaboratively to determine the most appropriate method to share the data; between either water companies only, with specific third parties, or with anyone that signs up.

9 https://waterinnovation.challenges.org/winners/stream/

Adopt data standards for Non Household data sharing defined by MOSL.

We note that MOSL has already set "Data Standards for Sharing Granular Consumption Data" in the NHH market and we endorse the MOSL recommendations[ref] calling for Wholesalers to share smart metering reads, analysis and services with Retailers on a standardised and regular basis, as this will be essential for driving a reduction in Business Demand.

Next steps:

We recommend that part of the fund is allocated to delivering the following:

1. Develop a Smart Data Usage Code of Practice defining how data can be used by water companies (as a priority) and then how it can be shared with others, in consultation with stakeholders including MOSL;

2. Working sessions with Stream to determine suitability for supporting data sharing;

3. Develop a prioritised list of data sharing opportunities in conjunction with the Technical and Benefit Enablement Working Groups;

4. Identify subsequent work and resourcing required.

4.9 Enable smart tariffs and incentives

We recommend that some of the fund is used to research into the effectiveness of different smart enabled tariffs and incentives at driving water efficiency. Some trials and research have already been conducted and more is planned for the future, but they are not joined up so there is an opportunity to collate the findings and potentially commission additional research for the benefit of the whole sector. For example, this could include looking at the effectiveness of:

Time of Use tariffs that charge customers more for using water when it is more scarce (e.g. summer months or during hose pipe bans) and less at other times.

Rising block tariffs that charge customers more when they use a volume of water above a certain threshold in a given time period, e.g. annualised, daily.

Demand side response credits given to customers who reduce water demand below a baseline during periods of acute scarcity (such as when hosepipe bans might be put in place).

Giving customers a credit if they reduce usage by a certain amount.

Giving customers a credit if they move on to a measured charge in the first place.

The findings of this research could result either in recommendations that water companies can choose to act upon, or potentially in regulatory intervention to enable the benefits.

Next steps:

We recommend that part of the fund is allocated to delivering the following:

1. Commission a project to collate existing information about potential tariffs and incentive schemes from water companies based on their past experience and research or future plans.

2. Assess options, develop a short list and suggested next steps (which may range from simply making recommendations to water companies, to funding new research or trials, to recommending that Ofwat consults on regulatory or license changes).

4.10 Consider enabling alternative investment approaches to accelerate the roll-out

As described in the Findings (see 8.10.2) a limiting factor to realising the water efficiency benefits of smart is the budget allocated to smart in AMP8, which, whilst a significant increase on AMP7, will still only result in c. 30% of meters being AMI smart by 2030. We recognise the Water Resource Management Plans have been agreed, but to de-risk or accelerate benefits without increasing AMP8 budgets we recommend that water companies and Ofwat explore the opportunity to increase smart metering penetration in AMP8 through the use of alternative investment models. This study could potentially be a project funded by the WEF.

Water companies could explore alternative financing and commercial arrangements, whereby the costs are spread over a longer period of time without impacting spend or bill levels within the AMP. The Meter Asset Provider (MAP) model in energy is one way in which this could potentially be achieved, but there may be other financing options that could be explored. Whilst one water company said they were exploring this approach, many had not considered it at all, whilst others had briefly considered it but were not clear on how it could work. We believe an Ofwat backed project to explore the options would encourage uptake.

We do note, however, that supply chain constraints may limit the scale of deployment in the earlier years of AMP8 so any acceleration should be phased appropriately. We also acknowledge that for some companies there may be additional costs associated with a faster roll out, for example earlier depreciation of some exiting assets or the need to ramp up and down internal workforces.

Next steps:

We have identified two options for this recommendation.

Option 1: Ofwat encourages water companies to propose alternative approaches that would enable them to deliver more smart meters in AMP8 and assess them through the PR24 process;

Option 2: Ofwat (or the Water Efficiency Fund) commissions a piece of work to identify financial barriers to increasing the scale and pace of the roll out and assesses options for addressing these barriers, such as alternative funding models.

4.11 Enable compulsory measured charging nationwide

We recommend enabling compulsory measured charging nationwide, including areas not yet deemed scarce. Currently, in non water scarce areas, water companies are allowed to fit a meter, but not to move the customer on to a measured charge without consent. Whilst these areas are a lower priority, this is a barrier to engagement and makes it less economical to justify metering. Removing this constraint would allow water companies in those areas to install meters and move customers to a metered charge without permission (but with a transition period). This will enable meter penetration levels to increase and a more efficient roll out as company can install street by street.

We recognise that this has previously been ruled out via consultation, but we also note that the since the 2019 consultation, new information about the water supply-demand gap has been shared and targets set to encourage water efficiency. In March 2024, at the Waterwise conference, the chair of the EA stated that he thought "all parts of the country should have a compulsory meter, not just those areas classified as water-stressed" and that "water metering is key to being water efficient."[10]

We note that Ofwat regulates the water industry in England and Wales, but that water policy is devolved across the UK. The devolved administration in Wales would need to decide the best approach regarding the introduction of compulsory measured charging in Wales.

Next steps:

We recommend the following:

1. The government determines the easiest and quickest way to remove the restriction and then implements the change.

10 https://utilityweek.co.uk/environment-agency-chair-backs-compulsory-water-metering-and-more-hosepipe-bans/

4.12 Assess and mitigate supply chain risks

As described in the Findings section later (see 8.4.3) there is a risk that supply chain constraints (both manufacturing capacity and labour market capacity) could result in target volumes, costs and benefits not being achieved in the early years of the roll out. This is because demand will increase significantly at the start of AMP8, which could lead to shortages and / or price and wage inflation as was seen at the start of the smart energy roll-out. This is compounded by the fact that water companies will not have certainty of their budgets until a few months before AMP8 and is further exacerbated by the expected increase in demand for installation skills across other sectors at the same time.[11]

We recognise that there may be a limit to see what can be done at this relatively late stage ahead of AMP8, given water companies have already committed to roll-out plans through the WRMP and PR24 submissions and that they are each procuring separate contracts for assets and installations. However, we have identified two options that may help mitigate this risk:

- **Option 1**: Ofwat, through the PR24 process, to encourage water companies to revisit their roll out plans to determine if their year 1 targets, in particular, are realistic (i.e. can be supported by the supply chain) and to explore whether a rephasing may be prudent (whilst looking to 'catch up' in the middle years to protect benefits).
- **Option 2**: Ofwat to commission an urgent study (possibly funded by the WEF) to assess the supply chain risks for smart and identify any mitigating actions This study could include the following activities:

Develop a combined view of all smart metering plans across the sector to identify the volume of installs planned by type, per region for the first years of the AMP.

Translate plans into an estimate of the assets and workforce levels required.

Develop a forecast of the forecast capacity available (based on information from water companies that have already secured capacity and from 3rd parties on their plans).

Identify options to mitigate shortfall risks, for example, sharing resources or joint-investment in recruitment and training.

In the meantime, we recommend that water companies secure contracts as soon as possible, accepting that they may need to make commitments for year 1 of AMP8 prior to budgets being agreed through the PR24 process.

Next Steps

1. Determine whether to accept the recommendation and whether to follow option 1 or 2.

11 This includes labour required to install energy smart meters (and replace existing comms hubs), EV chargers and heat pumps in the energy sector

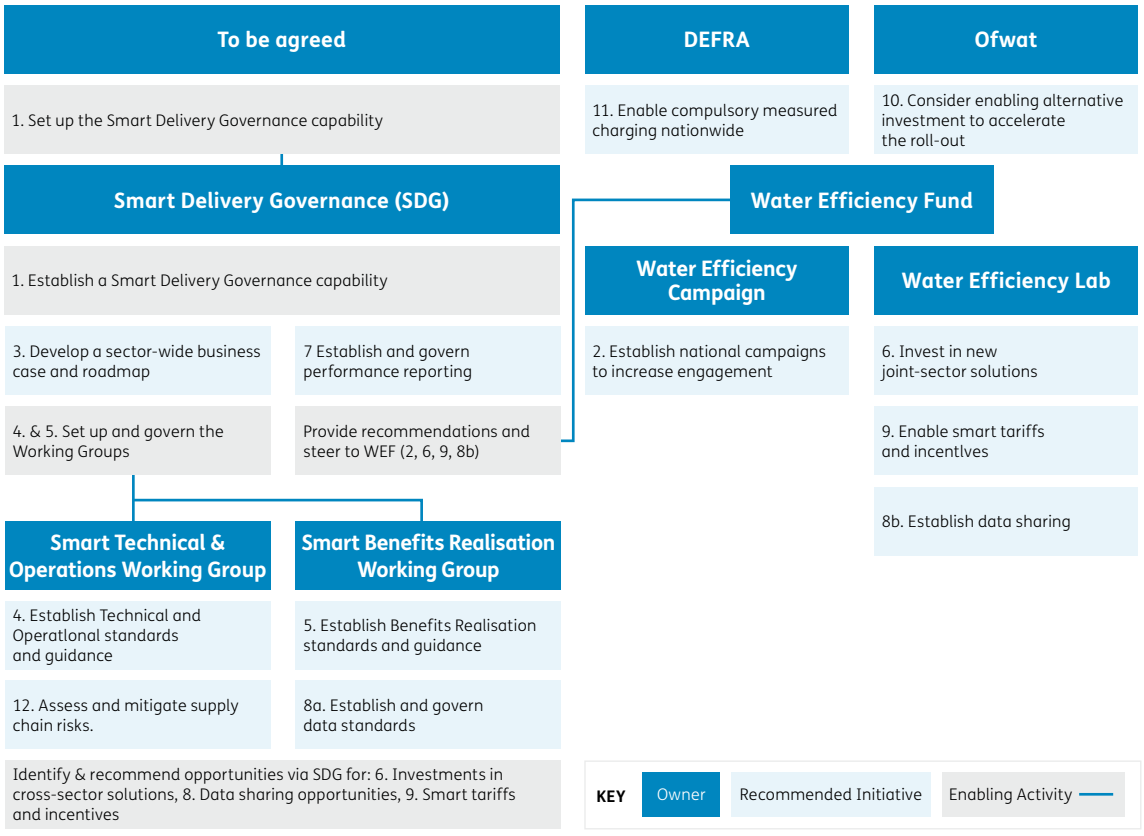
Enabling the recommendations

5. Enabling the recommendations

5.1 Ownership and governance of the recommended initiatives

The below diagram illustrates a potential governance model for the ownership and delivery of the recommended initiatives, although we recommend further work to confirm the best approach, including, crucially, how to fund each initiative.

FIGURE 3



5.2 Sequencing of initiatives

Ideally all the recommendations would be implemented as soon as possible given that smart deployment is already underway for many and procurement decisions are imminent for others. However, we recognise that this may be impractical, so we have drafted an indicative implementation plan below.

We would expect most initiatives to require additional resourcing and specialist support to set them up, before being run by the relevant Owner as listed.

FIGURE 4

Owner	H2 2024	H1 2025	H2 2025	2026+
To Be Agreed	Enable 1. Set up smart delivery governance capability	11. Enable compulsory measured charging nationwide		
	10. Enable alternative investment approaches to accelerate the roll-out			
Smart Delivery Governance Team	1. Establish a smart delivery governance capability	7. Establish and govern performace reporting	Provide recommendations and steer to WEF (2, 6, 9, 8b)	
	3. Develop a sector-wide business case and roadmap			
	Set up and govern the Working Groups (4 & 5)			
Smart Technical & Ops Working Group	12. Assess and mitigate supply chain risks	4. Establish Technical and Operational standards and guidance	Identify & recommend opportunities via SDG for: 6 Investments in cross-sector solutions, 8. Data sharing opportunities, 9. Smart tariffs and incentives	
Benefits Realisation Working Group		5. Establish Benefits Realisation standards and guidance	4 & 5, Develop, share and maintain best practice insight and codes of practice	
		8a. Establish and govern data standards		
Water Efficiency Fund			2. Establish national campaigns to increase engagement	8b. Establish data sharing capability
				9. Enable smart tariffs and incentives
				6. Invest in new joint-sector solutions

KEY: Recommended Initiative; Enabling Activity

5.3 Next steps

If these recommendations are to be taken forwards, there will need to be a further phase of work to define them in more detail, establish the terms of reference, estimated costs, funding paths and delivery mechanisms. We recommend that Ofwat works with other stakeholders such as Defra and the Environment Agency in the first instance to determine the appropriate next steps.

Appendix

6. Appendix A: Context and background

6.1 Why is water efficiency required?

A predicted 5,000 ML/d[12] supply-demand gap is driving the urgency of water efficiency measures.

In October 2023, the National Infrastructure Commission (NIC) released their national infrastructure assessment. This report identified that without any action, by 2050, there will be an estimated water supply gap of at least 4,000 megalitres per day (Ml/d).[13] This gap is driven by the need to reduce unsustainable abstraction, increase resilience to drought, supply a growing population and adapt to the impacts of climate change.

The NIC outlined how to close this gap via:

- 1,300 Ml/d from new supply and transfer infrastructure (e.g. reservoirs).
- 1,400 Ml/d from halving leakage in line with industry commitments.
- 1,400 Ml/d from reducing demand through measures such as smart meters and raising public awareness.

In 2024, the EA highlighted the gap had increased from 4,000 Ml/d as predicted in 2023 to 5,000 Ml/d by 2050 and prompted the EA to "call for a halt to dumb meter installation".[14]

In the high-level consultation on the Water Efficiency Fund, Ofwat outlines that "water companies currently put around 15,000 million litres of water into supply per day in England and 942 million litres per day in Wales. Of this, around 56% is used in residential properties with just over 18% used by business customers (including retail, offices, schools and hospitals) and a similar volume lost through leaks. The remainder is other uses such as operational use and water taken unbilled."[15]

12 https://www.gov.uk/government/publications/a-review-of-englands-draft-regional-and-water-resources-management-plans/a-summary-of-englands-draft-regional-and-water-resources-management-plans#:~:text=These%20plans%20include%20adopting%20a,to%20strategic%20water%20resources%20planning.

13 https://nic.org.uk/studies-reports/national-infrastructure-assessment/second-nia/#tab-resilience

14 https://www.thewaterreport.co.uk/single-post/ea-calls-for-halt-to-dumb-meter-installation-as-supply-gap-reaches-5bn-litres-a-day-by-2050

15 Scoping-the-Water-Efficiency-Fund-High-Level-Consultation_Final.pdf (ofwat.gov.uk)

Targets have been set that water companies are planning and working to.

Water companies have been given targets to reduce the gap between demand and supply:

- The UK Government's Environmental Improvement Plan set out a target in the Environmental Targets (Water) (England) Regulations 2023[16] for the reduction of potable water supplied by water undertakers in England to people in England. The target for 31 March 2038 is:
  - A 37% reduction in leakage.
  - Per capita consumption (PCC) reduction to 122 litres per person per day (from current level of 145 litres).
  - A 9% reduction in non-household (NHH) consumption.
- Ofwat expects all companies to meet long term water demand targets including[17]:
  - A 50% reduction in leakage by 2050 from 2017-18 levels.
  - Reducing per capita consumption (PCC) to 110 litres per head per day (l/h/d) by 2050.

If targets are not hit, the impact will be felt by the environment and customers alike.

There have been gradual changes in societal expectation over time, which mean society now expects good quality water to be available immediately and in sufficient amounts for people, businesses and the environment. The impact of not reducing the supply-demand gap sufficiently will be felt by all living things. With less secure water supplies, the risk of water restrictions (i.e. hose pipe bans, time of use bans such as in drought hit areas today) will increase and the cost of water may increase substantially if new alternative sources of water are needed at speed. The environment would also suffer if companies abstracted more water from rivers, impacting the amount and quality of the natural habitat required for species to thrive.

Taking urgent action now will reduce the risk of negatively impacting consumers and the environment.

Water companies are putting forward significant programmes to manage demand.

In their PR24 (Price Review 2024) plans, water companies have outlined the activities they plan to manage demand reduction over the coming years. Plans include new metering activity as well as activity to improve water efficiency such as provision of water efficiency advice (via home visits) and installation of water efficient fittings and appliances. Water companies are also starting to explore incentives to encourage reduced water consumption via new tariff structures.

16 Environmental Improvement Plan (publishing.service.gov.uk)

17 https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_Appendix_7_Performance_commitments.pdf

In AMP7 (2020 – 2025) some companies are already moving to introduce Smart Meters (defined in this report as meaning Advanced Metering Infrastructure. However, AMP8 (2025-2030) will see a significant increase in the numbers of companies that are moving to full Smart Metering at scale for both household and non-household customers: this involves a combination of replacing existing non-smart meters and installing smart meters at premises that currently have no meter.

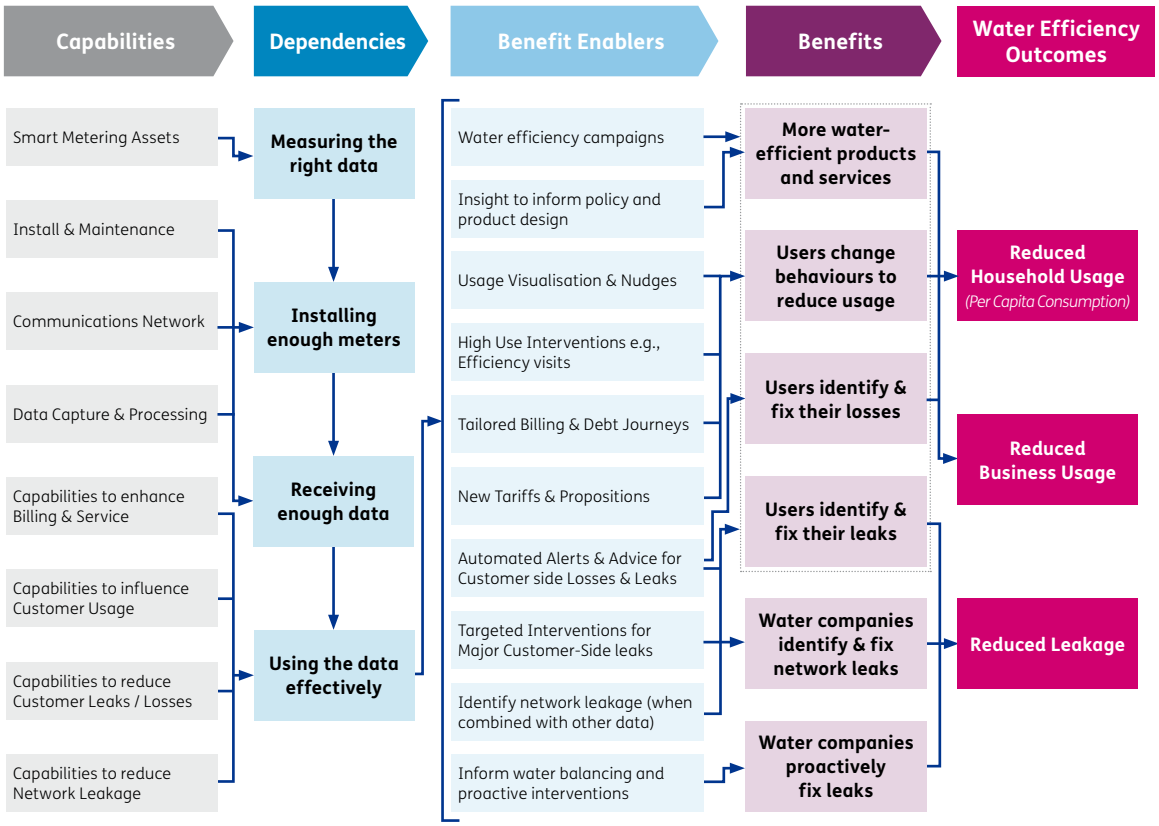
7. Appendix B: Benefits of Smart Water Metering

Improving water efficiency ultimately reduces the financial and environmental cost of having to produce, treat, store and transport more water. Water companies can use granular consumption data to drive their water efficiency outcomes:

- **Reduced household usage (per capita consumption):** by identifying and notifying customers of losses (such as continuously flowing toilets or taps), by giving customers access to their data and advice to help them manage their consumption and bills, encouraging and incentivising water efficient behaviours, and offering water efficient products and services.
- **Reduced Business Usage:** working collaboratively between water wholesalers, water retailers, and non-household customers to share data and offer water efficient products and services to support more efficient water consumption.
- **Reduced Leakage:** Water companies can use the data provided by Smart Meters to help identify and then fix more leaks, more quickly, both on the customer's side (typically the supply pipe) and on their side (the Network), in combination with other data. Using the granular data can also aid preventative techniques to minimise future leaks.

The following diagram outlines the capabilities, dependencies, benefit enablers, benefits and water efficiency outcomes that are impacted by smart metering in water.

FIGURE 5 SMART BENEFIT TREE



For Non-Households these may be delivered via wholesalers and/or retailers

Benefits of smart metering extend beyond water efficiency benefits.

The scope of this report (and therefore of this section) is on water efficiency benefits on the customer side of the meter, however there are wider benefits such as:[18]

- **Network management** – using smart meter data with other data sources to improve network-side leakage and network management.
- **Customer experience** – enabling a better experience for consumers (e.g. providing more accurate bills and smoother home move journeys).
- **Operational improvements** – enabling operational efficiencies (e.g. avoiding manual meter reading, fewer high bill queries, data-led identification of void properties).

The benefits of smart metering have been evidenced by key studies.

Before many water companies set out on their smart metering journeys, they anchored their potential benefits on published studies:

- 2008: The Environment Agency's Science Report into the costs and benefits of moving to full water metering, used a 10% consumption reduction assumption (citing findings from the 1993 National Metering Trials, alongside wider evidence from the sector for both compulsory and optant metering).[19]
- 2017: Ornaghi and Tonin[20] reported demand reductions of 16-20% from Southern Water's Universal Metering Programme from 2010 to 2016.
- 2018: The National Infrastructure Commission[21] highlighted that standard meters can reduce average consumption by 15% and smart meters by 17%, supported by a combination of studies on metered consumption, and evidence supplied from water companies.
- 2021: The Frontier Economics and Artesia report[22], supported by Arqiva, on the cost benefit analysis of water smart metering suggested a 12% reduction from unmeasured to dumb/AMR meter, and a further 5% reduction from dumb/AMR meter to Smart Meter, supported by evidence supplied by water companies.

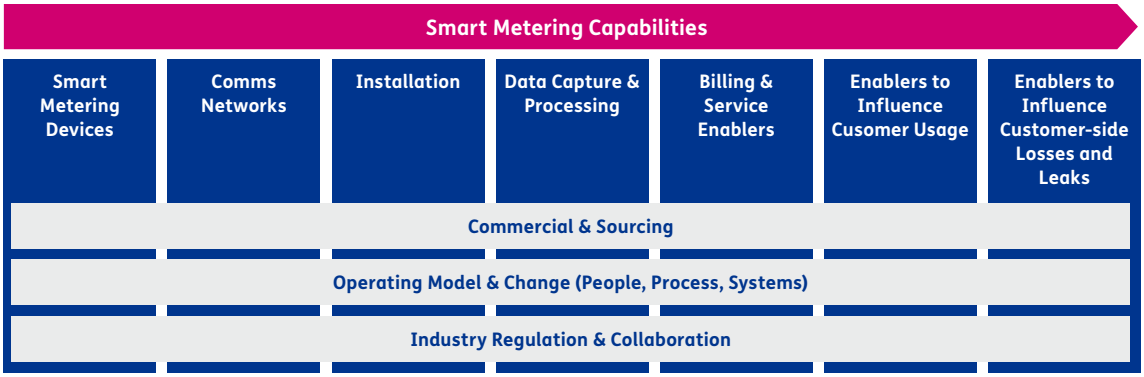
The most recent study shows that consumption can be reduced by up to 17% when moving from unmeasured to a smart meter.

18 https://ukwir.org/water-industry-technical-report?object=339f756e-c3aa-4cc1-8449-1d54e51c61c3
19 https://assets.publishing.service.gov.uk/media/5a7c5895ed915d338141e345/scho0508bobn-e-e.pdf
20 https://database.waterwise.org.uk/wp-content/uploads/2019/09/The-Effect-of-Metering-on-Water-Consumption_June2017.pdf
21 https://nic.org.uk/app/uploads/NIC-Preparing-for-a-Drier-Future-26-April-2018.pdf
22 https://www.frontier-economics.com/media/we4lon3z/arqiva-cost-benefit-analysis-a4-full-report.pdf

8. Appendix C: Lessons and findings from energy and water

In order to provide a framework for conducting literature reviews, interview and round tables (see Appendix E) in a consistent manner, and to ensure lessons were captured across end-to-end smart metering activities, Baringa leveraged own experience to develop the Smart Metering Capabilities Framework (below). This allowed each area to be reviewed in depth, as follows in the respective finding sections below.

FIGURE 6 SMART METERING CAPABILITIES FRAMEWORK



8.1 Commercial and Sourcing

8.1.1. Lessons from Energy Smart Metering

In the early stages of the energy smart metering rollout there was a rush to secure supply chain capacity, which led to inefficiencies.

Interviewees from energy suppliers all agreed that the early stages of the smart roll-out in energy could have been more cost efficient had there been a more phased ramp up. They reported that due to the challenging targets, it became a 'battleground' to secure both limited manufacturing capacity and meter installers from a limited labour market. They said that many suppliers overbought stock and the surge in demand drove asset prices up. Similarly, they were competing for meter installers, and they believe this inflated labour costs and potentially impacted the quality of installs, due to rushing to meet targets.

On the other hand, they said this also led to a greater diversification and resilience in their supply chain. For example, when there was a semiconductor shortage in 2022, some suppliers said the impact was not as significant as it might have been.

Smart metering in energy is financed by Meter Asset Providers, which enables switching and spreads costs.

In the Energy sector, a MAP model was introduced to finance the purchase and installation of smart meters. MAPs own the meter asset and rent them to whichever energy retailer is supplying that meter point at any given time. This approach removes a barrier to competition as customers can switch energy retailer without the meter assets needing to be transferred or replaced. This model also allowed energy suppliers to roll out meters at scale without taking on additional debt through "the use of alternative financing, e.g. non-recourse finance (typical for large-scale infrastructure investments."[23] This approach reduced the initial impact on customer bills that could otherwise have occurred due to the up-front investment required. Interviewees observed that the cost of financing available to the MAPs was typically lower than it would have been for energy companies but that this may not be the case for water companies in the current climate.

Some interviewees from the Energy sector noted that the existence of MAPs provided greater economies of scale and commercial leverage with the supply chain than individual energy companies might otherwise have had. MAPs would purchase on behalf of multiple companies and would also often have a global presence that gave them even greater buying power. Some noted that this meant that they were able to work with the supply chain to drive down the cost of meters significantly over time.

Interviewees also observed that MAPs brought a high level of rigor in the form of due diligence on meter assets – doing extensive and forensic analysis and testing of technology that improved quality (e.g. reduced technical failures) and also drove improvements in the longevity and functionality of meters. It was noted by MAPs that some meter manufacturers in the water sector appear to have notably lower levels of maturity in terms of technical due diligence than those in the energy sector.

However, other interviewees also noted that MAPs have extracted a significant amount of value from GB energy consumers (with up to one third of lifetime costs covering the financing costs), which has not been transparent or regulated. They also noted that energy companies that have had access to sufficient finance at low cost have set up their own MAP businesses instead, such as Scottish Power, EON and British Gas).

Common challenges have been addressed via collective sector procurement of shared infrastructure and services.

In the Energy sector, the DCC (Data Communications Company) was established by government (but funded though energy bills via energy suppliers) to procure contracts with service providers to establish a common set of communications networks that all meters would use. It also set up a set of central industry systems and operations that would collect the data from the meters and disseminate it to the relevant energy retailer. Key reasons for this approach were to ensure interoperability when switching and to help achieve high levels of cyber-security given that energy meters can remotely control supply (unlike water meters) which could pose a threat to critical national infrastructure.

Whilst there were mixed views expressed about how successful energy had been at establishing an efficient industry-wide set of solutions, energy interviewees expressed surprise

23 https://publications.parliament.uk/pa/cm201719/cmpublic/smartmeters/memo/smb09.pdf

that water companies were each procuring communications solutions separately rather than leveraging potential economies of scale. They also noted that at the geographical boundary of two companies there could be duplication of infrastructure from different providers. They recognised one of the drivers for a collective solution – to facilitate switching – was not a feature of the water market currently (as meters are owned by the regional wholesaler, even in the competitive NHH market).

Other examples of collective investments for the sector include the establishment of the not-for-profit entities Smart Energy GB and AltHan Co. The former was set up to promote smart energy metering in general, through campaigns and collaboration. AltHan Co was established to procure solutions for connecting hard to reach meters (see Communication Networks section). These entities were established as it was deemed a more cost-effective method of tackling collective challenges than each retailer working to find their own individual solutions.

The focus on meeting installation targets meant that there was less focus on end outcomes than there might have been.

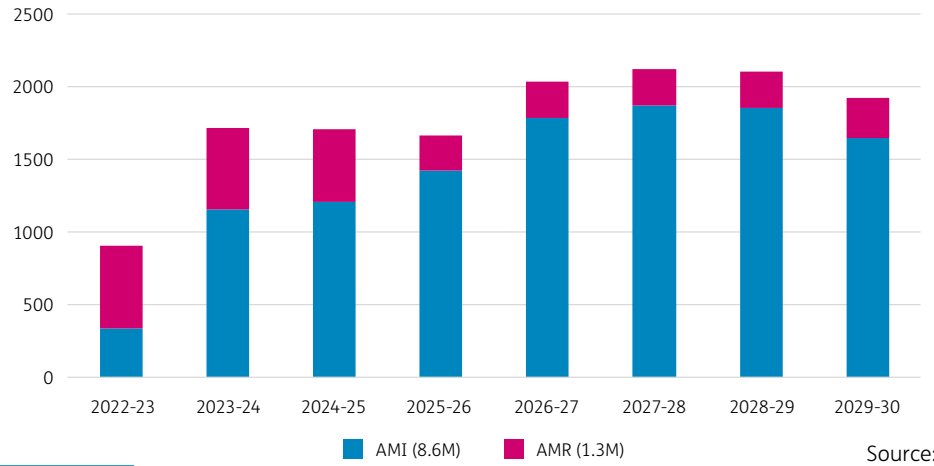
Interviewees from Energy suppliers noted that the overwhelming focus through most of the roll out to date has been on meeting regulatory obligations to achieve installation targets. It is our observation that this meant commercially and operationally there was less of an "outcome focus" than there might have been if, for example, commercial incentives had been more orientated to both ensuring ongoing quality of data and then using this data to drive down consumption.

8.1.2. Lessons from Water Smart Metering

Water companies are concerned about supply chain capacity in the early years of AMP8.

Several interviewees from water raised concerns about supply chain constraints in the early years of AMP8 as most companies will be seeking to secure capacity at a similar time and a significant increase in the number of meters that need to be bought and installed (from around 2.5 million AMI installs over the 5 years of AMP7 to around 2m per year in AMP8). This is an average of 41,000 installs a week[24] (combined household and non-household). They also noted that the relatively recent global chip shortage has had an impact on capacity in recent years.

FIGURE 7 TOTAL PLANNED AMI AND AMR METERS IN AMP 8



Source: PR24 Data Tables

24 PR24 Data Tables

Interviewees from the meter providers believe that the capacity can be met, but noted there is a lead time and expressed concern that some suppliers may not commit to order volumes until Ofwat makes its Final Determination on water companies' business plans, which is due in December 2024, only 3 months before the start of AMP8. Interviewees from the installer supply chain also noted that there could be challenges in ramping up a sufficiently large, appropriately skilled workforce fast enough to meet the volumes of installs planned.

Some water companies are seeking a "data as a service" model to align commercial incentives to target outcomes.

There are different commercial and sourcing approaches being taken by water companies. The typical commercial and sourcing approach to date in Water smart metering has been to contract separately with at least one meter provider, comms providers and install provider (i.e. similar to Energy). There have been some challenges with this approach, for example, providing guaranteed volumes of work for installers in one contract can lead to penalties if the volume cannot be achieved due to a shortage of meter stock procured under a separate contract. Another example noted in one interview was a risk that under one contract a communications provider could be incentivised to configure their network to improve connectivity in a way that reduces the battery life of a meter procured under a separate contract.

Interviewees from the supply chain observed that some water companies are procuring on very restrictive requirements, but without being clear on the outcomes they are seeking to achieve, so they encouraged water companies to be much more outcome-orientated in the way they procure. Some advocated assessing solutions on a cost-per-read basis as they believe it would be a more effective measure for assessing costs of outcomes. Others recommended aligning warranties and terms between suppliers, such as expected retrospective action required, to reduce disputes that cause delays in fixing meters, which then negatively impacts benefits.

In response to these risks, some water companies are now seeking a "data as a service" model, requiring a prime contractor to bundle multiple services under one contract orientated to delivering the outcomes required i.e. to get read data that can be used to drive benefits. Some are only bundling meter and comms together with installation separate (e.g. Thames Water in October 2023 launched a tender for Smart Meters[25], NB-Iota Radio Modules (LCE) and associated Head End System), but some are bundling all three (e.g. Yorkshire Water's tender launched in October 2023 proposed a primary award with one party or multiple-entity parties to deliver a scope of services including Network Provision, Supply of Smart Meters, and Install, Exchange, and Maintenance).[26] This should help align incentives to ensure that the meter, comms and install providers are all working with the Water company towards a common goal, i.e. to get the right data at the right time throughout the life of the meter.

One water company said it was seeking an "Alternative Metering Service" provider that finances & operates assets, similar to the Meter Asset Provider (MAP) model used in Energy.

One water company that was interviewed stated that it will be seeking a financed data-as-a-service model (which it calls an "Alternative Metering Service"). In this model, a service provider would finance, own, install and operate the assets (partnering with manufacturers, comms networks and installers), to provide this service to the water company. They believe this model would offer better value for money for customers, citing reasons such as:

25 https://bidstats.uk/tenders/2023/W27/802160795
26 https://bidstats.uk/tenders/2023/W41/808452451

- The interested financing parties in this model able to bring economies of scale and rigour, having invested in due diligence functions to promote technical assurance (meter life) and quality (Supply Chain Assurance).
- A "whole project" approach means they can optimise technology and other choices over the long term (e.g. which may enable optimisation of install pace).
- It takes an outcome-focused approach, by paying only if data is received to the standard required, over a given time, giving greater commercial leverage over outcomes.

8.1.3. Findings

There is a risk to benefits that install targets will not be met in the early years of AMP8 due to supply chain constraints and a cost efficiency risk that prices may increase due to high demand.

This risk is due to several factors including:

- The Price Review process drives a common starting point for new business plans and investments, so all water companies will be ramping up at the same time which is a very similar situation to the start of the Energy roll-out (when prices inflated due to demand exceeding supply).
- The lead time to develop supply chain capacity (hardware and labour) given that many companies will not have committed to volumes until shortly before the start of AMP8.
- Several Water companies have not yet developed their internal capability to handle the scale required to meet their very ambitious year 1 targets.

There is a cost efficiency risk due to each water company procuring separately and with different requirements, limiting economies of scale.

This risk is due to several factors including:

- There is no collective procurement of comms infrastructure as there was in Energy.
- Each Water company is procuring meters in relatively small volumes in what is a global supply chain, in contrast to Energy where the existence of MAPs (and common specifications) enabled greater economies of scale.

There is a benefit risk that some companies may not have the commercial models, or capabilities, to drive the optimal outcomes from the supply chain partners.

This risk is due to several factors including:

- Some companies are contracting on an "input" basis i.e. pay for an asset, rent communications, pay for an install, rather than an "outcome" basis e.g. "pay per read".
- This may also lead them to make decisions based on input costs, rather than value of output e.g. buying a cheaper solution that does not provide the reliable data required to drive the benefits.
- Separate contracts may result in misaligned incentives between meter providers, comms providers, installers and the water company itself.
- Water companies may lack the commercial leverage to drive the supply chain to improve quality and capability.

There is risk to cost efficiency if common challenges are not tackled through investments in joint-sector solutions, rather than each water company having to solve them individually.

This risk is due to several factors including:

- Unlike in Energy with the DCC and AltHan, there is no joint procurement of comms infrastructure or solutions for harder to reach meters.
- Unlike in Energy with Smart Energy GB, there is no central entity to carry out marketing / information campaigns to help customers understand the need for Smart metering in water and the benefits it can bring. Each individual water company would need to fund its own initiatives.

There is a potential opportunity to accelerate benefits by rolling out higher volumes more quickly through leveraging an alternative financing model to smooth the impact on bills.

- The volume of AMI meters that will be replaced or newly installed in AMP8 represents only c. 30% of Household supply points (measured and unmeasured) and a peak of 40-50k installs per week (compared to 90-100k per week being achieved in energy). Notwithstanding the challenge of supply chain constraints (assets and labour), a limiting factor for this volume is the ability of Water companies to both fund more meters and limit the impact on customers' bills.

8.1.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.1 Establish a smart delivery governance capability.
- 4.2 Establish national campaigns to increase engagement.
- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.10 Consider enabling alternative investment approaches to accelerate the roll-out.
- 4.12 Assess and mitigate supply chain risks.

8.2 Smart Metering Devices

8.2.1. Lessons from Energy Smart Metering

Common standards, based on a centrally developed business case, have been key to driving benefits from Smart metering.

In 2012 a standard for minimum common functionality, known as SMETS1 (Smart Metering Technical Standards), was defined for energy smart meters.[27] SMETS1 was followed by SMETS2 in 2013, to ensure a device compatible with the DCC telecommunications infrastructure.

27 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

In their 2019 Cost Benefit Assessment, the Department for Energy Security and Net Zero (DESNZ, although it was BEIS at the time) stated that the Government intervened to protect the interests of consumers in the smart meter roll out. DESNZ highlighted that without the technical standards in energy, it would have been more likely that there would have been "a proliferation of standards and functionality of smart metering equipment, with a focus on securing supplier benefits over those to the consumer or wider energy system."[28]

Standardised functionality was therefore defined to support the use cases that underpinned the government's central business case for smart metering (whilst allowing energy companies to compete on different propositions, products, services and tariffs enabled by the core functionality). This functionality included the following for Smart electricity meters:

FIGURE 8: ELECTRIC SMART METER FUNCTIONALITY

Electric Smart Meter Functionality	
Common protocols	Ability to transmit data from the meters automatically via a common communications network that was procured centrally for use by all energy suppliers.
Reads and registers	Ability to record consumption at a high frequency (e.g. half hourly intervals). This allows high flexibility in pricing and the potential for innovative products such as Time of Use tariffs.
Meter mode	Smart meters can be operated in both prepayment and credit modes and can be switched between them. This facilitates significant consumer flexibility in how they buy energy and reduced costs of operation, as suppliers do not need to exchange the meter when customers switch from one payment method to another.
Remote control	Smart meters can be remotely controlled, which allows changes to read frequency and payment method or to disconnect a meter e.g. if a property is vacant.
Alarms and alerts	The meter provides a range of alarms and alerts to the supplier e.g. to monitor if a prepayment consumer is self-disconnecting (and therefore may need support) or if a meter has been tampered with (suggesting possible energy theft).
Security	The meter and surrounding infrastructure are critical national infrastructure and as such is highly secure protecting against cyber threats to the energy system.

Interoperability has enabled competition and additional use cases.

The introduction of SMETS2 specifications and set up of the DCC infrastructure, enabled reads to pass from the meter to the relevant supplier. This was critical to enable consumers to switch energy retailers. Prior to this, the SMETS1 standards allowed energy companies to buy systems that met the overall benefits and requirements but left the market to solve interoperability. As it became clear market was not going to make SMETS1 interoperable, BEIS (the department for Business, Energy and Industrial Strategy) introduced the Enrolment and Adoption programme

28 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

asking DCC to move SMETS1 into national common system. It was noted that for water (where the wholesaler owns the meters in both the Household and Non-Household market), the equivalent of SMETS1 could be sufficient, but data sharing in some form is still likely to be required.

Another key consideration regarding interoperability is communication technology: this is covered later in the '8.3 Communications Networks' section.

Common standards have enabled economies of scale and a more efficient roll-out.

A further benefit of the technical standards according to DESNZ, was the economies of scale achievable in the supply chain. Without government intervention, there was "a risk that the roll-out could have been slower, more expensive and less secure, as it is unlikely all suppliers would have rolled out smart meters at the same time or to the same specifications, resulting in lower economies of scale for meter manufacturers and higher average costs."[29]

The right balance is needed to avoid over-specification that can lead to complexity or risk stifling innovation.

Several energy interviewees believe that SMETS standards are overly prescriptive in places, and this has led to complexity and costs that might have been avoided. However, they agreed that some level of standardisation had been essential. Supply Chain interviewees raised a similar concern and said that more consultation would have been beneficial, but they also noted that in water the absence of common standards has been even worse, as each water company is asking for slightly different requirements in their tenders and some are being so prescriptive as to exclude several potential bids.

8.2.2. Lessons from Water Smart Metering

An absence of technical standards and no common set of use cases or business case assumptions has led to a proliferation of requirements.

There are no common standards in Water for Smart Metering asset functionality or configuration. Interviewees from the energy sector were surprised by this and stated they would have expected some level of standardisation (albeit they cautioned against excessive specifications). Interviewees from the supply chain also noted that this was not a helpful situation as each company had different requirements in each tender document. Water companies noted that they had found it difficult to determine what the right specifications were for their needs and expressed frustration that they were each having to do this in isolation.

Interviewees, particularly from the supply chain, also noted that even more fundamentally there was no common set of use cases or clarity on benefit drivers to inform requirements or their product roadmaps (unlike in Energy). They believe this will result in different water companies achieving different levels of benefits and different customers receiving a different service depending on where they live (e.g. a customer with one water company may have more insight available to them to help reduce leaks and bills than someone nearby across the boundary with another water company).

29 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

Lack of clarity over which communication functionality is deemed "Smart".

Automated Meter Reading devices (AMR Meters) rely on a person or vehicle to drive or pass-by in close proximity to be read. Advanced Metering Infrastructure devices (AMI Meters) automatically transmit data over a communication network. As a result, AMR meters cannot, practically speaking, provide as granular or timely information as AMI meters. For example, one water company collected monthly reads from its AMR meters but with a 6 to 12 month delay due to only passing-by once or twice per year, whilst another collects a read every 2-4 weeks, but with no set frequency between reads. In contrast most AMI meters in Water collect hourly reads that are transmitted for use the next day.

Despite these significant differences, both AMR and AMI meters are often deemed to be "Smart". Ofwat has stated that it expects "companies to consider the benefits of increasingly detailed demand data that can be read without directly accessing the meter and provided on a near real time basis", but explicitly says that it will not specify whether AMR is appropriate because it does "not consider we should specify the technology that companies should use."[30] Similarly, the language used by the EA to describe its expectations for AMP8 are ambiguous as to whether AMR meters are deemed Smart or just AMI meters.[31] The consensus from interviewees was that they considered AMI meters to be Smart, but not AMR meters and that it would be helpful if AMI was specified as the expected standard. In this report we are referring to AMI meters when we say smart meters.

There is a lack of certainty in the optimal read and transmission frequency required to drive benefits.

As noted above, there is an emerging standard that AMI meters are configured to record hourly reads and transmit these once per day (as noted by Ofwat during Acceleration Final Decisions)[32]. However, this is not universal, and there has been a case made for 15-minute intervals for certain periods of the day by Yorkshire Water, or for large non-household customers by others. Key factors that influence the chosen configuration include use cases (e.g. the granularity deemed necessary to detect leaks or influence customer behaviour) and battery life (most companies business cases are predicated on a 15-year solution lifetime, which manufacturers have copsaid is difficult to achieve if seeking more granular than hourly reads / daily transmissions).

Several interviewees noted the desire for standardisation of read and transmission frequency to inform the requirements they needed to specify (water companies) or meet (manufacturers). This would need to be based on a set of defined use cases and benefits, but it was noted by multiple parties that each water company has developed these slightly differently, with no common definition. This contrasts with energy where there is a central business case and set of use cases that underpin the standards.

30 https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-Securing-cost-efficiency-technical-appendix.pdf

31 https://www.thewaterreport.co.uk/single-post/ea-calls-for-halt-to-dumb-meter-installation-as-supply-gap-reaches-5bn-litres-a-day-by-2050

32 https://www.ofwat.gov.uk/wp-content/uploads/2023/04/Appendix-2-Accelerated-Delivery-Project-Final-Decisions-2023.pdf

There is a lack of consensus on what additional functionality is required.

As described above, Smart meters in energy have a significant level of functionality beyond just measuring usage in the form of reads. In Water meters typically have far less functionality, but they do have a number of alarms and alerts (such as tamper alarms, continuous flow alerts). Certain features of energy meters are not relevant for water such as the ability to stop supply when pre-payment needs topping up or a property is vacant (water companies do not have the power to disconnect water supply whilst awaiting payment).

There is additional functionality that can be included within a metering solution, such as pressure sensors. Some water companies noted that some additional functionality was expensive and so they had not asked for it (though some are exploring pressure sensors in a selected number of meters to cover an area). Others noted that they had had some success at influencing manufacturers to introduce additional functionality, but at a cost.

Several interviewees with energy experience noted that by setting common standards they had been able to influence the supply chain, which in conjunction with the economies of scale from their commercial models (see 8.1 Commercial and Sourcing section) had enabled a significant increase in quality and functionality whilst also driving down prices over time. Supply Chain interviewees said that they would welcome a more consistent view of additional functionality required to inform their technology roadmaps.

Reliance on alarms can be less effective than analysing underlying read data.

Some companies have been using leak alarms from the meter as their primary method of leak detection, with some success. However, several water companies and members of the supply chain noted that continuous flow alerts or leakage alarms are not always a reliable indicator upon which to act. They recommended that using the underlying data is critical to success. They advocated keeping the meter functionality simple and instead building the sophistication into the analytics performed once data has been received.[33]

Battery-life is a critical determinant of whether target costs and benefits can be achieved.

Battery life is more of an issue in Water than Energy. Smart electricity meters do not require batteries, gas meters do, but they can transmit to a comms unit that is powered from the mains. In contrast Water meters (including associated communications devices) are battery powered due to the location they are fitted (typically in a boundary box located outside a customer's premise) and the complexity and cost of connecting to them to the mains.

Water company interviewees agreed that battery life was a key sensitivity in their business cases and that they are concerned about being able to deliver the cost/ benefits they have assumed. Typically, they have built a 15-year business case, but are finding many manufacturers will not warranty the battery for this long at a reasonable price.

Interviewees from energy noted that by having a clear set of standards and a commercial model that provided them leverage (see 8.1 Commercial and Sourcing section), the supply chain had responded over time to significantly improve the quality standards and commercial terms that they were able to provide. They suggested a similar approach may be able to help drive an increase in the battery life that the supply chain could provide.

33 https://www.ofwat.gov.uk/wp-content/uploads/2023/04/Appendix-2-Accelerated-Delivery-Project-Final-Decisions-2023.pdf

Interviewees also noted that there is some innovation in this space, for example, using the flow of water to help charge the battery or connecting meters to small solar panels. The consensus was that supporting innovation in this space could be a good use of the fund.

There are low economies of scale available to individual water companies in a global metering market.

Water companies and the supply chain noted that Water meters in the UK tend to be concentric meters, which are a different type to most meters in other countries. In addition, (as referenced in the 8.1 Commercial and Sourcing section), each water company is separately procuring meters and each to differing specifications. This means that water companies have lower commercial leverage as they are buying relatively small volumes in what is a large, global market. This contrasts to the situation in energy, as noted above, where there were not only common standards from the start, but also MAPs who have commercial leverage due to their buying power (on behalf of more than one supplier and in multiple countries).

Managing a complex metering estate and keeping up to date with the latest technological development is proving challenging for water companies.

Several water companies noted the challenge with managing an estate of different meter types, with different capabilities, in different environmental conditions and with differing level of remaining operational life. Some are tackling this by proactively replacing all meters in a given area at once, even if some have a few years left of operational life as they believe this is more efficient and also enables customers in a given area to receive the same level of service. There are challenges to this approach, however, as the base funding allowance in Ofwat models does not necessarily allow for this, so cost adjustment may be required.

Many also noted that the technology in the market has been evolving rapidly in recent years and that it is difficult to know which solutions to choose (e.g. choosing between new metering solutions, integrated or non-integrated meter/communications devices, or devices that "convert" a basic meter to transmit hourly readings) and to then compare the cost and performance of their solutions against others who may have made their choices earlier / later than them.

8.2.3. Findings

There is a risk to benefit realisation and cost efficiency due to a lack of minimum standards for Smart Metering Assets.

The consequence of not having standards includes:

- Some water companies do not have sufficient insight into the requirements (e.g. read frequency) and standards they need to procure to enable the use cases and benefits from Smart Metering.
- Some customers will receive a better service than others who may be locked into a 15-year solution that cannot deliver the benefits required.
- There are limited economies of scale available to drive down prices due to each water company procuring separately and asking for differing specifications into a global supply chain.
- Members of the Supply Chain lack clarity on where to prioritise development and investment.

- There is a lack of clarity on where innovation is most needed, such as increasing battery life.
- The ability to share data in a consistent manner (to support innovation or to support the NHH Retail market) is limited and more generally creates a risk of lock-in to certain combinations of meter and communication solutions.

There is a risk to benefit realisation due to a lack of common understanding of the benefit drivers and use cases.

Minimum standards are dependent on first being clear on the use cases and benefits of smart. As noted earlier, DESNZ were concerned that without standards, some energy companies would focus on "securing supplier benefits over those to the consumer or wider energy system". Whilst in Water, companies have more of an incentive to deliver benefits to consumers and the wider water system (due to financial incentives to reduce consumption and leakage), there is still a risk that some companies do not fully understand how to deliver these benefits.

Based both on certain interviews and our engagements in the sector over the past few years, we have observed that some water companies lack clarity on how they are going to drive the benefits of smart. They have not all taken a "right to left" approach, starting with the benefits they are trying to achieve, determining the use cases to deliver these and then using this to inform the requirements they specify and solutions they procure. The focus for some seems to be more on getting meters procured and installed within a cost envelope set for AMP8, with a sense that they will worry about the benefits later. This may result in procuring solutions which do not enable optimal benefits.

8.2.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.1 Establish a smart delivery governance capability.
- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.7 Invest in new joint-sector solutions.

8.3 Communication Networks

8.3.1. Lessons from Energy Smart Metering

Energy suppliers share a common set of communication solutions.

As described in the Commercial and Sourcing section, in Energy the communication networks used by Smart Meters are centrally procured and managed through the DCC (unlike in Water where each company separately procures connectivity from a service provider).

In central and south GB, the shared comms network uses cellular technology (2G for SMETS 1 and 2G/3G for SMETS2 – though this will need to be upgraded to 4G over the coming years). In the less densely populated north, a long-range radio solution is used.

Energy interviewees stressed the important of having a communications solution that is available and effective for the life of the meter given the huge impact it has on both the cost efficiency of the roll-out (i.e. to avoid cost of a revisit to adapt or replace a meter or comms hub) and the ability to deliver benefits.

DCC noted that the solution they provide to the Energy sector could potentially be extended to the Water sector. Energy companies expressed caution at this approach citing previous challenges with the volume of data the DCC was sized to handle, high level of security standards that would need to be met, challenges with enabling all meters to connect, and updates to the Smart Communication Liscence that would need to be made. Nonetheless they agreed with the principle that common infrastructure might offer economies of scale and enable future competition and innovation around data solutions. Others also suggested the consumer Wi-Fi could be used instead, particularly for internal installs.

Energy companies continue to experience significant challenges with meters failing to communicate or operate as intended.

Enabling meters to connect to a communications network and then maintaining full connectivity over the long term to the required standard (i.e. providing sufficiently complete and timely data) has been a significant challenge in Energy. Over 12 years into the programme this issue is still headline news, with nearly 4 million Smart Meters (c. 11.5%) not operating in smart mode.[34] Interviewees from Energy said that Water companies should not underestimate the challenges they are likely to face and must ensure sufficient rigour is put in place to monitor and rectify the root causes.

There are numerous reasons why energy meters sometimes fail to operate and communicate as intended, including software issues, lack of signal strength at the meter or installation and hardware issues. Where connectivity is the issue there are some solutions that help, such as mesh hubs and aerials, but some locations are still proving hard to reach, such as reinforced concrete intake rooms. Also, some issues are related to the Home Area Network by which gas meters connect to the comms hub, which is not relevant for water.

Interviewees from some Energy companies and the Supply Chain noted that in the early stages of the energy smart rollout, suppliers were so focused on "getting meters on the wall" to meet regulatory targets, that the correct functioning of the meters was not a priority despite this being essential to being able to realise benefits. They observed that many suppliers focused on quantity of meters deployed, without focusing on the quality. A lesson from energy is to ensure a high quality of solution to prevent issues down the line, and to also act on non-communicating meters early and systematically. Energy suppliers now have to invest significant time and money in seeking to understand why meters are not communicating, triaging and solving the issues.

The sector co-funded a new company to deliver a technical solution for hard-to-reach meters.

The Energy sector also recognised that for around 5% of properties it needed a different technical solution to be able to connect the in-home display and/or gas meters to the

34 https://www.bbc.co.uk/news/articles/cz9zqn77ezno

communication hub (e.g. certain blocks of flats where gas meters were fitted in a basement, but electricity meters and comms hubs were fitted in each flat)[35]. The sector therefore established AltHan Co to develop range-extending products and services to enable the full functioning of these hard-to-reach meters.

8.3.2. Lessons from Water Smart Metering

Selecting the right communication solution is vital to being able to deliver the full benefits of Smart, but some water companies are finding this a challenge due to lack of insight.

AMI water meters transmit data automatically via a communication network and there are a variety of different technical solutions and providers that can be used. Interviewees agreed that without connectivity the full benefits of smart cannot be achieved, as the meters would then need to be either visually read or read via a drive-by or walk-by (if they can default to AMR mode). It is therefore impractical that non-AMI meters could provide the level of granularity of AMI meters (e.g. hourly reads available next day) without incurring huge labour costs, e.g. daily walk-bys. Therefore, selecting a comms solution that can reliably provide data to the standard of quality and timeliness required to meet certain use cases and drive the full benefits of Smart meters is essential.

The majority of water companies have either already procured or are in the process of procuring communication network service partners to support their own individual Smart programmes. Interviewees said that deciding on the right solution was one of the most challenging aspects of the programme due to a lack of evidence as to which solution is best for them. They have struggled to find reliable performance data to be able to compare solutions due to Smart being relatively new in water and the lack of published data. They also noted that trials and scaled rollouts to date have revealed that there may need to be more than one comms solution for different areas (such as dense urban centres, versus less dense rural areas).

Some interviewees from Water companies and the Supply Chain suggested that there should be minimum performance standards set for communications networks to ensure that sufficiently granular reads (e.g. hourly) are received sufficiently frequently (e.g. next day). These would need to align with standards set for meter assets, with analysis required to determine the optimal standards that should be set.

Some water companies that have already installed Smart water meters are finding communications connectivity a challenge.

There is limited data available on how successfully water meters that have already been installed in this country are communicating. Anecdotally some solutions are delivering much lower levels of comms connectivity than had been planned, but there is a lack of published evidence.

Water companies and meter manufactures highlighted a number of issues with being able to reliably connect meters to a comms network, including the following:

- External meters are often installed in 'hostile environments' for communications connectivity: installed a few feet underground, in metal chambers with metal lids, or other

35 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

enclosed spaces which hinder transmission of the signal, and away from a power source. Several noted this contrasts with other countries where meters tend to be installed above ground.

- Tall buildings can block signals, which can also occur post install if new developments are built.
- Some meters are installed internally where building materials can block signals (particularly for multi-tenancy buildings or some NHH sites where the install can be in deep cement basements).
- The topography of the region also impacts signal strength e.g. hilly areas vs flat rural areas vs urban areas.

Meter manufacturers and water companies identified that innovation should be sought to overcome some of these challenges. For example, looking at how to improve the ability to get a strong signal through a boundary box lid or exploring the use of Wi-Fi for internal installs. They also suggested that joint solutions may be required (analogous to AltHan Co for energy).

Interoperability is desirable, but difficult to achieve in practice.

Several Water Companies stated that they would prefer a communications solution that did not lock them into a particular communications provider over the long term. Others noted that even with open standard protocols, there could still be barriers to switching provider due to the investment required up front for a challenger to be able to provide connectivity to the same level as an incumbent who had already invested in building communications infrastructure for a region. They also noted that some communications technology was more suitable for certain regions due to differences in density, topography etc. so a single standard is unlikely to be appropriate.

8.3.3. Findings

There is a risk to benefits that Water companies procure a communications solution that is not fit-for-purpose due to a lack of common standards and performance reporting.

Communication networks need to be able to collect reads from meters at the granularity and frequency required to enable benefits, but Water companies may struggle to make informed decisions about the comms solutions they require due to factors including:

- There is a lack of common set of standards for establishing the optimal level of data granularity and frequency required to derive the benefits, so it is hard to compare solutions.
- There is a lack of published data to understand the effectiveness of different communications solutions against a common specification (e.g. % of meters providing X% of expected reads on time per month).
- Some solutions have not yet been proven at scale in UK conditions.
- Experience from energy is that there are a large proportion (10-15%) of meters that are not communicating as intended.

There is a risk to benefits that a high proportion of meters fail to transmit reads at the granularity and frequency required to enable benefits.

Even the most effective communications solution for a given area may struggle to connect reliably to all meters at all times due to a range of factors, including the location of meters (e.g.

deep underground or inside a block of flats), the materials surrounding the meters (e.g. heavy metal lid or a concrete basement) or the topography of an area.

There is no central entity or forum to try to systematically tackle these issues at scale on behalf of the sector. It would be prudent to assume that a given proportion of meters will not communicate at any given time (pending any major interventions) and to therefore adjust benefit assumptions accordingly.

There may be an opportunity to reduce costs over the long term through joint procurement of comms solutions.

Whilst it is likely to be too late for AMP8 (as most companies have either already procured or are in the process of procuring comms solutions) there may be benefits in some joint procurement activity in the future to leverage economies of scale, whether via regional collaboration between adjacent water companies or through a central entity for the whole country (like DCC in Energy).

8.3.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.3 Develop a sector-wide business case and roadmap.
- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.10 Consider enabling alternative investment approaches to accelerate the roll-out.

8.4 Installation

8.4.1. Lessons from Energy Smart Metering

A major challenge to achieving install targets is gaining customer consent and access to their property.

In Energy, retailers are mandated by government to deploy smart meters to their customers, but customers still retain the choice as to whether to accept the offer of a smart meter. DESNZ considers consumer choice to be central to the programme in energy to help drive engagement, which is crucial to achieving the high level of benefits associated with energy usage reduction. This requires the customer to engage with the install beyond mere acceptance.

This approach has driven usage reduction, however, when the offer of a smart meter is made in benefits terms, some consumers choose not to accept the install on the basis that they do not want the benefits, or they are insufficient to counter the perceived inconvenience of the installation. This creates a tension between deployment efficiency and benefits realisation as consumers in one area do not all accept the smart meter at the same time, so appointments are dispersed over a large area.

The original plan in energy was to have reached "all homes and small businesses" (e.g. close to 100% smart meter penetration) in Great Britain by 2019. As of December 2023, only 61% has been achieved.[36] The current target is 74.5% of homes and nearly 69% of small businesses by the end of 2025.[37] Energy interviewees said that the main issue has been securing customer consent to have a meter installed and then providing access at the appointed time (as not only is permission needed, but the meters are on the customers' premises, so access is required).

It is predicted that the speed of roll out will slow over time due to having to deal with more challenging premises and consumer groups; a reduction in installer efficiency due to travel distances increasing between installs; and a reduction in the number of installers working on smart meters.[38]

Baringa's experience of helping energy companies to increase appointment conversion rates has been to implement a strategy that includes: tailoring messages about the benefits of smart to appeal to different types of customer; using multi-channel, multi-step engagement journeys; leveraging events such as price rises or inbound contact about high bills to secure appointments; and developing a continuous improvement approach to constantly test, learn and adapt over time.[39]

Another major challenge has been securing the right amount of installer capacity in the right areas.

As noted in the Commercial and Sourcing section, energy retailers said that in the early years they were competing with each other for meter installers and they believe this inflated labour costs and potentially impacted the quality of installs, due to rushing to meet targets. Nonetheless, they invested heavily in their installation workforce through the recruitment of new operatives as both directly employed labour and through third parties, but also through significant investment in their back-office capabilities and IT systems. This saw total field FTE increase from ~2000 to ~8000 between 2011 and 2020.

However, as smart meter coverage approached 50% and the covid pandemic heavily reduced smart installations, total operative numbers fell (to around 6000). Post Covid install rates have not reached pre-pandemic levels and energy suppliers say they are struggling to recruit enough engineers and that competition for trained field operatives has increased again.[40]

A high proportion of installs are cancelled or aborted.

According to interviewees, approximately 40% of planned Smart Energy meter installs do not go ahead, of which around one third are due to not being able to access the property and two thirds due to the installers either not being able to fulfil the appointment, or they arrive but cannot complete the job for technical reasons. Levels of installation success are a key factor in consumer satisfaction with the smart metering journey.

36 https://assets.publishing.service.gov.uk/media/65fc3d0a65ca2f001b7da7c5/Q4_2023_Smart_Meters_Statistics_Report.pdf

37 https://committees.parliament.uk/committee/127/public-accounts-committee/news/197947/delayed-smart-meter-programme-fails-to-hit-targets-and-secure-public-support/#:~:text=However%2C%20it%20has%20adjusted%20its,by%20the%20end%20of%202025."Delayed smart meter programme fails to hit targets and secure public support - Committees - UK Parliament

38 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

39 https://www.baringa.com/en/insights/low-carbon-futures/what-the-water-sector-can-learn/

40 https://committees.parliament.uk/publications/41730/documents/206773/default/

Energy companies have to report on their performance to the central programme and are under scrutiny to improve performance. DESNZ have led extensive best practice sharing, both through an ongoing "stewardship" of industry stakeholders involving regular engagement and best practice sharing, as well as specific initiatives to improve performance such as knowledge sharing workshops for industry, creation of guidance documentation, and ongoing performance benchmarking. Performance benchmarking takes place quarterly and encompasses the largest energy suppliers. It allows them to view their performance across the end-to-end installation journey in relation to that of their peers and in doing so identify areas of relative strength and weakness. The leading performers take a data-led, end-to-end approach to continuously to improve performance at each stage of the journey.

Interviewees also noted that it was vital, at point of install, to capture accurate information about the asset, the job and the location, enabling ongoing maintenance of the asset.

A Code of Practice was established to set standards for customer service during an install.

In April 2013, an Ofgem approved 'Smart Metering Installation Code of Practice' (SMICoP). This is a licence-backed code of practice which governs the installation of smart meters for electricity and gas. It has since been subsumed into the overall metering code of practice (CoMCoP) under the Retail Energy Code.[41] It sets the minimum standards for members to follow in relation to a customer having a smart meter installed. The objectives of the SMICoP are to ensure the customer receives a high standard of service through the installation process, understands how to use and benefit from the equipment installed and to understands how to improve the energy efficiency of their home.[42]

Interviewees from the Energy Suppliers had mixed views as to the effectiveness of the code and some felt it was too restrictive. It was also noted that for Water, where the majority of installs are external, there may be less of a case for a code that requires efficiency advice to be given at the point of install as this would add considerable time and cost to the process and the customer may not be available (since external installs tend not to need an appointment), but that communication soon after install is still important.

Increasing smart meter penetration in has its unique challenges due to the difficulty with engaging the right person to grant permission and access.

In energy, there is a large degree of complexity around gaining consent to access a site to install a meter. This is especially the case for multi-site organisations (e.g. chains of supermarkets). Suppliers have found a different degree of tailoring is required to both campaign messages as well end-to-end management to secure the appointment and gain access.

Appointment timing is an important consideration, as depending on the type of business or industry, they may not want (or be able to) turn the power off during operating hours meaning appointments are required out of hours. Often the person who books the appointment is not

41 https://recportal.co.uk/rec-wiki-metering#:~:text=The%20Consolidated%20Metering%20Code%20of,the%20scope%20of%20the%20CoMCoP.

42 https://www.edfenergy.com/smart-meters/smart-meter-installation-code-practice

the same person on site, available to allow access to the premises. There is a dependency on good communication between the customers in the office and on site to enable the appointment to go ahead as planned. For publicly owned multi-site organisations like councils and housing associations, often the only opportunity to install is during vacant periods or when/if the tenant decides to enable it.

8.4.2. Lessons from Water Smart Metering

Smart meters can be rolled out quickly if installed externally street-by-street, but internal installs are proving problematic.

Interviewees from Water and the Installer Supply Chain agreed that installing meters externally in a street-by-street approach was the most efficient way to deploy smart meters at scale and noted this provided a considerable advantage over the energy sector (for the reasons described above).

Anglian Water has carried out analysis and process optimisation to make the process as efficient as possible. They noted that it was able to achieve between 20 to 25 replacement installs per operative per day following the street-by-street approach (and often as high as 40-60 in dense urban areas), providing the tip that using "festival trolleys" to transport a stock of meters increased productivity by avoiding the need to continually return to, or to move, a van. Anglian have different install targets per operative for summer and winter, above which operatives earn a bonus. Operatives routinely hit the weekly target, including days when they are in more rural areas, or carrying out industrial fits which are slower. All operatives are trained in the AMI programme so are able to talk to the customer about smart meters and benefits if the customer asks. Customers receive a targeted email around 4-6 weeks before going to the area, then a second email and a targeted door drop 2-4 weeks before. When the smart meter is installed, the customer receives a contact card with next steps, detailing how they can view their consumption on their account.

Some companies noted that a new external install (where there is no meter already) costs more up-front than an internal install and that budget constraints had led to them following a policy of installing internally. The overwhelming consensus was that this was the wrong approach due to: risk of not being able to get an appointment / access (and therefore not fit a meter all all); the long-term costs of having to maintain assets in the home with appointed visits; and the fact that an internal install fails to capture losses on the supply pipe between the boundary and the home. Some were concerned that there is a risk that Ofwat cost models may not take into account the differences between internal and external install costs which may drive more internal installs to the long-term detriment of the roll-out.

"Optants" are customers who request a meter – often this will be outside an area where smart metering is being pro-actively rolled out en masse and are therefore more expensive due to the inefficiency of increased travel time. Some companies are exploring whether they can delay installing optant meters until they roll out smart meters in that area (unless the user has very high usage), but there are regulatory limits on the time allowed between request and install that limit this.

Some noted that in other certain countries meters tend to be installed externally, but above ground, and that this was a better solution from both an access and communications connectivity perspective. This led to several interviewees advocating that new developments in the UK should be required to have smart meters installed above ground and enforced through building regulations.

Interviewees highlighted that they expect a significant proportion of installs (30-40%) will be conducted internally. In some cases, this is for technical reasons – for example a block of flats may have one pipe entering the building before splitting inside to supply each flat so an external install is not feasible.

Water companies that are already facing into this challenge noted that it is proving extremely difficult to obtain and then fulfil customer appointments – in much the same way as in energy. They cited challenges including: not having accurate customer contact information; not being able to persuade customers to book an appointment (e.g. some customers believed there was an ulterior motive to the water efficiency message they were given); or customers booking an appointment, but then not being at home during the appointed time slot.

Interviewees expressed significant concern that the challenge of internal installs was a material risk to them being able to achieve their planned roll-out volumes and believed that others may have underestimated the cost and complexity of the challenge. They agreed that one way to help partially mitigate this risk was for 'marketing' campaigns (nationally and locally) to help customers understand the need for smart water meters and that this would be most effective when backed by an independent, trusted voice. With current low trust in the water sector, many companies are finding it challenging to convince customers about the need for a meter and its benefits.

There are concerns that a shortage of installers will cause delays and or drive price inflation.

Water smart metering requires a variety of skills from the labour market, including: a relatively low-skilled meter replacement field force who can screw-in/out a meter in an existing chamber, completing jobs in less than 30 minutes; civils gangs to dig holes for new meter boxes; engineers to cut pipes and fit meters and stop taps in the meter boxes; and plumbers to fit internal meters.

Interviewees from water companies and from the Supply Chain itself expressed concerns that it may be challenging to ramp up the workforce quickly enough to meet demand in the early years of AMP8. Some water companies said that some installation firms had told them they were being selective over which tenders they bid for given the finite resources available. The water companies said they were concerned this could lead to price inflation (as observed in the early years of the energy roll out noted above) pushing costs above those forecast in PR24 plans.

A further challenge is that water companies will not have certainty of their plans until the PR24 Final Determinations are published in December 2024, so (depending on the level of risk parties are willing to take) they may not commit to volumes in time to allow the supply chain to recruit and train sufficient installers to meet year 1 targets.

Some interviewees from the supply chain noted that a potential way to help mitigate the risk of a labour shortfall was for the industry to establish an independent training centre (or

regional centres), but others noted this would be impractical from a funding and location perspective unless 3rd parties providers were willing to join forces to fund them. Other mitigations that were suggested included water companies aligning plans so that they did not roll out at scale in adjacent areas at the same time.

A significant minority of properties are uneconomical to fit a meter (such as joint supplies).

For properties where it is not possible to fit an external meter, such as some terraces or blocks of flats with a joint supply, even when it is possible to get an appointment and to gain access, a meter cannot be installed economically. Some examples cited include:

- Some flats and terraces have 2 or 3 separate supply pipes coming in, which would require individual meters fitting, representing a significantly higher per-property metering cost (one company noted it had a policy of fitting up to 2 meters in a property, but noted this would be monitored given the extra cost involved).
- There is no space to fit a meter without substantial alterations to the fabric of the property at considerable expense.
- Some properties have been modified with e.g. kitchen units fitted in front of supply pipes.
- Some properties may be able to have a meter installed, but there is no way of getting a reliable signal to connect the meter, removing most of the benefits of smart meters (like the challenge in energy that led to the formation of AltHan described earlier).
- Some NHH premises would require meters in cramped or hard to reach locations.

For buildings with these challenges, some companies are looking to fit small bulk meters to measure the water flow into the building as a whole with the aim of getting a proportion of the benefits of smart (e.g. to aid understanding of total water use in an area), but noted this would not enable benefits such as helping customers manage their usage, and would limit the ability to detect losses and leaks in their individual property. Others stated they were uncertain whether the benefits of a bulk meter were justified and that this would be something they might explore in a later AMP.

All agreed that finding solutions to the challenge of metering such properties was vital and that in the meantime there needed to be an appreciation of the limits to smart metering penetration levels that could be achieved. Many also expressed concern that Ofwat cost models would not be granular enough to consider the extra cost of more complex installs.

A "communications first" approach can help drive greater customer engagement, but can also constrain the pace of roll out.

One water company noted that is has established a "communications first" approach whereby it will not install smart meters at scale in an area until there is communication network connectivity available. They have taken this approach as they have found that they get greater customer engagement in the use of smart data if they can capitalise on the awareness of the installation process. Where "communications first" is not possible, others noted it was important to avoid engaging customers on the benefits of smart at point of install, but rather to engage them once the data was available to use, in order to manage expectations.

Metering of Non-Household properties has additional challenges due to the wholesaler/ retailer roles being split.

The majority of business or non-household (NHH) properties in England are metered, and companies' AMP8 plans seek to deliver a material uplift in the proportion of these properties which have smart meters. Following the creation of the NHH retail market, NHH customer relationships are owned by water retailers, with Wholesale water providers owning and installing meters. This means the processes to be followed to make contact with a customer and to complete a meter installation are more complex than for household customers.

Interviewees from water companies expressed concern at being able to meet Non-household metering targets due to the high proportion of NHH installs that will require an appointment and access to complete an install and the challenge of engaging the right person to make the appointment.

Companies have sought to identify emergency site-based contact details for NHH customers, to be used by Wholesalers in the event of water supply issues, but not for routine maintenance such as meter exchanges. The primary contact details held by Retailers will be a billing-related contact. Whilst the two may be the same individual for small businesses, for many multi-site and national NHH customers, this billing contact may have little or no ability to assist in identifying an appropriate contact on site for the scheduling of a meter exchange or provision of access.

Interviewees from water companies expressed confusion around responsibilities for different activities such as engaging with the customer about the benefits of smart metering and arranging the appointment where needed for installation. For some NHH customers appointments are needed outside of regular business hours, on weekends, or at times to avoid interrupting business, which may be very restrictive for 24/7 operations.

Interviewees from water companies highlighted that metering NHH premises attracts more costs than household, with the costs associated with appointment scheduling, site surveys and data collection.

MOSL recently published a National Metering Strategy for the NHH Retail Market which aims to support wholesalers in rolling out smart metering to NHH customers as efficiently as possible. With regards to meter installation, MOSL have outlined that Wholesalers should give Retailers plenty of notice ahead of their intended smart meter installation to allow time for the Retailer to communicate with their customers. MOSL expects Wholesalers to publish rollout plans in advance to enable this. MOSL expects Wholesalers and Retailers to work cooperatively together during the rollout, paying particular attention to the communication needs of customers with medium and large meters (which may need extra care due to supply needing to be turned off (or re-routed) temporarily for install).[43]

43 https://mosl.co.uk/document/market-improvement/strategic-metering-programme/key-documents-smr/strategic-programmes/7997-strategic-panel-national-metering-strategy-for-the-nhh-market-1/file

8.4.3. Findings

There is a risk to benefits that, particularly in the early years of AMP8, planned install volumes will not be achieved (or not within budget) due to a labour market shortage and/or wage inflation.

This risk is due to several factors including:

- Water companies are looking to ramp up installations at the same time, with a limited number of 3rd parties that provide the type of workforce required (a similar situation to the start of the energy roll out).
- Water companies will not have certainty of their plans until the PR24 Final Determinations are published in December 2024, so may not commit to contracts in time for the supply chain to ramp up.
- There is currently a shortfall in the number of energy smart installers in some areas of the country and the demand for labour to install other infrastructure such as EV charge points and heat pumps is expected to rise. In addition, there is a significant increase in infrastructure spend in the water sector across a wide range of projects (e.g. mains pipe replacements). Whilst the skill sets for water smart are somewhat different to some of these other types of work, there may well be a challenge in attracting and retaining labour to install smart water meters given the wider demand for field operatives across multiple sectors.

There is a risk to benefits (and long-term costs) that planned install volumes will not be achieved due to the high proportion of internal installs.

This risk is due to several factors including:

- It is extremely challenging to secure an appointment and then successfully install a meter internally, based on experience from energy and water so far. This is the key reason why the energy smart roll-out (where all installs require appointments) has only reached 60% smart penetration in 12 years (much lower than originally planned).
- Some companies are choosing to install internally when there is no technical reason they could not install externally – typically due to budget constraints making the lower up-front cost of internals more attractive (despite the negative long-term impact on meter penetration, costs and benefits). This is compounded by a risk that companies may try to meet a notional efficient cost of install that has not taken into account the difference in up-front costs between internal and external installs.
- Many properties (particularly in urban areas) are not suitable for external meters (e.g. due to having a shared supply pipe that then splits inside the building to feed different flats), so an internal install is unavoidable.

There is a risk that some properties will never benefit from smart as it is not economically feasible to fit a meter (or else connect it to a communications network).

This risk is due to several factors including:

- The cost of some installs are much higher than others. Examples include an internal install in a flat where more than one meter is required due to multiple supply pipes (e.g. a cold and a hot water feed), or where significant building / carpentry is required to access the pipe and then make good afterwards, or where external installation would require physical separation of underground supply pipes.
- Some properties may not be able to access a reliable signal from a comms network e.g. in some remote regions some companies may deem that the cost of installing comms infrastructure to service a small number of properties is not economically viable.

There is a risk to benefits that install volumes will not be achieved due to a high proportion of jobs being cancelled or aborted.

This risk is due to several factors including:

- The energy rollout has proven that is it challenging to successfully completed planned jobs with c. 40% failure rate – partly due to access issues (particularly relevant for internal water installs), but also for other reasons such as poor workforce planning or jobs being more complex than originally anticipated.
- Water companies and the supply chain may not have the appropriate Management Information and associated performance incentives and operational capabilities in place to improve completion rates (these were often not in place in the energy sector for many years into the roll out).

There is an additional risk to achieving Non-Household install targets due to the challenges of being able to secure suitable appointments.

This risk is due to several factors including:

- A high proportion of NHH installs will need appointments either because they require access to a premise or because installs need to take place at certain times to avoid disruption to the business.
- It can be difficult to get hold of the right contact details of the person that can arrange the appointment, as different contacts may be responsible for billing, site access or facilities management.
- Both of the above issues are more challenging because the wholesaler (responsible for installation) is a different entity to the Retailer (responsible for billing and other services) and may not have a direct relationship with the customer or have the right contact details.

8.4.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.3 Develop a sector-wide business case and roadmap.

- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.12 Assess and mitigate supply chain risks.

8.5 Data capture and processing

8.5.1. Lessons from Energy Smart Metering

Data standardisation has been essential for enabling competition, customer engagement and innovation.

As noted earlier in the 8.2 Smart Metering Devices section, data standardisation has been essential for enabling meters to connect with the DCC infrastructure that enables switching. In the early years, the lack of standardisation caused significant regret spend and complications later on. These common standards enabled data sharing with "Other Users" of smart meter data, to provide value add services, including:

- Fuel poverty analysis by social housing groups;
- County councils analysing their own carbon footprint; and
- Medical research into the correlation between heat, poverty and respiratory issues.

DCC noted some principles it believes are key to leveraging the data effectively:

- Data must be free (e.g. not monetised) to attract people to use it.
- Data must be easy to access (with the right checks in place).
- Data must be interoperable (i.e. in a consistent, usable format).
- Data must be sharable via an API so third parties can use it.

Common consumer protection standards have been defined, including a data privacy framework.

In energy, a Code of Practice has been defined, which all energy suppliers have signed up to. This includes specific requirements "to assist vulnerable... consumers" and also a "data protection and privacy framework giving consumers rights and control over who has access to their data."[44] Research has found that "only 2% of consumers surveyed by BEIS in 2017 cited data privacy as a concern" and research by Citizens Advice has found that "most consumers who have expressed concern felt reassured when the data access and privacy framework was explained."[45]

44 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830668/smart-meters-benefits-realisation.pdf

45 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830668/smart-meters-benefits-realisation.pdf

8.5.2. Lessons from Water Smart Metering

Substantially more data needs to be stored and processed than today, which causes issues.

With Smart AMI, instead of receiving one read every 6-12 months, water companies will typically receive 24 reads per day (as well as alarms and alerts). So for every 1 million customers a water company goes from receiving c. 1-2 million reads per year to 9 billion.

Some water companies have already encountered issues dealing with this volume of data and being able to process it to develop meaningful insight in a timely manner. Others have had fewer problems, citing the use of cloud technology as key to handling the scale, however they noted that as well as having the technology to handle the data it is vital to have the operational set up and skills able to use the data effectively.

Data standardisation is essential for the NHH market and MOSL have recommended how this should be achieved.

The NHH market in Water (like in Energy) is competitive, i.e. customers can switch Retailer and the roles of the Wholesaler and Retailer are separate. The Wholesaler is responsible for metering and needs to provide read data to whichever Retailer is supplying a given customer.

The water MOSL is investigating methods of improving data sharing securely among wholesalers, retailers and the NHH customer. They want Wholesalers to "make it as easy as possible for Retailers to access the data they need to identify and develop innovative products, services and tariffs, including those related to water efficiency."[46] MOSL have proposed the following data standards and principles for sharing data:

- **Standard format**: Wholesalers should adopt common data format for granular consumption data, to enable national retailers to share, analyse and aggregate data for multi-site customers across different wholesaler regions. MOSL has developed "Data Standard for Sharing Granular Consumption Data" which MOSL will assess adherence to.
- **Storing and sharing data**: Wholesalers should adopt a standard approach to storing and sharing consumption data. MOSL are investigating options (such as a central data hub or standardised peer to peer sharing) and aim to recommend next steps in mid-2024. The Panel recommends Wholesalers do not to commit to data storage solution(s) that may not align to future data sharing and storage strategies before such recommendations are made.
- **Data governance**: data sharing governance will be developed and introduced. A series of use cases for each party needing access will be developed, to which defines the purpose of each data item and how it is used, stored and disposed.
- **Provision of data to Retailers**: Wholesalers to make hourly meter reading data available to Retailers for customers with smart metering as standard (separately, monthly meter reads to CMOS are required for billing and settlement).
- **Provision of analysed data**: Wholesalers are expected to make already analysed metering data available in a standard format, on a regular basis, to maximise the value of data being captured.

46 https://mosl.co.uk/document/market-improvement/strategic-metering-programme/key-documents-smr/strategic-programmes/7997-strategic-panel-national-metering-strategy-for-the-nhh-market-1/file

- **Provision of data-related services**: The use of metering data provided by wholesalers and the products and services developed from them are to be determined by Retailers, subject to a 'minimum recommended service level'.
- **Wholesaler charging for providing data**: Wholesalers will be expected to provide hourly consumption data to retailers. Wholesalers can charge for initial set up with ongoing provision of data free of charge.

In their national NHH metering strategy, MOSL suggest that all market participants should adopt the common data format for granular consumption to make it easier to national retailers to analyse data for multi-site customers across many wholesaler regions.

Whichever technologies are used, MOSL highlight that the adoption of common data output standards will be key.[47] Instead of standardising technology, there is an opportunity to standardise the output. This would enable application of data analytics and artificial intelligence to an accumulation of large data sets to identify insights.

Many believe there should be similar minimum data standards for the Household market.

As noted earlier in the 8.2 Smart Metering Devices section, there are no common data standards defined for the Household water market and each company captures and stores data directly (i.e. there is no DCC equivalent like in energy). Whilst there is no switching in this market (unlike in Energy Retail or NHH Water), several interviewees said they would welcome common standards for Household market as it would: help provide confidence in the solutions they were procuring; provide consistency for the supply chain; and enable easier data sharing (see below).

There is common support for (controlled) data sharing to help drive benefits.

There was common support for enabling data sharing (under compliant, cost-efficient conditions and underpinned by common data standards) on the assumption that it could help support innovation and benefits realisation.

Interviewees from water did not think this necessarily meant all Household read data needs to go into a single data repository (as with DCC in energy, or a central data hub as is being explored by MOSL for NHH), but there was agreement that some form of data sharing would be beneficial, such as sharing one-off extracts, aggregated data sets or insight into common usage patterns.

Several interviewees noted that Stream, the existing open-data sharing mechanism, could be an option to explore.[48] Depending on the data use case, the data can be shared with different groups, from "open to all" (e.g. third parties, the public) to "restricted to certain groups" (e.g. water companies only). Stream is already funded by water companies and has governance in place.

For the NHH market, however, it is essential that regular, timely and granular data is shared with Retailers and there was support for the MOSL strategy which calls for "a standard approach to storing and sharing consumption data" with options currently being "assessed to determine a recommended approach."[49]

47 https://mosl.co.uk/documents-publications/6333-artesia-mosl-enhancing-metering-technology-report/file
48 https://waterinnovation.challenges.org/winners/stream-2/
49 https://mosl.co.uk/documents-publications/6333-artesia-mosl-enhancing-metering-technology-report/file

Determining what constitutes compliant use of data has been a complex, costly task that each company is doing independently.

Companies that are more advanced in their Smart roll-out have spent a significant amount of time and money on determining how to use data in a way that is compliant with data protection legislation and then implementing the required system and process changes to support this. Considerations have included:

- The granularity of data that should be available to a customer by default, e.g. hourly or daily;
- The granularity of data that should be visible to a customer services agent when they are supporting a customer (e.g. via a phone call);
- The granularity of data that should be available in the back office to teams using the data to e.g. manage leakage or network performance etc.. e.g. hourly per property or aggregated across several properties.

There appear to be different interpretations between companies as they have each tackled this independently (albeit they are proactively sharing lessons learned with others). For example, one company was not using hourly data as a default without permission, recognising that this may potentially limit benefits, whereas another company was. All interviewees agreed that a more efficient and effective approach would be for there to be consistent industry-wide set of principles that were funded once with approval from the relevant regulatory bodies.

8.5.3. Findings

There is a risk to benefits realisation if water companies do not invest in the appropriate technology and capabilities required to handle significant volume of data.

An unprecedented volume of data will need to be captured (e.g. in a Meter Data Management System), processed and utilised quickly (e.g. next day), for most water companies this will require significant investment in IT as well as the people and processes to use the data. It is not clear whether all companies have allowed sufficient provision for these costs in their PR24 plans. Anglian Water suggested companies should be doubling their predicted budget for Smart Meter Data Integration.[50]

There is a risk to benefits in the NHH market if data standards and data sharing are not established.

Standardised data sharing is essential in the NHH market to enable the benefits of smart by giving insight to Wholesalers, Retailers, customers and 3rd parties to drive improvements in consumption and leakage. The recommendations from MOSL should help mitigate this risk if implemented.[51]

There is a risk to benefits and innovation in the HH market if data standards and data sharing are not established.

Data standards will help provide water companies with confidence in the solutions they are procuring; provide consistency for the supply chain; and enable easier data sharing. Whilst data sharing is not needed for switching currently in the Household market, lessons from energy

50 https://mosl.co.uk/documents-publications/6333-artesia-mosl-enhancing-metering-technology-report/file
51 https://mosl.co.uk/document/market-improvement/strategic-metering-programme/key-documents-smr/strategic-programmes/7997-strategic-panel-national-metering-strategy-for-the-nhh-market-1/file

and water suggest there are opportunities to underpin or increase the benefits from smart if data can be shared in a controlled manner to enable insight and innovation. The NHH data standards that are being developed by MOSL should be considered as a starting point when developing household data standards.

There is a risk to benefits if some water companies interpret data protection rules as meaning they cannot use granular data (and a cost impact of each company determining this independently).

The consensus is that (a minimum of) hourly data is required to drive the full range of consumption and customer leakage. If some companies decide they require permission to be able to use data at this level it may limit benefit realisation. In addition, if each company determines its own standards this will cost more to the industry and leave customers in different regions receiving a different level of service. Managing and maintaining customer consents (in particular multiple levels of consent) adds a layer of technical and operational complexity that drives cost and experience issues and can affect availability of meter readings. In energy a common set of privacy standards has been established.

8.5.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.4 Establish Technical and Operational standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.8 Establish and govern data standards and data sharing.

8.6 Billing and Service Enablers

Billing and Service benefits are broadly out of scope of this report, as many of them do not directly impact water efficiency Where they do have a more direct link, such as innovative tariffs, they are covered in 8.7 ‘Enablers to influence customer usage’.

However, we would note that Smart metering provides an opportunity to improve customer relationships, which in turn should help enable water efficiency benefits (which rely on strong customer engagement). Smart does this by enabling Billing and Service benefits such as those listed below (which apply to both energy and water smart when the end-to-end smart enabled system is working as intended):[52]

- Fewer field visits and customer contacts to provide visual reads.
- More accurate bills (and fewer estimates).
- More accurate and automated home move processes (read is available for the day moved in/ out).
- Fewer bill disputes (as customers can engage with their consumption at a granular level).
- Better debt management (can help proactively prevent or support debt based on usage).

52 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

We also note that whilst increasing customer engagement levels with their usage is an essential ingredient in the successful delivery of benefits associated with smart metering, companies will likely need to increase their capacity to handle the customer queries that more granular data may bring, particularly for customers receiving metered bills for the first time. However, investment in self-service journeys and automated processes will help mitigate this.

We also note that in energy there have been a significant number of billing issues related to metering and that these have a detrimental impact on the perception of smart and therefore the level of engagement with smart data. It is therefore vital that meters are installed and connected correctly to enable accurate billing – the enablers for this are covered elsewhere in this report (in the recommendations related to technical and operational standards, for example).

8.7 Enablers to influence customer usage

8.7.1. Lessons from Energy Smart Metering

The energy smart programme has focused on 4 key levers to drive the benefits.

In energy, the Smart Metering Implementation Programme carried out a detailed analysis and developed a 'Theory of Change.' This exercise aimed at better understanding the drivers for changing customer behaviours around energy consumption, to help inform policy decisions. DESNZ (BEIS at the time) recognised four levers to support change in consumer behaviour: motivational campaigns, direct feedback, indirect feedback and advice and guidance.[53]

- **Direct feedback**: In energy, the smart meter is installed and connected to the electricity supply of the property and is accompanied by the IHD showing how much electricity and gas are being used, in near real time (not currently an option for water meters due to battery constraints). Customers have visibility of their energy consumption, as well as cost in pounds and pence. BEIS identified that making consumption data available in real time and visible to the consumer, via an IHD drove the 2-3% reductions of energy use. [54]
- **Indirect feedback (aggregated/ non-real time data)**: In energy this is provided to customers via historic comparative information on bills. To ensure customers are able to easily access their own consumption data and share it with third parties – the 'Data Access and Privacy' framework was established. The aim was to encourage development of personalised energy advice, new products, and services. As the roll out has progressed, many suppliers have developed apps and are offering energy saving recommendations based on their actual energy consumption.
- **Advice and guidance**: In energy, a typical installation will take around 90 minutes and the installation engineer will show the customer how to use the IHD. Provision of energy guidance during the installation process became a requirement of the Smart Meter

53 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830668/smart-meters-benefits-realisation.pdf

54 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830668/smart-meters-benefits-realisation.pdf

Installation Code of Practice in 2016.[55] Some energy companies offer an energy efficiency inspection of the home at the same time as the meter installation. Here they recommend energy saving products as well as different customer behaviours.[56] For example, customers turning their thermostats down and replacing lightbulbs with more efficient LED lightbulbs have a significant impact.

- Suppliers, with the support of Smart Energy GB, designed customer journeys and installer scripts to support the installers. These documents considered the needs of different customer types.[57] The Energy Saving Trust highlights that face-to-face advice is important to ensure everyone (including those of low literacy, long term illness, disability), can benefit from learning how to operate the IHD and receive energy saving advice. Failing to deliver energy saving behavioural advice in an effective way drastically reduces the benefits of the smart meter install.[58] BEIS' 2017 Customer Experience Study found that after a year, around half of consumers said their smart meter and IHD had helped improve understanding of their energy consumption.[59]
- **Motivational campaigns**: In energy public awareness is raised via Smart Energy GB (as well as more tailored engagement directly by suppliers, such as in the lead up to the actual install).[60] The company was created in 2013 and is funded by the energy suppliers[61] with the following aims:[62]
  - Build consumer (both households and microbusinesses) confidence in the installation of smart meters;
  - Build consumer awareness and understanding of how to use smart meters and the information obtained from them;
  - Increase consumer willingness to use smart meters to change behaviours, to enable a reduction in usage; and
  - To assist vulnerable, low income and pre-payment customers to realise the benefits.

As a single centralised company that delivered campaigns across the country via mass media channels, this approach brought economies of scale, consistency and independence (rather than each energy company having to deliver its own campaigns).[63]

SEGB conducted research and developed two type of messaging, 'me' messages focusing on the personal benefits of smart metering (e.g. saving money) and 'we' messages, looking at national benefits (e.g. environmental benefits). SEGB ensured the message was agile so that

55 https://energysavingtrust.org.uk/the-success-of-smart-meters/
56 https://energysavingtrust.org.uk/smart-meters-explained-what-you-need-to-know/
57 https://assets.publishing.service.gov.uk/media/5a818dd0e5274a2e8ab549c7/8_Synthesis_FINAL_25feb15.pdf
58 https://energysavingtrust.org.uk/the-success-of-smart-meters/
59 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/830668/smart-meters-benefits-realisation.pdf
60 https://assets.publishing.service.gov.uk/media/5a818dd0e5274a2e8ab549c7/8_Synthesis_FINAL_25feb15.pdf
61 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf
62 https://assets.publishing.service.gov.uk/media/5a7962d8e5274a2acd18c6b7/7224-gov-resp-sm-consumer-engagement.pdf
63 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

messages could be changed based on the context at the time. For example, around COP27 focus was given to environmental benefits, and during the cost-of-living crisis, to individual benefits.

The company also considered how to spread the message to hard-to-reach groups, such as low-income communities and those with special needs. Their research found that young, females, those on low salaries and private renters are less likely to have a smart meter. Older, wealthier, males, homeowners are more likely to own a smart meter.

Smart has enabled new types of tariffs that can help drive benefits.

Energy suppliers have often provided financial incentives for customers to have a smart meter, such as direct bill credits for accepting an install or offering fixed price deals only to customers if they have a smart meter. Whilst these tariffs have helped increase meter penetration and helped raise awareness of the benefits of smart, they do not directly incentivise energy efficiency.

In contrast, time-of-use tariffs do directly drive energy efficiency by incentivising customer to shift their energy use to certain periods of time when demand (and prices) are lower, which in turn supports the shift to renewable energy. These tariffs have been less prevalent in recent years when most customers have been on a standard tariff under the price cap, though more are emerging linked to Electric Vehicle and Heat Pump propositions.

National Grid has also periodically run "switch off events" in conjunction with certain suppliers to offer savings for a specific time and date – these schemes have always been oversubscribed suggesting there is appetite from consumers. For example, in the winter of 2022-23, National Grid ran a demand response exercise, paying some smart metered customers to reduce demand temporarily.[64]

8.7.2. Lessons from Water Smart Metering

There is low awareness about the challenge of water scarcity and how smart meters can help.

Water has a challenge in convincing the public to take water scarcity seriously. Despite efforts to raise awareness, the issue fades from the public's attention when conditions change (e.g. as soon it rains the public believe a hosepipe ban should end). One water company commented on the difficulty of conveying a sense of urgency, particularly in times of abundance and floods. There are challenges in maintaining focus on the long-term environmental challenge in the face of short-term fluctuations in weather and public interest. In a 2021 Survey, CCW found that 41% of customers in seriously water stressed areas felt that water is plentiful where they live, and 20% said they did not know.[65]

However, there does seem to be some awareness that meters can help. Waterwise cited in their report that data from a 2018 UK survey of 2238 people found that 66% of respondents agreed that the installation of a household water meter would help them reduce their use of water.[66]

64 https://committees.parliament.uk/publications/41730/documents/206773/default/
65 https://www.ccw.org.uk/publication/watervoice-views-of-current-customers-on-water-resources/
66 https://database.waterwise.org.uk/wp-content/uploads/2021/04/Smart-Metering-and-the-Climate-Emergency-2021-Final-1.pdf

Some interviewees noted that water is perceived as relatively cheap. To date there has been low correlation between water scarcity and cost, the public are not yet feeling the impact on their wallet. MOSL also highlight that due to the relative low cost of water, it tends to be a lower priority for NHH customers than gas/electricity – its real value becomes apparent when it is restricted or unavailable – and then it comes business critical.[67]

Several parties suggested changing the name from "Smart" metering to an alternative such as Digital Metering to avoid potential negative connotations that some may have with energy smart or to avoid implying the meters have as much capability as energy smart meters (which they do not, such as the ability to show real time data on a display). Others disagreed and said that the narrative on energy smart was changing, and they believed customers would be confused by other terms.

Stakeholders believe there is a need for national campaigns to promote the need for smart water metering and its role in tackling water scarcity.

Across all interviews there was unanimous recognition that mass market campaigns were required to support smart metering with a compelling vision communicated to emphasise the benefits of smart and to drive behaviours to improve water efficiency. Currently, there is very low public trust in the water sector. The consensus was that there needs to be an independent messenger to avoid any perception that smart is being rolled out for the benefit of the water company, but rather it is to tackle the collective challenge of water scarcity. Several also suggested that multiple parties needed to be engaged to help reinforce the message, such as charities, Local Authorities, developers, schools, customer advisory groups etc. There was a view the national campaign should also have a website that acts as the central source of information about the water scarcity situation and water efficiency advice.

Interviewees mentioned the success of community-run campaigns, such as a community reducing water in exchange for funded swimming lessons for children in the area.[68] In 2021 Affinity Water ran their environmentally orientated 'Save Our Streams' (SOS) behavioural campaign. This involved use of behavioural science to develop adverts, high-profile stunts and social media to encourage 120,000 customers to sign up to receive tailored communications. Over 225,000 signed up and 85% of people who saw the campaign said it has made them change their behaviour. Affinity Water estimates that 20.25 million litres of water a day were saved as a direct result of the SOS activity.[69]

Interviewees commented that the rise of environmental consciousness in the public (driven by climate change) means that motivational messages about water efficiency may have more traction than the early messaging from the energy sector, before Net Zero targets were widely recognised. Others noted the opportunity to focus on the social value of water conservation (e.g. recreational use such as wild swimming etc) – enabling a sustainable and equitable water supply for all members of society, now and in the future.

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67 https://mosl.co.uk/document/market-improvement/strategic-metering-programme/key-documents-smr/strategic-programmes/7997-strategic-panel-national-metering-strategy-for-the-nhh-market-1/file

68 https://consult.defra.gov.uk/water/measures-to-reduce-personal-water-use/supporting_documents/Consultation%20on%20reducing%20personal%20water%20use%20FINAL.pdf

69 https://database.waterwise.org.uk/wp-content/uploads/2022/09/J37880-Waterwise_Water_Efficiency_Strategy_Inners_Landscape_WEB.pdf

Lessons can be learnt from overseas.

Both Australia and South Africa (where the impact of water scarcity is being felt more acutely) have had to establish methods to reduce water consumption due to the imminent threat of running out of water. When drought was declared in the state of Victoria, the government stated that Melbourne's three water companies should create a joint response, with one utility responsible for leading the behavioural change activity. The effectiveness of the response to water saving campaigns in Melbourne led to a reduction from 247 litres per person per day in 2001 to 147 litres in 2011.[70] "Reducing demand saved 107bn litres of water per year in Melbourne during the drought – equivalent to roughly 70% of the capacity of the city's controversial $4.5bn desalination plant, at a fraction of the cost."[71]

Engaging customers prior to install is important, but expectations need to be managed.

Water industry bodies identified the need for communication with the consumer, before, during and after the smart meter installation. The group considered that communications need to manage the customers' expectations and be honest about how the meter works, what data the meter collects and what benefits the customers will see.

However, as noted in the Installation section, if the full benefits of Smart are not available immediately after install (e.g. the communications network is not in place, or a company has not yet got the capability to share granular consumption data and leakage alerts with customers), then it is important not to over promise. One water company noted that initially it had installed meters without mentioning the smart benefits as they were not yet available, they would then engage the customer later once the capabilities were in place. They noted this was necessary in the early stages of the roll out, but that it is not the current approach (as they now have the capabilities in place and are rolling out the comms network ahead of the meter installs) which is proving more effective at engaging customers.

Smart Energy GB endorsed the view that it is important to get end-to-end solutions working before engaging customers on the benefits of Smart as otherwise credibility is undermined, as happened with some customers in the earlier years of smart in energy. Water companies that are already rolling out smart meters have been sharing similar lessons with other water companies (albeit this has been very time consuming with lots of bilateral meetings and duplicative requests). Also, MOSL has laid out its view of the roles of the Wholesaler and the Retailer before, during and after the installation. MOSL notes that after rollout, ongoing communications will depend on the smart metering related products and services the Retailer provides to its customers.[72]

One-to-one engagement with customers during the install is not cost effective for most installs.

Unlike in energy, most water installations do not require an appointment or access to the property, therefore the opportunity for face-to-face engagement with customers at point of install is limited. Water companies and the supply chain noted that introducing mandatory appointments or face to face efficiency advice at point of install (as in energy) would add a

70 https://www.nytimes.com/2016/11/01/opinion/australias-lesson-for-a-thirsty-california.html
71 https://www.nytimes.com/2016/11/01/opinion/australias-lesson-for-a-thirsty-california.html
72 https://mosl.co.uk/document/market-improvement/strategic-metering-programme/key-documents-smr/strategic-programmes/7997-strategic-panel-national-metering-strategy-for-the-nhh-market-1/file

huge cost to the roll out, for example a simple 20 minute replacement job could double in duration if the engineer has to knock on each door and engage in a water efficiency conversation.

Anglian noted that it does knock on the door during external installs as a courtesy when turning supply off briefly, but that the interaction is brief and often no one is in. Other interviewees advocated posting information through the door and sending follow-up communications. One water company said it had trialled leasing a retail property for drop-in visits by consumers in an area where they were doing a mass roll-out and that this had been very effective at driving engagement but was cost prohibitive at scale. Others stated they were considering having a mobile presence in areas of mass roll out, but also noted concerns about the cost impact. For internal installs there is a more obvious opportunity to engage customers in water efficiency, but again this would need to be weighed up against the cost impact.

Proactive and continuous engagement of customers post-install is critical to nudge the behavioural change necessary to reduce water consumption.

Water industry bodies commented that messaging needs to be very clear to manage customers' expectations. Initial messaging around energy smart meters was that the meter would save you money, when in fact it's the actions you take after engaging with your consumption data that could save you money and support the environment.

This is view is supported by surveys run by Anglian Water (who have already rolled out a significant number (830,000[73]) of Smart water meters), which found that customers recognise the importance of saving water but have found there is an action gap between how customers feel about saving water and what they actually do about it.[74] Through their proof-of-concept trials held in Newmarket in 2016/2017, Anglian Water identified that customer engagement is key to behaviour change. Anglian outline that education is not enough – customers need to be nudged into taking action. Education around the issue (climate change and growth) and highlighting the changes needed is the first step. This needs to be followed by building intent, developing customers understanding of importance of individual action, motivate them and create a culture that values water. Anglian suggests water companies should use behavioural science to develop nudges to take action, (e.g. comparison of usage month to month and comparison of usage vs. other similar sized properties).[75]

Severn Trent found that 67% of customers with connected meters engaged with the smart metering communications. 83% of those that logged once, have returned back to the site. Severn Trent also developed a water habits survey to better understand their customers and enable tailored advice, so far more than 5,400 customers have completed a survey.

Providing customers with visuals of their usage and supporting this with advice is helping to improve water efficiency.

Water companies that have already started to deploy smart meters are, typically, providing customers with visualisation of their usage (down to hourly in some cases) via web / app (and at a less granular level on bills). Customers can compare hourly, daily, weekly and monthly

73 Utility Week Webinar: How to supercharge your smart metering success, April 2024
74 Waterwise Conference March 2024
75 Waterwise Conference March 2024

usage, and understand trends (e.g. You used 57% less in May than you did in April.) They are supplementing this with advice to help customers understand how they can reduce water consumption and using gamification in the form of comparisons to similar homes to show customers what they could potentially save (e.g. This month you used more water than other similar homes). There are increasing number of third-party tools / apps in the market that water companies can purchase and integrate with their data and customer systems. Water industry bodies highlighted the need to make consumer data available to them as quickly and slickly as possible, drawing on methods used more recently by energy suppliers, such as gamification on easy-to-use apps.

Behavioural change takes time and then there is a further delay until the impact can be reliably measured (it is hard to establish a baseline and then to normalise for different circumstances such as weather). The early indications are that this approach is providing effective at engaging customers in their usage, as show in the sample of examples below:

- **Anglian**: Across all of Anglian's smart metered customers, 58% have a 'My Account' and receive monthly comparison emails: on average, they use 3L per day less than those who do not receive comms.[76]
- **Severn Trent found that of the 94k customers that has a smart meter installed**, 65k engaged with the communications about smart. They found that 83% of those that logged on to view their data returned to the site again, and 5.4k have completed water habits surveys at the end of customer calls.[77] Some water companies suggested that an industry-wide portal could be used to provide usage visualisation for consumers (even if it was accessed via the customer's water company website or app). Others consider it a point of differentiation to be able to provide a tailored service and noted they had already invested in their own tools.

Home water efficiency visits are highly effective when smart data is used to both target high 'value' properties and to inform the advice given.

Water companies have carried out home water efficiency for a number of years, but smart is enabling them to be more effective. These visits involve visiting homes or businesses (in person or virtually) to engage customers on their usage and to explore opportunities to save water such as by changing behaviour (e.g. shorter showers and no baths), fitting water saving devices (e.g. pressure/ flow restrictors or even rain-water / grey water recycling systems) or reducing wastage and leakage (e.g. fixing leaky loos and dripping taps). Smart data can be used to target properties where there is a higher potential saving and the data can also be used to tailor the advice (based on the usage pattern). Examples of this are provided below:

- **Thames Water**, in 2021, found that mean average PCC was 169l/p/d, but the modal amount is 115 l/p/d – meaning a small number of households have very high average daily usage and skew the average household usage and PCC results.[78] This suggests that a targeted approach will be more effective. So they target their efficiency visits only at homes with usage >500 litres/day. Through this approach they have helped consumers reduce average usage by 10% (through both behaviour change and use of water saving devices).

76 Waterwise Conference March 2024
77 Email from Severn Trent May 2024
78 Thames Water - Unlocking the value from smart metering. Smart Water System Conference April 2023

- **Severn Trent** carried out over 420 home water efficiency visits and enabled a total saving 0.08 Ml/d through behavioural change, water efficiency advice, installation of water saving products, and fixing of leaks identified.

One water company highlighted that with NHH customers it had the most success at influencing customers behaviours with companies that are high users, but not high enough to have a dedicated facilities team looking into their water consumption. For example, smaller independent hotels or some schools could save a great deal of water through a water efficiency visit.

Companies are exploring new tariffs and incentives to help drive water efficiency, but for some this will be dependent on implementing new billing systems.

There is evidence that charging for water by volume leads to more efficient water use. In their 2018 review of drought resilience, the National Infrastructure Commission outlines that charging by volume (via the use of a meter) leads to more efficient water use, with customers with standard meters reducing average consumption by 15% compared with having no meter.[79] Water companies are exploring whether there is more that could be done to further incentivise customers financially to reduce usage through new propositions enabled by smart. There was a general consensus across all interviewee groups such financial incentives would help maximising smart benefits.

Thames Water, for example, has been running a household incentive scheme, which monitors customers' consumption using their smart meter and rewards them for reducing their usage and being efficient. This has reduced customers' water use by around 5%.[80]

New tariff types can also be targeted to deliver reductions in consumption based on individual household consumption patterns.[81] Several other water companies are trialling (or planning to trial) new types of tariffs and because these are reliant on frequent data Smart meters are seen as a critical enabler. The types of tariffs that are being considered include Time of Use tariffs, such as charging higher rates in periods of water scarcity (e.g. summer) or Rising Block tariffs which charge more for water usage above certain thresholds. Several interviewees noted that for these tariffs to be feasible at scale they are reliant on old CRM and billing systems being replaced (which many companies are doing or are planning to do in AMP8) as well as regulatory support.

The need for customers to opt-in to metered billing in certain areas is proving a barrier to improving water efficiency.

In areas of the country that are not officially designated as water scarce by the EA, customers must opt-in to allowing water companies to charge them on a measured basis via meter readings. One company found, for example, that 75% of metered customers that were being billed on a measured charge would fix a leak once informed, but this dropped to 50% if the customers had a meter but was not being billed on a measured charge. Water companies in such areas said that they only provide a meter if the customer gave permission, and they are finding it difficult to convince customers to accept a meter (and measured bill). They said that

79 https://nic.org.uk/app/uploads/NIC-Preparing-for-a-Drier-Future-26-April-2018.pdf
80 https://www.thameswater.co.uk/media-library/home/about-us/responsibility/affordability/water-saving-affordability-study.pdf
81 https://www.water.org.uk/wp-content/uploads/2019/12/Water-UK-Research-on-reducing-water-use.pdfAngl

without the regulatory approval to compulsory charge on a measured basis, then high levels of meter penetration will not be achievable, limiting water efficiency. This view was also shared by Waterwise in a 2021 report.[82]

Compulsory measured charging has been considered before. In 2019, Defra and the EA consulted[83] and then, in its report 'Preparing for a Drier Future', The National Infrastructure Commission recommended that Defra "should enable companies to implement compulsory metering beyond water stressed areas by the 2030's by amending regulations before the end of 2019 and requiring all companies to consider systematic roll out of smart meters as a first step in a concerted campaign to improve water efficiency."[84] As part of this consultation, the EA recommended that additional areas in the South, East and the Midlands should be designated as in serious water stress, enabling compulsory metering to take place in those areas.

Following the consultation, in July 2021 Government announced that it would make no changes to existing rules, and that metering programmes must be "justified by water companies and achieve customer support." In 2021 (8 years after the previous update), the EA updated the determination of water stressed areas in England for the purpose of compulsory metering, adding eight additional areas.[85]

Since the 2019 consultation, new information about the water supply-demand gap has been shared and targets set to encourage water efficiency. In March 2024, at the Waterwise conference, the chair of the EA stated that he thought "all parts of the country should have a compulsory meter, not just those areas classified as water-stressed" and that "water metering is key to being water efficient."[86]

Even in areas where compulsory measured charging is allowed, companies tend to offer customers a transition after the meter is installed prior to charging them on a metered basis. CCW's view was that "where there is compulsory metering, customers should be offered the option to postpone switching to their new bill for two years, while they get used to the new system and understand what that means for their budget."[87] In a cost of living crisis in particular, this is clearly an important consideration, but from a purely water efficiency perspective it potentially delays benefits realisation if customers do not feel immediately incentivised to reduce consumption or fix leaks. On the other hand, companies to tend to show customers what they would be paying on a metered charge, which, if it is lower, encourages earlier switching or, if it is higher, can influence behaviour ahead of the compulsory switch to measured charges.

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82 https://database.waterwise.org.uk/wp-content/uploads/2021/04/Smart-Metering-and-the-Climate-Emergency-2021-Final-1.pdf

83 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/998882/Summary_of_responses_for_the_consultation_on_measures_to_reduce_personal_water_use_.pdf

84 https://nic.org.uk/app/uploads/NIC-Preparing-for-a-Drier-Future-26-April-2018.pdf

85 https://consult.environment-agency.gov.uk/environment-and-business/updating-the-determination-of-water-stressed-areas/

86 https://utilityweek.co.uk/environment-agency-chair-backs-compulsory-water-metering-and-more-hosepipe-bans/

87 https://database.waterwise.org.uk/wp-content/uploads/2021/04/Smart-Metering-and-the-Climate-Emergency-2021-Final-1.pdf

Smart meters can be used to help assess the water efficiency of new products and services.

Whilst recording usage at very granular level (e.g. every 1-5 minutes) is not feasible given battery life / economic constraints, it is possible to use smart to understand the impact of certain products. For example, by comparing average water usage before and after the installation of water saving devices or new white goods such as a new washing machine. Some water companies, for example, have used smart to measure the effectiveness of water efficiency visits, which often include the provision of new water saving devices.

Water efficiency labelling is recognised by Government as a key mechanism to encourage water efficiency. Water efficiency labelling of new toilets, sinks, dishwashers and washing machines will be mandatory by 2025.[88] Waterwise highlight in their Water Efficiency Strategy to 2039 that Water labelling has been mandatory in Australia since 2005 and by 2017 it was estimated at saving over 300 Ml/d of water and had also reduced carbon emissions and saved households an average of $175 per year.[89] Smart metering could be used to measure the impact.

The benefits of smart in the NHH market are significant and will require targeted engagement strategies

MOSL's National Metering Strategy for the NHH market outlines that:[90]

- NHHs use 3bn litres of potable water per day (around one third of the country's water).
- 1% of NHH customers use half of that water.
- NHH Customers with medium (25-65mm) and large meters (80mm and above), represent 13% of supply points, but account for 72% of consumption.

Metering in the NHH market is different to HH due to an additional party (the Retailer) being involved in the metering process. Interviewees mentioned the additional complexities of working out which party is responsible for each part of the process. MOSL's Metering Strategy has since been published and has worked to clarify responsibilities parties regarding engagement pre-roll out, pre-installation and post installation.

8.7.3. Findings

There is a risk to benefits if there is not an increase in consumer awareness of the water scarcity crisis, how smart meters can help and the role consumers need to play in tackling it.

88 https://www.gov.uk/government/news/household-goods-to-carry-water-efficiency-labels

89 https://database.waterwise.org.uk/wp-content/uploads/2022/09/J37880-Waterwise_Water_Efficiency_Strategy_Inners_Landscape_WEB.pdf

90 https://mosl.co.uk/document/market-improvement/strategic-metering-programme/key-documents-smr/strategic-programmes/7997-strategic-panel-national-metering-strategy-for-the-nhh-market-1/file

This is based on a number of factors including:

- Research suggests that awareness of water scarcity and the role of smart water meters is low.
- National campaigns in energy have played an important role in recent years. From Smart Energy GBs econometric modelling in 2023, they found that their campaigning activity drives 50% of smart meter installations[91].
- There was a unanimous view from all stakeholders that without a consistent, independent, trusted message it will be difficult and costly for water companies to engage customers on their own.

There is a risk to benefits if companies do not engage customers effectively about the purpose and benefits of smart meters (ideally starting with the install journey).

This is based on a number of factors including:

- In energy, engagement with customers during the install journey has been important to helping customers to engage with their smart meter data.
- Water companies have found that customers are often cynical about the purpose of a meter and do not always appreciate the benefits it can bring.
- Water companies have found that engagement around the time of the install is effective as the event creates awareness (but only if the benefits are available at the time to avoid undermining credibility). This need not be face to face (as this can add time and cost to the install) but could take the form of posting materials at time of install with follow up via email or other channels.

There is a risk to benefits if companies do not provide customers with regular insight about their usage along with advice and nudges to reduce usage (as near to real time as possible).

This is based on a number of factors including:

- In energy a critical driver of benefits was the ability to give customers "direct" insight into their usage in real time (e.g. via IHDs or more recently near-real-time apps). In water, the current smart solutions do not typically provide the opportunity for "direct", real time insight into usage due to limitations in the battery life and location of meters.
- However, as in energy, water companies do have the opportunity to provide "indirect" insight (e.g. allowing customers to see hourly consumption for the day before) as well as longer term patterns and comparison to others similar households. Water companies have found that this can be effective at influencing behaviour, but only if accompanied by advice and nudges to turn awareness into action on a sustained basis.
- This is, in turn, heavily dependent on investment from water companies to drive a step change the way they engage customers with their usage. Traditionally water companies have provided annual bills and minimal insight into actual usage, whilst advice has been generic rather than tailored and often in ad hoc, one-off campaigns. Smart provides a transformational opportunity, but will require people, process and system change to realise the benefits.

91 https://committees.parliament.uk/publications/40843/documents/198994/default/

There is a risk to benefits if companies do not provide direct and tailored advice to customers through targeted one-to-one interactions.

This is based on a number of factors including:

- In energy, each installation visit involved providing customers with energy efficiency advice which has helped customers engage with their usage. In water this is not economically feasible as most installs are external and do not require an appointment or face to face time with a customer (and if they did it would add material cost). It is possible to provide insight indirectly via mail or other channels, which is still valuable.
- Water companies do, however, have the opportunity to provide one-to-one home efficiency visits to a proportion of customers. These visits have been a key driver of the benefits that have already been achieved by those water companies that have started rolling out smart at scale. Evidence suggests that benefits will not be achieved if these visits are not well targeted (using smart data to identify highest 'value' properties) or tailored to the property (using smart data to provide insight into usage patterns).

There is a risk to benefits if companies do not provide customers with financial incentives to reduce water consumption (such as via new tariffs).

This is based on a number of factors including:

- In energy, financial incentives have been effective at both influencing customers to accept a smart meter and then also to change their behaviours to use less, or shift usage to periods of time which better support renewable sources.
- Water companies who have already rolled out smart at scale have evidence to suggest incentives have helped reduce usage.
- There are barriers to water companies being able to provide incentives, such as through innovative tariffs, as many will require new (or significantly modified) IT systems as well as policy, process and data changes that require investment. Some also suggested regulatory changes may be required.

There is a risk to benefits if companies are not able to move customers on to measured bills.

This is based on a number of factors including:

- Customers that pay based on actual the volume of water consumed, use materially less water than those who are billed on an unmeasured basis – and those with smart meters, rather than visual or AMR meters, use even less. Over 2022/23 Anglian Water found unmeasured customers used on average 175 l/h/d, compared to 121 l/h/d for smart metered customers.[92] To maximise water efficiency benefits it is therefore preferable to have as close to 100% of customers on a smart meter and being billed on a measured basis as soon as economically possible.
- However, companies with customers in areas that are not deemed water stressed are not able to compulsorily charge on a measured basis and are finding it difficult to persuade customers to opt in. This also makes their roll-out less efficient than if they could go street

92 https://www.anglianwater.co.uk/SysSiteAssets/household/about-us/pr24/ANH29-Enhancement-strategy-Sustainable-growth.pdf

by street to every property rather than only visiting a property once permission has been granted.

- Customers in water stressed areas may not be billed on a measured charge for 2 years after a meter is fitted.

There is a risk to benefits if insight is not used to both influence consumers to use more water efficient products and to influence manufacturers to improve the water efficiency of their products.

This is based on a number of factors including:

- In energy, it has been demonstrated that 'set and forget' solutions (such as buying a more energy efficient boiler or washing machine) are more effective than ones where a customer has to continuously change their behaviour (e.g. turn off devices / heating when on holiday).
- Water saving devices (e.g. flow regulators) have been proven to improve water efficiency, but these are often only used as a result of water efficiency visits, which relatively few customers receive.
- Studies suggest that the use of more water efficient products (such as washing machines and dishwashers) can have a significant impact on water efficiency, but giving customers the insight and nudges to choose these products is critical. Smart metering can help enable this by both providing usage data and through the associated customer engagement opportunities it presents.

There is a risk to benefits if companies delay the roll out of metering to NHH customers due to uncertainties around customer engagement roles and responsibilities between the wholesaler and the retailer

This is based on:

- A perceived lack of clarity between retailers and wholesalers around roles and responsibilities. We note the MOSLs recent National NHH Metering Strategy will help to address this risk (which was identified its prior publication).

There is a risk to benefits if New Appointments and Variations (NAVs) do not install smart meters or provide demand reduction information for customers.

- Water companies and a water industry body said they did not believe that that NAVs have regulations or incentives in place to install smart meters or provide usage data to their customers. According to Ofwat[93] there are 9 NAVs in the market serving over 1,000 sites and around 85,000 properties.

8.7.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.1 Establish a smart delivery governance capability.
- 4.2 Establish national campaigns to increase engagement.

93 https://www.ofwat.gov.uk/regulated-companies/markets/nav-market/

- 4.5 Establish Benefits Realisation standards and guidance.
- 4.6 Invest in new joint-sector solutions.
- 4.8 Establish and govern data standards and data sharing.
- 4.9 Enable smart tariffs and incentives.
- 4.11 Enable compulsory measured charging nationwide.

8.8 Enablers to influence customer-side losses and leaks

8.8.1. Lessons from Energy Smart Metering

There are no direct lessons referenced here as customer side losses and leaks are not a typical feature of the energy market. Broader lessons around how to nudge customers to take action are covered in the previous section.

8.8.2. Lessons from Smart Water Metering

Customer side leakage and usage are reported separately.

Water consumption and leakage are recorded separately for regulatory purposes:

- Customer Side Leakage: Leaks from a pipe between the property boundary and the property building, in addition to leaks on a Water Company's own network.
- Consumption/Usage: Intentional usage by customers as well as leaks on pipes in the home and wastage via e.g. leaky loos or dripping taps. Measured by Ofwat on a Per Capita Consumption basis.

This treatment is important as it impacts the performance measures by which water companies are financially incentivised or penalised (which are separate for customer usage, business usage and leakage). Customer side leakage goes into the overall leakage calculation along with leaks outside the customer boundary (often called "network leakage", which is out of scope of this report).

Several interviewees felt it would be far simpler to simply treat all water use, losses and leaks within the boundary of the property under one measure and noted that the distinction can lead to inefficient outcomes, with various parts of a water company often responsible for different measures with conflicting priorities.

We note, however, that Ofwat consulted on this already as part of PR24. In the consultation of the draft methodology for PR24, Ofwat considered whether to set three separate performance commitments (business demand, household customer demand (PCC) and leakage), or combine them into a single water demand performance commitment.[94] Ofwat considered all responses and decided to keep them separate measures enabling companies to track how performance against the following targets:[95]

- 50% reduction in leakage from 2017/18 baseline.

94 https://www.ofwat.gov.uk/wp-content/uploads/2022/07/Draft-methodology-main-document-3.pdf
95 https://www.ofwat.gov.uk/wp-content/uploads/2022/07/Appendix-6-Performance-commitments-1.pdf

- Reducing personal water consumption to 110 litres per head per day (l/h/d) by 2050.
- Show progress towards Defra's proposed Environment Act 2021 target of reducing use of public water supply in England per head of population by 20% by 2037.

Customer side leakage policies are different across the sector and stakeholders would welcome a consistent approach.

Broadly speaking, customers are responsible for fixing leaks on their property (unless caused by a faulty asset installed by the water company such as a meter). However, some companies offer free fixes to customers and others do not – with a variety of variations in between. Several water companies reported that with smart the number of customer side leaks that can be identified increases substantially (a 10-fold increase in one case). As a result, it was not feasible to offer free fixes, so companies have changed their policies. Several companies reported that customer satisfaction with leakage journeys increased once they no longer offered free fixes, as customers were pleased to be told about the problem and accepted responsibility (whereas previously when a water company tried to fix a leak, they would inevitably get associated with the disruption that a leak / fix often causes).

Interviewees from water companies agreed that a standard baseline policy across the sector would be welcome to avoid inconsistencies in service levels, to help manage customer expectations and to avoid the duplicate cost of each company separately developing new policies (that would be required with smart). The majority believed the policy should be for customers to fix their own leaks, with the water company responsible for helping them identify the leak. They agreed there may need to be some limited exceptions such as support for customers in certain vulnerable situations, which is endorsed by a water industry body, which highlighted that people in poverty are less likely to pay for a one-off fix, even if it did save them money in the longer term.

Sophisticated analytics on data from smart meters is being used to identify customer-side leakage and losses.

Water companies that have already rolled out a significant number of smart meters are delivering material benefits through analysing consumption patterns to identify leaks and losses on a customers' property then informing the customers so that they can fix the issue. Examples include:

- Thames Water calculate that of all water consumption in unmeasured homes, on average around 6% is wastage and 9% is customer side leakage (CSL). They found that "on moving to a smart meter, customers eliminate almost all CSL" as well as a significant reduction in wastage. [96]
- Thames Water also found that a large proportion of water (30%) supplied to Non Household properties is continuous flow (which they classify as at least 1 litre continuously flowing for at least 14 consecutive days). Lettering of small businesses with this information and advice increased the number of customer fixes by 7%. [97]

96 Thames Water: Unlocking the value from Smart Metering – Smart Water Systems Conference 24 April 2023
97 Waterwise Conference March 2024

- Anglian Water's leakage analysis shows that leakage (internal and external customer side leakage) is reduced by 10 litres, per household, per day, on average, for every smart meter installed. The majority of these were already metered, with around 5% being new connections/ meter optants.[98] This does not include and additional behavioural change benefits.
- Anglian and Severn Trent both found that around 75% of customers will fix leaks once notified. For Anglian the fix was usually completed within 10 days of being notified. Severn Trent found this reduced to around 53% if the customer had a meter but was not being billed on a measured charge.
- Of Anglian's remaining 25% of customer leaks that remain un-repaired, the majority are below 8 litres per hour.
- Severn Trent have found that smart meters have enabled them to identify leaks/continuous flow 104 days faster than they would have using AMR data. Over 2023-24 the average duration of a closed leaks or closed continuous flow periods, on smart meters, was 40 days.

There are different levels of sophistication in the analytics being applied – some have used basic leak alarms on the meters that are configured to raise an alarm if there has been continuous flow above a certain rate for a certain period of time. Some interviewees found this was too crude and that it was better to analyse the underlying consumption to determine the issue and resolution and strongly recommend removing complexity from meter functionality and focusing on data analytics. They believed this could give a much richer and more nuanced view of leakage as different patterns could indicate different situations e.g. a temporary high use, compared to a continuously flowing toilet or an increasingly leak major pipe.

The volume of leaks and losses that can be identified by smart are substantially higher than historic levels, but traditional approaches to customer side leakage need transforming to enable the benefits.

Water companies that have already deployed smart meters highlighted that the volume of leaks that are identified by smart are substantially higher than historic, non-smart levels. Anglian Water, for example, identified 100k properties with continuous flow in 2022/23 compared with less than 10k per year historically (and this will rise further as more smart meters are deployed).[99]

To drive the benefits from stopping these leaks efficiently, it is necessary to develop robust analytics and decision logic as well as highly automated customer journeys: this means distinguishing between different types and sizes of leaks to determine the right treatment paths and communications to use and then using automated, digital-first journeys to engage customers promptly and effectively. This is very different to how many water companies have handled this in the past and interviewees noted that investment is needed not only for system changes, but operating model, culture and process change to handle the volume efficiently and effectively.

Leak allowances mean that customers do not pay for lost water for a period of time.

In the Household market, under license condition H (which relates to household and non-household) companies are required to reimburse the cost of water lost on the supply pipe, though leakageby way of credits to bills, once a leak has been fixed. The company can refuse

98 Interview with Anglian Water 2024

99 Utility Week Webinar: How to supercharge your smart metering success, April 2024

leakage if the customer has "not arranged for the repair of the leak within any reasonable timeframe specified by the company". With smart AMI meters it is possible to detect leaks and notify customers far quicker than it has been historically (at properties with a dumb, AMR or no meter). Some interviewees noted that what is deemed a "reasonable timeframe" should change with smart.

Similarly in the NHH market, as MOSL points, the "allowance was introduced to recognise that most NHH customers do not, or cannot, read their meters regularly and that it could be many months before a leak is identified at the next meter reading, by which time the customer could be facing an excessively high water bill. By contrast, smart metering makes it possible to identify potential customer-side leaks within days or even hours of the occurrence and take remedial action". Consideration should be given to whether the policy around leak allowances should change for customers receiving Smart data, for both household and non-household.

New developments are not always as water efficient as they should be.

Several interviewees noted that new developments often have continuous flows or leaks and felt more should be done to ensure new developments were more water efficient. Analysis provided by Thames Water, for example, suggests that 6% of all new homes have continuous flow (with leaky loos the most common cause). They also found that real-life water use levels do not achieve Buildings Regulations target levels of 110 l/p/d.[100] The WRC also conducted research which found that the majority of new build homes (before taking into account leakage or any household behaviour), do not comply with the building regulations.

Enabling Non Household benefits is critical, but has unique challenges the must be tackled.

Several interviewees mentioned the relative difficulty of metering NHH premises when appointments are often required (which is more often the case than in HH). This complexity should not prevent urgent action, however, as the potential water saving benefits are substantial.

Thames Water identified that 30% of all water supplied to Non-Household properties is continuous flow (classified as at least 1 litre continuously flowing for at least 14 consecutive days). Thames found that sending letters to small businesses with this information and advice increased the number of customer fixes by 7%.[101]

8.8.3. Findings

There is a risk to benefits if there is not a more consistent approach to measuring and responding to customer side loses and leakage and a revision to leak allowances.

This is due to a number of factors including:

- Distinguishing between measures and incentives for improving customer side usage and losses versus leaks causes complications and potentially unhelpful incentives.
- There is no consistent definition of what constitutes a continuous flow.
- Customer side leakage policies are different across the sector and stakeholders would welcome a consistent approach so that consumers are clear that it is their responsibility to

100 Thames Water: Unlocking the value from Smart Metering – Smart Water Systems Conference 24 April 2023
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fix leaks on their property (other than in some exceptional circumstances).

- The volume of leaks and losses that can be identified by smart are substantially higher than historic levels, policy changes are required to handle the higher volumes (e.g. if a water company has a policy to visit each property with a potential customer side leak then this may not be feasible in future and could lead to delays or excessive costs to fix issues).
- Leak allowance policies reduce the incentive for customers to fix leaks quickly.

There is a risk to benefits if water companies do not invest in the full range of capabilities required to not only identify leaks and loses, but to help customers resolve them.

Capabilities requiring investment include the following (based on insight from water companies as well as Baringa's experience of best practice for similar customer journeys), but it is not clear whether all water companies have budgeted and planned for the scale of change required:

- Identifying leaks and losses at the scale required will need new, sophisticated analytics tools, but also people with the skills to continuously improve analysis to more accurately diagnose the likely cause (e.g. identifying from the flow patterns what is likely to be a leaky loo vs a leak that is getting progressively bigger).
- Once an issue (and its likely cause) is diagnosed, the water company will need to determine the next best action by taking into account other variables such as the customer's circumstances (for example, if the customer is already in a high bill journey, is vulnerable or has no email address, then the actions may differ). This will require decisioning tools and people with the skills to continuously improve the logic.
- Once the right next best action has been determined, this needs to trigger a customer engagement journey which should be automated (other than by exception such as for a vulnerable customers or for a leak so large it needs an urgent call/ visit) and may span multiple channels and multiple stages (e.g. may start with an email then progress to email then letter then call over a period of time if no response at each state).

There is an opportunity to accelerate benefits if developers are held to account for ensuring new homes are water efficient, using smart metering data.

This is based on the following factors:

- Analysis from Thames Water using smart data, suggests real-life water use levels in new developments do not achieve Buildings Regulations target levels of 110 l/p/d and that 6% of all new homes have continuous flow (with leaky loos the most common cause).[102]
- If similar analysis was consistently undertaken across the country and then used to drive action to improve performance, then this could accelerate benefits.

There is a risk to benefit realisation if water companies delay metering NHH customers.

This is based on the following factors:

- Analysis from Thames Water identified that 30% of all water supplied to Non-Household properties is continuous flow (classified as at least 1 litre continuously flowing for at least 14 consecutive days).

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- Smart metering will enable potential customer-side leaks and losses to be identified within days and enable the NHH company to take faster remedial action than they would have been able to otherwise.

8.8.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.5 Establish Benefits Realisation standards and guidance.
- 4.7 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.8 Establish and govern data standards and data sharing.
- 4.11 Enable compulsory measured charging nationwide.

8.9 Operating Model and Change

8.9.1. Lessons from Energy Smart Metering

Smart has required huge investment in systems, people and processes, and a joined-up approach is required across different parts of an energy company is critical to success.

Interviewees from energy noted that smart has had a huge impact on the systems, people and processes needed within energy companies, requiring transformation across new and existing customer journeys. Several interviewees from energy noted that there have been challenges at times within energy companies to ensure all capabilities work together to support smart deployment and benefits realisation. In some cases the companies had separate reporting lines within the organisation for each of the following: managing the smart programme; installation and maintenance activity in the field; generating customer demand and appointments for smart meters; managing the channels through which customers are engaged about smart; developing the tariffs, products and services that leverage smart meters to drive benefits and regulatory reporting. Several noted that this has often led to conflicting priorities and a lack of end-to-end management of journeys and issue resolution.

Energy companies have tended to organise themselves in a way that prioritises meeting installation targets rather benefit realisation.

Interviewees from energy noted that the overwhelming priority for energy companies when it comes to smart (particularly in the early years, but even now), has been on achieving installation targets rather than on delivering the benefits of smart, such as energy efficiency. The vast majority of teams involved in smart have been responsible for activities across the deployment journey (such as generating appointments or installing meters) rather than in driving energy efficiency (other than the regulatory obligation to offer advice at install), whilst products, discounts and tariffs that encourage customers to accept a smart meter have been far more prevalent than those focused on rewarding a reduction in usage.

Detailed management information and continuous improvement is critical to improving outcomes.

Energy companies have, over time, improved the MI (management information such as key performance information) through which they manage end-to-end performance of their smart programmes. This was not only necessary to demonstrate whether they had met the regulatory obligation to "take all reasonable steps" to install meters for each customer, but more importantly, to help improve outcomes such as more efficiently generating appointments, successfully completing jobs and receiving reliable data from communicating meters. Baringa's extensive experience in helping organisations to improve MI is that most companies under-estimated and under-invested in the amount of MI they needed to capture and the size of the team needed to use this MI on a day to day basis to drive improvements throughout the end-to-end journey and across all parts of the operating model (including 3rd parties).

8.9.2. Lessons from Water Smart Metering

Smart metering will require significant investment and transformational change within water companies to be successful.

Thames Water and Anglian, the two companies that have rolled out the most smart water meters to date, both stressed the need to not underestimate the amount of change required to prepare for smart metering and Thames noted that the traditional water company business model is not set up to 'action what you find' from data insight.[103] Based on Baringa's engagements across energy and water, a sample of changes required include:

- System and data architecture and tools that can handle a significant increase in the volume of data provided by smart meters and enable it to be processed in the time frame required (e.g. next day visualisation of granular consumption).
- Establish new demand reduction capabilities to a) provide customers with compelling usage insight and advice to nudge them to reduce usage and b) identify and diagnose customer-side losses and leaks and then engage and support the customer to fix them. This requires new and enhanced IT systems, integrations and automations, but also, crucially, a radically different operating model and set of skills. This is likely to include establishing an enduring, multi-disciplinary team with skills spanning data science and analytics, behavioural science, workflow and journey design, system configuration, experts from both customer operations and field operations as well as communication / marketing specialists to create and continuously improve engagement with customers to drive action.Changes to traditional customer side leakage policies, processes and accountabilities to ensure a customer-centric, data-led approach rather than traditional field-focused approaches.
- New tariffs and marketing campaigns.
- A significant increase in the size of the field workforce (whether internal or 3rd parties) to install meters at the rate required, with different skills for different install types, as well as the central functions required to plan and manage the roll out.
- Changes to improve the level of automation and data quality of meter exchange processes.

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- Enhanced and tailored customer engagement journeys to support deployment (pre, during and post installation), including online appointment booking capabilities with real-time availability for installations requiring appointments.
- New, enduring meter operations teams responsible for monitoring meter health and taking action to ensure meters are operating and communicating as required.
- Transformation of core customer service journeys, such as billing, debt and home move, to leverage smart data to improve customer experience and efficiency (e.g. accurate bills, automated home move, debt prevention).
- New training for contact centre staff to handle customer queries related to smart as well as new information via websites and other channels to enable customers to understand smart, to self-serve and avoid the need to contact or complain.
- A model office (for a period) to help implement and improve the changes to customer journeys through testing and learning (one water company noted this approach had helped them efficiently implement changes related to smart, for example).[104]

8.9.3. Findings

There is a risk to benefits if water companies do not deliver the level of transformation required.

This is based on several findings including:

- Lessons from energy and water to date indicate that the level of change is significant and that most companies in both sectors have underestimated this.
- Through our interactions across the sector, we believe that most companies will need to embark on a significant transformation journey to establish these capabilities, but some do not yet appear to have the budget, plans or designs in place to deliver the required level of change.
- Traditional operating models, systems and skills are not fit for purpose: to enable smart benefits will require a far greater level of customer-centricity and data-led approaches than typically exist in many water companies today. Many water companies are also changing CRM and billing systems now or in the near term: this will need to be done hand in glove with the smart programme to develop optimal, smart enabled journeys or this could lead to lower levels of benefit, regret spend or change fatigue across the impacted parts of the organisation.

8.9.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.4 Establish Technical and Operational standards and guidance.
- 4.5 Establish Benefits Realisation standards and guidance.
- 4.8 Establish and govern data standards and data sharing.

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8.10 Industry Regulation and Collaboration

8.10.1. Lessons from Energy Smart Metering

The energy roll-out is coordinated at a national level by a delivery body – the Smart Metering Implementation Programme (SMIP).

Early on in the rollout, it was determined that a delivery body was needed to support Smart (noting that Ofgem, like Ofwat, is a regulator as opposed to a delivery body). This led to the creation of The Smart Metering Implementation Programme (SMIP) within the Government (now within DESNZ) to act as an industry wide body, responsible for coordinating the roll out and working through issues. SMIP is one of the largest and most high-profile programmes in government.[105] The department determined the high-level design of the smart metering system, then private companies implemented and operate the system (e.g. suppliers, meter manufacturers, communications networks). The Programme is funded by suppliers, as opposed to HM Treasury.[106] Interviewees from energy were surprised that there was not the equivalent delivery body for water and believed something similar would be needed in water.

DESNZ states that without government intervention through the SMIP, to establish common standards for example, that there was "a risk that the roll-out could have been slower, more expensive and less secure, as it is unlikely all suppliers would have rolled out smart meters at the same time or to the same specifications, resulting in lower economies of scale for meter manufacturers and higher average costs."[107]

Once DESNZ views the rollout as complete, responsibility for smart metering will pass to Ofgem and the Smart Energy Code (SEC) governance. DESNZ is in the early stages of planning this transition and will need to keep the right controls and regulation in place, as well as managing the complexities of smart metering (e.g. some premises cannot have a smart meter, but metering manufacturers are stopping release of traditional meters; and many existing meters are connected to 2G and 3G networks that are due to be switched off). Meanwhile, Ofgem's current role in smart includes monitoring the programme and carrying out a cost / benefit analysis in 2019.[108]

SMIP monitors and shares information to drive improvements and plays a convening role to bring stakeholders together to share best practice and resolve issues.

Part of the SMIP remit is to provide an SDG team, which captures performance metrics from suppliers and publishes these on a quarterly basis, as well as capturing and sharing best practice.[109] This enables energy suppliers to see how they are performing compared to others with the aim of helping to de-risk deployment and improve standards via comparison. The report covers meters operating and meters installed.

It also acts as a convening body to bring stakeholders together to share knowledge and resolve issues. The National Audit Office highlighted good practice in DESNZ's approach to smart

105 https://committees.parliament.uk/publications/41730/documents/206773/default/

106 https://www.nao.org.uk/wp-content/uploads/2023/06/update-on-the-rollout-of-smart-meters.pdf

107 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

108 https://assets.publishing.service.gov.uk/media/5a7962d8e5274a2acd18c6b7/7224-gov-resp-sm-consumer-engagement.pdf

109 https://www.gov.uk/government/collections/smart-meters-statistics

metering through "engaging with a range of stakeholders to identify and help remove barriers, working with suppliers to speed up installation rates... and sharing good practice between suppliers."[110]

There is a central cost benefit analysis for smart energy to inform decision making, which is periodically refreshed.

A national cost / benefit analysis was developed across the whole sector. The National Audit Office (NAO) identified the importance of up-to-date data to enable confidence that smarter meters are delivering the intended benefits. The NAO believe that evaluating energy savings requires large samples of data, collected over an extended period of time, which includes data from more recent installs. A more recent evaluation of benefits could enable DESNZ and Smart Energy GB to demonstrate the benefits of smart and encourage uptake.[111] The NAO report outlined that DESNZ recognises that annual updates on costs and benefits to the rollout would also be beneficial from a transparency and accountability perspective.[112] Water could learn from this by establishing a CBA and then refreshing it on a regular basis.

Energy companies are obligated to deploy meters.

Energy companies are obligated to install smart meters – originally the regulation required them to take "all reasonable steps" to install a smart meter in every premise. In 2022 the government introduced a new four-year regulatory framework with binding installation targets for suppliers instead. Customers, however, have the right to refuse a smart meter. Interviewees from energy suppliers believe this needs to change, although it was noted that even if there was a mandate from government, customers still need to allow access to their property to replace the existing meters (as the vast majority of electricity meters are internally fitted).

Collective industry investment and collaboration has been critical to solving issues, setting standards and sharing knowledge.

In energy, the central oversight of the programme has enabled coordinated activity for the benefit of the sector. This has included:

- The establishment of several entities to procure and run capabilities for the benefit of the sector (further details provided in the Commercial and Sourcing section earlier), such as:
  - DCC (Data Communications Company) – which provides a common set of communications infrastructure that all meters use;
  - Smart Energy GB – a not-for-profit organisation which promotes smart metering nationally; and
  - AltHan Co – which provide solutions for connecting hard to reach meters.
- Defining standards for minimum common functionality (further details provided in the Metering and Comms section later), such as:
  - Firstly SMETS1 (Smart Metering Technical Standards) in 2012 and;
  - Then SMETS2 in 2013, to enable the DCC telecommunications infrastructure.

110 https://www.nao.org.uk/wp-content/uploads/2023/06/update-on-the-rollout-of-smart-meters.pdf
111 https://www.nao.org.uk/wp-content/uploads/2023/06/update-on-the-rollout-of-smart-meters.pdf
112 https://www.nao.org.uk/wp-content/uploads/2023/06/update-on-the-rollout-of-smart-meters.pdf

- Establishing formal governance and knowledge sharing forums such as:
  - 'Smart Metering Directors Group' to provide a senior decision making forum during the transitional governance phase of the programme, 'Smart Metering Operations Group' to provide operational oversite of installation activity including health and safety, 'DCC operations Group' to manage DCC operations, 'Implementation Managers Forum' to allow technical change leads to meet with DCC and manage DCC development progress, and 'Consumer Reference Group' to discuss consumer facing elements and communications amongst others including a range of specific sub-groups;
  - 'Communications Transition Group' to tackle the switch 2G/3G switch-off

There has been some funding to drive innovation.

DESNZ (when BEIS) and the SMIP set up and funded large scale innovation competitions to drive value out of smart metering data. One such competition was the £8.8m Non-Domestic Smart Energy Management Innovation Competition (NDSEMIC) which looked at apps and online platforms to covert smart data into tailored, actionable insights for businesses. This competition was successful in proving the hypothesis that smart energy management tools can add value to smart meter data for smaller non-households, as well as providing insight into what made tools more successful than others piloted.

DESNZ (when BEIS) also committed £6.25m to the Smart Energy Savings (SENS) competition which aimed to trial innovative feedback products and services to help domestic users reduce consumption. This competition was successful in proving the hypothesis that "more sophisticated uses of energy consumption data can deliver additional savings to those already achieved by having a smart meter installed in the home". Across all trials, customer feedback showed there was a strong appetite for energy consumption feedback, advice and recommendations to help secure both energy consumption and associated bill savings." As well as benefiting consumers, the fund also set out to support competition partners in commercialising their products, and services, enabling proof of benefits and matched grant funding and better commercial readiness.[113]

8.10.2. Lessons from Water Smart Metering

There is no central coordinating programme for smart metering across the sector.

There is no equivalent to the SMIP in Water and very low levels of intervention or guidance from government or regulators. Water companies must submit Water Resource Management Plans (WRMPs) explaining how they will help meet improve water efficiency, but they have choices as to how to achieve this. Whilst Ofwat has stated that it expects smart to be part of the solution and that future meters that are installed must be smart enabled, there is no obligation on suppliers to roll out smart meters per se.[114] Nonetheless, most water companies have submitted PR24 plans which include varying levels of smart metering deployment. Once those plans are approved, they will in effect become binding through incentive and penalty mechanisms.

113 https://assets.publishing.service.gov.uk/media/5d7f54c4e5274a27c2c6d53a/smart-meter-roll-out-cost-benefit-analysis-2019.pdf

114 https://www.ofwat.gov.uk/wp-content/uploads/2022/12/PR24_final_methodology_Appendix_9_Setting_Expenditure_Allowances.pdf

There is no collective procurement or entities established to collectively support the roll out, no agreed technical standards and no formal governance or working groups (a voluntary Smart Metering Advisory Group was set up, more details below). Interviewees from all groups stated that they felt more central coordination would be beneficial. Waterwise also highlights that water needs a collective effort similar to energy, with reducing water demand being dependent on "visible leadership from government and regulators, coupled with policy and regulatory frameworks that support water efficiency."[115] Waterwise outlined the challenge of the current roll out being disjointed, with no centrally organising body – leading to the risk that roll out takes place at different paces, to different standard and with different messages. The Consumer Council for Water (CCW) has proposed creating a central body 'Accelerating Reduction In Demand' (ARID) to coordinate water demand management efforts, evaluate effectiveness and provide strategic direction.[116]

There has been positive collaboration, but there is no formally governed and empowered convening body.

Water companies are sharing their smart meter roll out experience with others – with multiple parties praising the role Thames Water and Anglian have played as early adopters, sharing lessons learnt. There was also an informal Smart Metering Advisory Group (SMAG) formed, but interviewees had mixed views about its effectiveness, noting that there had been some useful sessions, but that it lacked the governance, independence and powers required to consistently deliver value. Interviewees believed that a government/ regulator sanctioned set of forums with specific terms of reference, aims and attendees would be beneficial.

The pace of the roll out is constrained by the budgets that water companies are able to spend within the 5-year AMP period.

The regulatory framework for water means that water companies set their plans, budgets and prices every 5 years. So, if a company wanted to try to reach c. 100% Smart AMI metering penetration within one AMP for example, this would be financially challenging for several reasons, including the limited 'base' funding that would be allowable (even with a cost adjustment claim) and the impact that such levels of spend could have on the size of customers' bills (on top of the cost of all the other investments a water company needs to make in the same time period). As a result, most companies are limiting the number of installs they plan to do in AMP8, but whilst they may hope to complete the roll out over AMP 9 or 10, they cannot currently plan for this with certainty due to the 5 year planning cycle.

8.10.3. Findings

There are risks to costs and benefits due to a lack of a joined-up approach to smart metering across the sector.

Based on evidence from energy and views from stakeholders in water, we have found that the lack of central governance across the smart roll out in water is likely to make it more challenging to deliver the benefits of smart at an efficient cost. This is due to a range of factors such as those listed below (several of which are further explored in later sections).

115 https://database.waterwise.org.uk/wp-content/uploads/2022/09/J37880-Waterwise_Water_Efficiency_Strategy_Inners_Landscape_WEB.pdf

116 https://www.ccw.org.uk/our-work/people-and-the-environment/arid/

- There is no central business case that specifies the macro costs and benefits of smart to drive consistency, transparency and to help inform decision making and plans.
- There are no formal governance forums established to tackle topics such as establishing technical standards, influencing policy and codes of practice, resolving common issues, sharing best practice, coordinated planning and supply chain collaboration.
- Ofwat is not a 'delivery organisation' and so is not set up to monitor plans and performance in order to drive better outcomes at an operational level (such as by collecting and sharing anonymised performance data alongside best practice recommendations).
- There is no body with the remit and power to establish collective solutions to common challenges such as macro-customer engagement to drive uptake and benefits of smart or developing technical solutions.
- There is a lack of clarity for the supply chain in how it can best support the roll out due to each company having differing requirements and plans.

There is an opportunity to accelerate benefits if the roll out can be done more quickly, by removing the budget constraints of the AMP cycle.

Budget constraints are a key reason why most water companies are looking to roll out smart meters over several AMP periods (i.e. over 10-20 years). The roll out could go faster (not withstanding supply chain limitation), if there were a means to removing this constraint, such as through the use of 3rd party funding providers as used in the energy sector (discussed further in the Commercial and Sourcing section below).

8.10.4. Recommendations

These findings have informed the following Recommendations (described earlier in Chapter 4: Recommendations):

- 4.1 Establish a smart delivery governance capability.
- 4.3 Develop a sector-wide business case and roadmap.
- 4.6 Invest in new joint-sector solutions.
- 4.7 Establish and govern performance reporting.
- 4.10 Consider enabling alternative investment approaches to accelerate the roll-out.
- 4.11 Enable compulsory measured charging nationwide
- 4.12 Assess and mitigate supply chain risks

9. Appendix D: Situation in energy and water

9.1 Defining Smart Metering

A water meter is a device that measures the volume of water being used by each household or non-household premises. It is fitted to the supply pipe of the property and measures the volume of water passing through the meter, in cubic metres.

Smart meters replaced traditional analogue meters. They enable the consumption data to be sent from the customers meter to the supplier automatically over a communication network. In water there are different types of meters being deployed. In this report, we are focusing on the benefits of AMI, which are considered "smart" meters.

FIGURE 9: METER TYPES AND THEIR USE IN THE WATER SECTOR.

Meter Type	Meter use in water sector
Visual or Dumb Meter	Meters that require someone to look at the dial or LCD display on a meter to record the reads.
Automatic Meter Reading (AMR)	Meter reads (and other information such as alarms) are transmitted to a handheld receiver only when a meter reading device is walked or driven past the meter. Typically, data is collected once or twice per year, though can be as often as fortnightly e.g. if attached to bin lorries. In this report we do not include these meters within our definition of Smart Meters.
Advanced Metering Infrastructure (AMI) **[Smart Meters]**	Data (such as hourly reads and leak alarm data) is transmitted to the water company at a regular frequency, remotely and automatically, via a fixed or mobile communications network. **These are the only meter referred to in this report as Smart Meters.**

9.2 Current situation of smart metering in energy

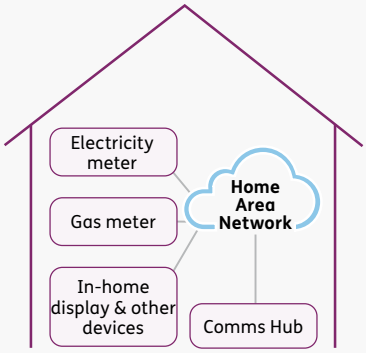
The rollout of smart meters in energy has been underway since 2011 with a centrally co-ordinated programme established in 2013 with the aim of installing smart meters in every home and small business in Great Britain. The rollout is simultaneously delivering smart meters into consumer homes and a central infrastructure to operate those meters in a deregulated and competitive environment.

In energy, each property has a smart metering system made up of multiple components:

- A smart electricity meter.
- A smart gas meter (if the consumer has mains gas)
- A communications hub (to communicate to/ from the meters) An In-Home Display (IHD)

device via which the consumer can view their actual usage in real time and manage pre-payment functionality where relevant).

FIGURE 10: HOME/OFFICE SET UP FOR SMART METERING IN ENERGY



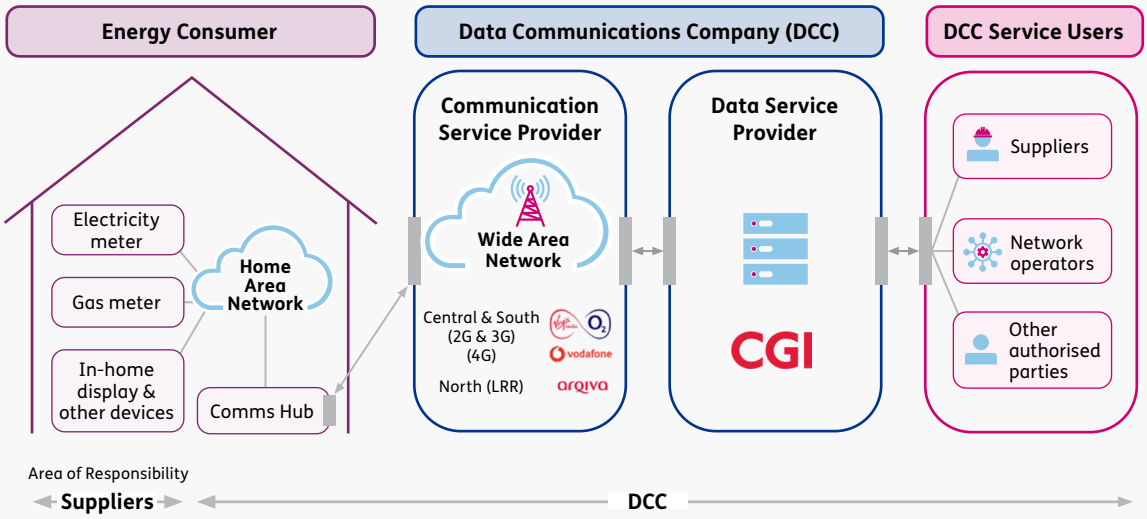
The deployment of smart meters in GB is key to enabling the Government to reduce carbon emissions to net zero by 2050 and reducing consumer bills in parallel through reducing household consumption.

The energy suppliers are responsible for supplying and fitting the smart meters and Department for Energy Security and Net Zero (DESNZ) is responsible for leading and monitoring the roll out. In 2021 the Government estimated that smart meters will benefit the UK economy by roughly £16.7bn between 2013 and 2030. On a quarterly basis DESNZ reports on the number of smart meters operated and installed in Great Britain. At the end of 2023, there were 34.8 million smart and advanced meters in GB.[117]

Communications network

The SMIP in energy uses a centralised technology and communications infrastructure with the Data Communications Company (DCC) at its centre. The DCC provide the communications to smart meters, collecting data from the assets, managing the communications (through Communications Service Providers), and the exchange of information to and from the meters and industry parties.

FIGURE 11: INFRASTRUCTURE – SMART METERING IN ENERGY



117 https://assets.publishing.service.gov.uk/media/65fc3d0a65ca2f001b7da7c5/Q4_2023_Smart_Meters_Statistics_Report.pdf

During the period when DCC infrastructure was being built, industry deployed ~15m meters that did not utilise this centralised architecture, but instead used proprietary products procured by energy suppliers. These meters offer a similar smart service to those that operate natively through the DCC but can only be operated by energy suppliers who have procured the specific systems required. This meant that consumers would often lose smart functionality when switching energy supplier.

Since 2019 ~12m of the ~15m installed first generation (SMETS1) meters have been enrolled into DCC and are now inter-operable in the same way that second generation (SMETS2) meters are and will not lose smart functionality if the consumer changes energy supplier).

Roles and responsibilities

- Data Communications Company (DCC) – provide the central technology and communications infrastructure for all energy smart metering systems in GB.
- Energy Suppliers – Engage with consumers, install smart meters, deliver energy saving advice, and maintain their deployed smart metering estate.
- Smart Energy GB (SEGB) – Increase awareness of smart metering and drive consumer uptake of smart meters.
- Meter Operators (MEM) – Install and maintain metering of behalf of energy suppliers.
- Meter Asset Providers (MAP) – Finance and own the meter asset and its installation.

9.3 Current situation of smart metering in water

In the water sector, unlike in energy, water companies are not obligated by the regulator to roll out smart meters, or any meters at all. However, they are incentivised to reduce consumption and leakage in AMP8 via three Outcome Delivery Incentives (ODIs) related to smart metering: Leakage, Per Capita Consumption (PCC) and Business Demand (non-household consumption).

To achieve these targets the use of smart meters is seen by the vast majority of the sector to be an essential enabler. Therefore, most water companies have submitted plans to install a material volume of smart meters in AMP8. Subject to approval of these plans by Ofwat, the companies will then effectively be committed to delivering their smart programmes (and crucially to deliver the benefits they have declared they will drive from them).

The EA is responsible for water stress designations.[118] A water company can install a meter and charge on that basis if the region is an area of serious water stress. A customer cannot refuse a meter in an area of severe water stress, nor can they object to the type of meter (for example a smart meter).[119] Permission is not needed to install smart meter at the boundary, on the supply pipe which is often accessed via the street. Water companies that are already rolling out smart meters, are typically targeting their roll out in the more water stressed areas of their region.

Customers can request a smart meter, but a water company is not obliged to install a meter if it is not reasonably practicable to do so, or if it is unreasonably expensive.[120]

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118 https://commonslibrary.parliament.uk/research-briefings/cbp-7342/

119 There are other instances where a water company can install a meter including, where the customer has a power shower, garden sprinkler, a pool or point and is new owner of a property – see https://commonslibrary.parliament.uk/research-briefings/cbp-7342/

120 https://commonslibrary.parliament.uk/research-briefings/cbp-7342/

Defra and Ofwat have said meters should be smart by default. In the PR24 Final Methodology, Ofwat said "We expect all companies to consider smart meter solutions as the standard meter installation type."[121]

There has been some ambiguity as to whether AMR meters should be classified as smart meters, it is our belief that they should not and, in this report, we only refer to AMI meters as Smart.

The Green Recovery Programme:

In July 2020, Ofwat, the EA, Defra, the DWI and CCW invited water companies in England to play their part in the economic recovery from Covid-19.[122] As part the Green Recovery Programme – Thames Water, Severn Trent and South West Water all received funding to progress smart metering, helping their customers to manage their water use. Companies used this funding to trial a variety of network communications, explored best practice for data standards and developed ways to engage their customers with smart metering data.

AMP8 Readiness

Ahead of AMP8, water companies are mobilising their programmes, procuring the services they need to deliver smart and developing the internal capabilities they need to both deploy the meters and utilise the data to drive benefits.

9.4 Key differences between smart metering in energy and water

FIGURE 12: KEY DIFFERENCES BETWEEN SMART METERING IN ENERGY AND WATER THAT NEED TO BE TAKEN INTO ACCOUNT WHEN CONSIDERING LESSONS THAT CAN BE LEARNT FOR WATER SMART METERING.

Attribute	Energy	Water
Switching	Customers choose their retailer	• Household: regulated monopoly, wholesalers & retailers typically the same entity provide and bill for water. • Non-Household: Retailers are separate from Wholesalers and compete for customers to switch to them (although levels of switching are low). • Wholesalers "compete" via Outcome Delivery Incentives set by Ofwat in the price review.
Regulatory obligation	Suppliers are mandated to install smart meters and achieve a set volume per year, but customer can refuse.	Not mandated, but once the companies have agreed plans with Ofwat they are committed to delivering them, with substantial incentives and penalties at risk.

121 PR24_final_methodology_Appendix_9_Setting_Expenditure_Allowances.pdf (ofwat.gov.uk)
122 https://www.ofwat.gov.uk/wp-content/uploads/2021/07/Green-economic-recovery-final-decisions-spreads.pdf

Attribute	Energy	Water
Metering Penetration	• 100% metered • 59% Smart (30/11/2023)	• 60% households in England are metered, but only 13% of those have smart meters. • Water companies are planning a roll out of smart meters, achieving around 48% smart metering of households by 2030. • Most NHH businesses are already metered, but only 8% have a smart meter. Water companies are planning to increase this to 48% by 2030. • Meter penetration varies according to how water scarce the area is.
Customer permission	Customer permission required to accept appointment to install (which is a major challenge for meeting targets)	• In water scarce areas customers cannot refuse a meter (in non-water scarce areas a meter can be installed, but customer can opt to be billed on an unmeasured basis). • Where meters are installed externally no appointment required, but appointments are required for internal installs (which therefore face same challenge as in energy).
Comms network	DCC central communications infrastructure	No DCC equivalent– each water company procuring own meters and comms network, choosing their own meter config and storing reads in their own systems.
Disconnection	Energy companies can stop the flow of energy at the meter (e.g. due to lack of payment)	Water companies cannot turn off supply at the meter.
Meter install location	• Almost all meter installs are internal so require an appointment for access. • Cannot roll-out street by street as appointments are dispersed	• 60-70% of installs are external to the property, in the pavement on the supply pipe, so no appointment required. Most companies installing street by street. • But 30-40% are internal requiring appointments for access as in energy.

Attribute	Energy	Water
Meter read & transmission frequency	• Variable read frequency, can do half hourly reads with permission • Transmitted in real time to IHD and within day to central systems	• No formal standard, but most common approach is hourly reads transmitted as a packet once a day for use the following day. • Battery is limiting factor as not mains connected so higher frequency (or real time local transmission) would reduce life of meter and significantly impact business case.
Meter power	Gas meters are battery powered. Electricity meters are mains powered.	Battery powered. Batteries currently last up to 15 years when sending 1 read per hour. Increasing the frequency of reads would decrease battery life without innovation.
In home display (IHD)	Industry mandated installation and customer introduction to the IHD during the smart meter installation.	No mandated provision of an IHD and not feasible with typical technology currently (no local area network not home, insufficient batter power to sustain real time data).
Efficiency advice during installation	Industry mandated provision of energy efficiency advice given at the time of smart meter installation.	No mandated provision of water efficiency advice during install – would severally impact efficiency of roll out if mandated as majority of installs are external with no appointment required. Emerging standard practice is provision after the installation via letter drop or other channels. Home efficiency visits (separate to the install) are given to proportion of customers (targeted based on likely opportunity informed by smart data).
Benefit to company	Enabling carbon reduction (net zero) via greater insight into usage- ability to influence behaviours and enable new propositions. Also, automatic reads, accurate bills, better service.	• Enabling water efficiency through influencing behaviour and enabling new propositions. • But also, immediate interventions to identify and fix customer side leaks and continuous flow – largely via engaging customer to self-fix. • Also, automatic reads, accurate bills, better service.

10. Appendix E: Sources and glossary

10.1 Literature review

Below is the list of literature reviewed as an input into this report. Other documents were also reviewed but not included in this list as they are not publicly available or already published online.

FIGURE 13: REVIEWED LITERATURE

No.	Publishing Company	Documents and link
1	DESNZ	Smart Meter Rollout: Cost Benefit Analysis 2019 – Aug 2019
2	DESNZ	Quarterly Statistics Energy Roll out – Nov 2023
3	DESNZ	Reviewing energy supplier evidence on impacts of smart metering on domestic energy consumption – Jun 2023
4	Environment Agency	Intelligent metering for water: potential alignment with energy smart metering – May 2008
5	WaterUK	Pathways to long-term PCC reduction -Aug 2019
6	MOSL	Panel metering strategy urges companies to accelerate adoption of smart meters – Apr 2023 (website only)
7	MOSL	Interim National Metering Strategy for the Non-Household Market – Apr 2023
8	MOSL	Strategic Metering Review (website only)
9	MOSL	Enhancing Metering Technology Report – Jun 2022
10	DECC	Smart Metering Early Learning Project: Synthesis report - 2015
11	Waterwise & Arqiva	Smart water metering and the climate emergency - 2021
12	UKWIR	Using Smart Meters to Deliver Savings for Consumers - 2019
13	EnergyUK	Energy UK response to BEIS Consultation on maximising non-domestic smart meter consumer benefits, improving the data offer and enabling innovation – Sep 2021
14	EnergyUK	The Smart Way to Net Zero – learning from smart as we roll out other low carbon technologies – Jun 2022 (website only)
15	Ofwat	Water Efficiency Fund Consultation – Jul 2023
16	MOSL	Data standards for sharing data – Nov 2023
17	UK Parliament	Delayed smart meter programme fails to hit targets and secure public support (2022 – 2023)
18	National Audit Office	Update on the rollout of smart meters (Jun 2023)

No.	Publishing Company	Documents and link
19	Smart Energy GB	Identifying audience characteristics that may act as additional barriers to realising the benefits of a smart meter (Jul 2015)
20	CCW	Smart metering for NHH customers (Jun 2023)
21	Energy Saving Trust	Success of Smart Meters (Jan 2021) website only
22	Utility Week	The truth about the long-term impact of smart meter ownership on consumer behaviour (Feb 2019) website only
23	Energy UK	Energy UK responds to the National Audit Office's Smart Meter progress report (Jun 2023) website only
24	Energy Efficiency Directive	Smart meters and consumer engagement (May 2008)
25	Utility Week	Don't kick the can down the road on smart metering (website only)
26	Utility Week	Smart Energy GB wasted money by going full pelt from day one, ex-director says (website only) (Feb 2024)
27	BEIS	A report on progress of the realisation of smart meter consumer benefits (2019)
28	Waterwise	Water Efficiency Strategy (2022)
29	DEFRA	Plan for Water (2023)
30	Waterwise	The Effect of Metering on Water Consumption (May 2017)
31	MOSL	MOSL log of all the meter tech and contacts - 2023
32	MOSL	MOSL projects looking at different aspects of smart metering to standardise (Nov 2023) Website only
33	MOSL	Training and Guidance Docs - NHH Smart Metering (website only)
34	DECC	Government response to the consultation on the Consumer Engagement Strategy (2012)
35	BEIS	SMIP: Policy Conclusions following energy suppliers' trials of alternatives to In-Home Displays (2019)
36	National Infrastructure Commission	Preparing for a Drier Future (2018)
37	CCW	Why we need ARID - response to the WEF consultation (2023)
38	CCW	Review of the NHH Market – 5 year review (2022)
39	CCW	Views of current customers on water resources (2021)
40	CWW	Stats on water meter install volumes (2023) Website only
41	Arqiva	Water Insight Guide
42	Artesia & Frontier Economics	Smart Water Metering: Marking the right decisions (Jan 2024)
43	MOSL	Non-Household Metering Strategy (Mar 2024)

10.2 Companies: Interviews & round tables

Energy:

- Energy Suppliers
- Ofgem
- DESNZ
- Data Communications Company (DCC)
- Smart Energy GB (SEGB)
- Alternative HAN Company (Alt HAN Co)

Water:

- Water companies
- WaterUK
- UKWIR
- CCW
- Waterwise
- MOSL
- Stream

Both:

- Meter manufacturers
- Communication network providers
- Meter Asset Providers
- Meter Installers

10.3 Glossary

FIGURE 14: GLOSSARY OF TERMS

Term/Company	Acronym	Detail
Alt Han Co	N/A	Organisation focused on developing solutions to help customers whose 'home area network' (HAN) – the meter, in-home device and communications hub, are too far apart – to connect with one another.
Automatic Meter Reading	AMR	Meter reads (and other information such as alarms) are transmitted to a handheld receiver only when a meter reading device is walked or driven past the meter. Typically, data is collected once or twice per year, though can be as often as fortnightly e.g. if attached to bin lorries.
Advanced Metering Infrastructure (Smart Meters)	AMI	Data (such as hourly reads and leak alarm data) is transmitted to the water company at a regular frequency, remotely and automatically, via a fixed or mobile communications network.

Term/Company	Acronym	Detail
Department for Business Energy & Industrial Action	BEIS	BEIS existed until 2023 when it was split to form the Department for Business and Trade (DBT) and the Department for Energy Security and Net Zero (DESNZ).
Communications Hub Providers	N/A	Provide the communications hub that connects the to the electricity meter. The comms hub is installed in homes and businesses to connect the electricity and gas meter to the DCCs secure network.
Consumer Council for Water	CCW	Independent voice for water consumers in England and Wales. It supports consumers in resolving complaints against their water companies. It is a Defra Non-Departmental Public Body in England and a statutory body in Wales.
Central Market Operating System	CMOS	The core IT systems for the non-household market. CMOS manages all the electronic transactions involved in switching customers and provides water usage and settlement data.
Data Communications Company	DCC	Company owns and runs the central data and communications platform. It is a secure network that connects the smart meters in homes and premises to the central platform system as well as other users.
Department of Energy and Climate Change	DECC	Created in 2008 and disbanded when BEIS was created in 2016.
Department for Environment Food and Rural Affairs	Defra	Responsible for improving and protecting the environment. Developed the Environmental Improvement Plan 2023 which sets the target for water companies to reduce leakage by 50% by 2050.
Department for Energy Security & Net Zero	DESNZ	The Smart Metering Installation Programme is part of DESNZ today. It was previously part of DECC and BEIS, predecessors of DESNZ.
Environment Agency	EA	Non-Departmental Public Body sponsored by Defra.
Energy Suppliers	N/A	Procure, install and maintain electricity and gas smart meters. Responsible for engaging with customers on meter uptake and provide energy efficiency advice.
Home Area Network	HAN	Short-range wireless network that allows the electricity meter to communicate with the gas meter and the in-home display.
In-home Display	IHD	A small electronic screen that connects wirelessly to the gas and electric smart meters. It can be used to see how much energy is being consumed and how much it costs.
Meter Asset Provider	MAP	Businesses that finance the installation of smart meters. They own the meter asset and rent them to whichever energy retailer is supplying the meter point at any given time.

Term/Company	Acronym	Detail
Meter Equipment Manager	MEM	Previously known as MOPs. A combination of the MOP (energy specific) and MAM (gas specific) but provided by the same company.
Market Operator Services Limited	MOSL	Market Operator for the non-household water retail market in England. Enabling more than 1.2 million business customers to choose who suppliers their waste and water services. Responsible for the central market operating system (CMOS),
New Appointment and variation	NAV	New appointments and variations (NAVs) are limited companies which provide a water and/or sewerage service to customers in an area which was previously provided by the incumbent monopoly provider.
Non-household	NHH	Non domestic water customers – e.g. shops, hairdressers, breweries, supermarkets etc.
Office of Gas and Electricity Markets	Ofgem	Energy regulator for Great Britain. Regulate energy suppliers and the DCC's compliance with smart metering obligations.
Smart Energy GB	SEGB	Independent, non-profit, funded by energy suppliers, organisation that helps households and businesses in GB understand how smart meters can benefit them and the environment.
Smart Metering Implementation Programme	SMIP	Government programme set up to design the smart metering system and determine the way smart meters are rolled out. Owns the policy and regulatory framework. Coordinates various other organisations such as suppliers, DCC, Ofgem and other parties.
Wide Area Network	WAN	The network which allows the smart meter to connect to the energy supplier's servers. The energy data goes through the secure DCC network through to the supplier.

Prepared on behalf of

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OC303471 and with registered offices at 62 Buckingham Gate, London, SW1E 6AJ, UK.