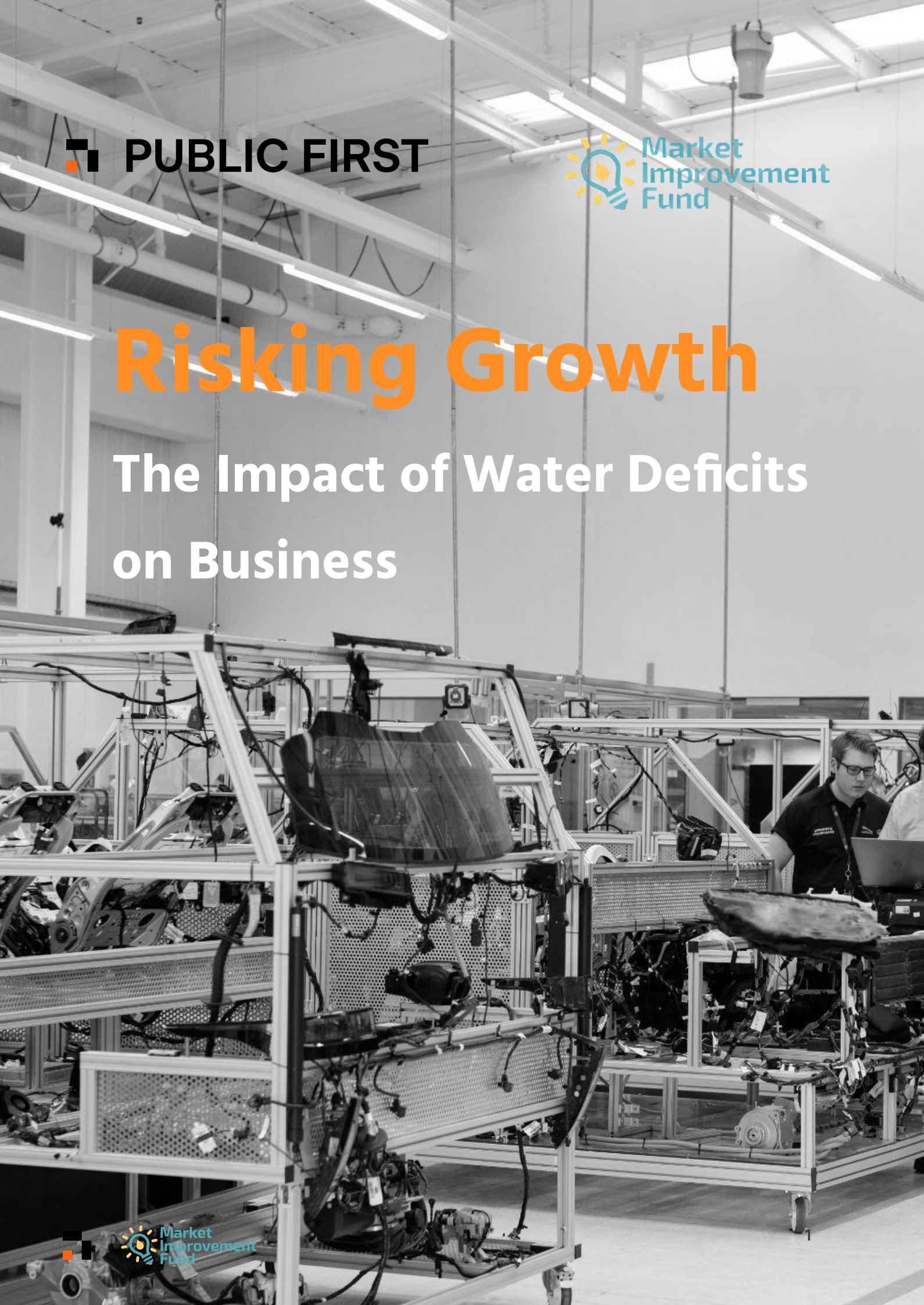

PUBLIC FIRST

Market Improvement Fund

Risking Growth

The Impact of Water Deficits on Business

CONTENTS

3 Executive Summary

9 Chapter One: Introduction

11 Chapter Two: The Cost of Missing the 9% Target

27 Chapter Three: Business User Perspectives

36 Chapter Four: Conclusion

37 Appendix: Methodology

Acknowledgements

This project is funded by the Market Improvement Fund. The Market Improvement Fund was set up to fund innovative projects that will benefit the non-household water market and its customers. The fund is overseen by the Strategic Panel (including project selection, funding allocation and progress of work) and administered by MOSL. Public First would also like to thank Waterwise for their support and guidance as a partner on this project.

Risking Growth: Executive Summary

Background

Household water use makes up around two-thirds of all water use in England, Non-Household (NHH) water use makes up the rest[1]. Any discussion of the impacts and importance of water as an enabler or blocker of growth needs to have a clear understanding of how the NHH market operates. How much water it uses and how this differs across sectors; its policy targets and behavioural trends; and the attitudes of business users themselves.

The business market is hugely variable in its water use and intensity. Understanding how the NHH market fits into the overall picture of water use is crucial to understanding the relationship between water availability and the economy's ability to grow. This is particularly relevant given the role the NHH market is being asked to play in managing water demand in England. The Environment Act (EA)[2] set targets to reduce the overall use of water in the NHH market by 2038 by 9% relative to a 2020 baseline, reductions reflected in the water resource modelling carried out by water companies as part of their 2024 Water Resource Management Plan (WRMP24).

The rationale is clear. Increasingly, water resources are becoming a blocker on business expansion and growth. In water scarce areas several restrictions are in place preventing the establishment of businesses. Were the targeted reductions in NHH water use described above not to transpire, this would contravene plans and potentially lead to planning restrictions as a result.

There has been a moratorium on new non-domestic supplies in the Hartismere Water Resource Zone since 2023[3]. This will remain in place until 2033 when the moratorium is due to be lifted. Breweries, distilleries and food manufacturing companies have all been affected.

Last year, North Lincolnshire Council were urged to reject a planning application for a hyperscale data centre near Scunthorpe due to water resource pressures[4]. Similarly, in 2024, the construction of a Cancer Research Hospital on Cambridge Biomedical Campus was temporarily halted because of water supply. The EA's 2025 October Water Resources Framework itself said that "some water companies are already removing

[1] MOSL Interim National Metering Strategy for the Non-Household Market Strategic Panel
[2] https://www.gov.uk/government/publications/environmental-improvement-plan-2025/environmental-improvement-plan-eip-2025#chapter-2-environmental-quality
[3] eswater.co.uk/globalassets/business/wtr0534-mortatoriumleafletimageov_sa_v3.pdf
[4] Anglian Water objects to Elsham Wolds data centre plan - BBC News

guarantees to reliable supplies from mains connections to leisure companies - golf courses, horse racing, sports fields - as pressure on their networks grow."

The last thing the planning system needs is another barrier. If these were isolated incidents they might be more easily ignored, but, as evidenced above, the problem of water resources preventing development is a growing one. As is the knock-on effect on economic growth.

Similarly, the short-term impacts of peak-demand phases and drought on the economy by virtue of curtailing business activity are not well-known but are growing in likelihood[5]. Company Water Resource Management Plans (WRMPs) are required to build in a level of resilience to drought of 1 in 500 years but not enough is known about the impact of droughts on business confidence and sentiment.

It's important to remember that businesses are operated by people. In the same way that efforts are being made to stimulate behaviour change in household users, it's worth considering how attitudes of business owners and operators affect how much water is used by those businesses themselves. Public First sought to answer these and other questions in this piece of research.

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Specifically, it aims to explore the trends in NHH water use and the implications for water deficits were these trends to continue, and the potential cost if these deficits lead to a block on commercial growth. It also explores businesses' attitudes themselves, asking valuable questions about users' views on water scarcity and its impact on their operations. The evidence in this report looks at the following separate strands:

1. **Business Water Use Trend Analysis**: We analysed trends in recent business water use and explored whether these trends were consistent with the business market hitting the 9% reduction target.
2. **Modelling Water Deficits and the Potential Economic Cost**: We mapped this analysis of trends onto each Water Resource Zone (WRZ) and subsequently modelled the potential for water deficits in each one, quantifying the potential economic cost were these deficits to block commercial development.
3. **Business Polling:** We ran a poll of 586 business users of water; exploring senior decision-makers' awareness, attitudes, and recent behaviour as it relates to water use and scarcity.

[5] Drought likely to continue into 2026 due to record dry weather - GOV.UK

Key Findings

1. Business Water Use Trend Analysis

We carried out trend analysis on Water Company Annual Return data submitted to and published by the EA. This data has been extracted from data submitted between 2005/06 to 2023/2024 as part of the Annual Review of WRMPs for water companies in England. We analysed long-term trends in NHH water use to understand not only the percentage decline at any point but also the rate at which that decline is changing. This allows us to accurately understand the longer term trends and project water use into future years.

Using a simple semi-log form we estimate that over the period 2005 to 2023 the annual rate of change over all water companies was -1.35%. However, this does not tell the whole story, as there are a wide range of geographical differences to contend with[6].

Whilst there has been much progress in reduction in NHH water use between 2005 and 2023, when combining all company data from 2005 onwards, we find that progress has stalled in recent years. This is likely caused by the tailing off of 'easy wins', such as the rapid roll-out of metering, the introduction of water efficient appliances (particularly in the hospitality sector), and water efficient manufacturing processes. To model this effect, we introduced a quadratic coefficient to the model. This produced some significant results for NHH water use going forward.

- **The initial decline in water use is 2.66% with a rate of change of 0.15% per annum.** The apparent stalling in water use reduction that has occurred over recent years is of particular interest when we look at the water use planned for in WRMPs.
- **This second-order trend, when extrapolated forward, suggests NHH water use will have been increasing since 2024 and will not decline further.** This suggests that the 9% target reduction will not be met.

The cost of failing to hit the target

We modelled the likely impact of these trends on future available water resources by Water Resource Zone (WRZ), the additional demand placed on NHH supplies, the deficits this imposes above supply-demand balances, and ultimately the economic cost through constrained development.

Our first scenario is based on findings from our trend analysis, that NHH water use will not continue to decrease in the coming years. We model the impact of aggregate water use at an England level staying fixed from 2025 onwards by increasing water use above levels planned for in the WRMP24. We do this proportionally based on total water use

[6] *There was also a significant dip in NHH water use during Covid. Although water use levels have recovered to pre-Covid levels since then, this shock will have influenced all estimates - as such we carried out sensitivity analysis using only data from before Covid.*

by WRZ. The findings from this scenario are outlined below:

- A flat trend in aggregate water use in England would create a water deficit (relative to what has been planned) of 13.7 Ml/d by 2035 and affect 36 WRZs
- This could potentially block up to **£10.1 billion of economic growth** by 2035, a 0.46% loss in English Gross Value Added (GVA), affecting 95 local authorities.

Our second scenario examines the subsequent economic cost in the event that half of the planned-for reduction in England-wide NHH water use was to be achieved. The findings from this scenario are outlined below:

- This would lead to a water deficit (relative to what has been planned) of **6.7 Ml/d by 2035.**
- This could potentially block up to **£5.1 billion of economic growth** by 2035.

It is worth noting that our analysis does not make any judgement on the value or merit of such targets and planning assumptions, it simply seeks to understand whether targets will be hit or not, and the consequent impact on the available headroom for development across the country.

2. **Economic benefits of planning for a 1-500 year drought.**

Whilst our modelling above analyses long-term trends, immediate short-term access to water is essential to NHH operations. From manufacturing to hospitality access to water is the most fundamental element of the production process, without which it would be impossible to operate.

Water companies have been asked to plan for 1-500 year drought events as part of the efforts to build resilience into the system against extreme weather events[7]. Under a 1-500 year drought event it is highly likely that all non-essential use will be curtailed for at least a short period. Failing to plan for such a drought could therefore have a significant economic impact.

- We calculate that businesses in the **UK will lose on average 23.2% of their revenue and 26.9% of their economic activity**, if a drought forces all business use to be curtailed for two days.

3. **Business users' attitudes to water scarcity**

We also conducted polling of 607 business decision makers in England to understand their attitudes to water scarcity. The findings from this poll show the issue is rising in importance.

While water reliability does not yet feature among the top challenges businesses face,

[7] Government resilience: extreme weather

a meaningful minority already experience unreliable supply—**around one in ten nationally, rising to one in seven in the Midlands and East of England**. At the same time, many firms say they are becoming **more**, not less, water-intensive. We also found:

- **Around half** of businesses say their water intensity has **increased** in the last five years. Among highly water-dependent firms, **85%** report rising intensity.
- **38%** of businesses plan to **increase water usage** over the next five years; this reaches **46%** in the South of England. Increases are driven primarily by **expected rises in output (66%)**. Most organisations say reducing water use is not a strategic priority for most organisations, even as usage grows.
- **61%** believe water shortages pose a risk to their business; this rises to **72%** in large organisations (250+ employees). **1 in 3** say they are more concerned now about water shortages than they have been in the past. **31%** of all businesses—and **42%** of highly water-dependent ones—do **not** feel prepared for water-related challenges.
- **62%** are interested in reducing their water intensity; this increases to **77%** for highly water-dependent businesses. However, **1 in 5** of those interested say they **do not know how** to reduce water usage—particularly smaller companies.

Overall, these headline findings point to a landscape where awareness of water risk is rising sharply, but capability and understanding have not yet caught up. Companies recognise the strategic threat and the potential for efficiency gains, but don't feel they have the tools and incentives to really solve the problem. Addressing this—through guidance, support, and targeted policy measures—will be essential if the NHH market is to build resilience in the face of growing water-related challenges.

Taken together, our economic and opinion research findings indicate that the current framework governing non-household water use is not wholly compatible with sustained economic growth;

A note on this report

These figures demonstrate that there are economic challenges upstream as a result of water scarcity. Whilst these numbers clearly show the value in doing more to boost water resources, we want to stress that throughout this report **we define "water scarcity" as a policy problem rather than a hydrological one.**

Take this example. Under our approach a hypothetical country with abundant water would still be water scarce if its planning system only allowed one household's worth of water supply per year. In this hypothetical country, two or more households (not to mention businesses) would be unable to access enough resources to satisfy their water-needs. In other words, this report is not based on the material supply and demand of water in England, it is based only on the **models of water use that feed into the policy framework for decision-making**.

Questions of water scarcity and its impact on the environment are primarily questions for hydrologists and engineers. The policy question, however, is one that is - albeit imperfectly - based on a combination of water use data and projected water use. These are the models that we use to predict the overall economic cost of decisions about which developments will go ahead and which will not. These are real-world decisions relating to whether or not a business can be established in a given area or not. This is an important distinction.

CHAPTER ONE:

Introduction

Where water supply was once assumed to be a passive input into growth, it is now emerging as an active constraint[8]. With competing pressures of climate change, population growth, water intensive industry growth, and lower capacity for abstraction, water scarcity is becoming a growing concern in terms of its knock-on impact on growth. Planning and development decisions are increasingly being made whilst having to consider whether water supplies can meet the demands of said development long into the future.

Water use in England is split between household and non-household (NHH) users, with household consumption accounting for around two-thirds of total demand[9]. Business use is an essential piece of the puzzle for water management, with intensity varying widely across sectors, firm sizes, and locations. In some cases, individual businesses or clusters of businesses place significant demands on local water resources. As a result, the NHH market is often central to the debate about the trade-off between the environment and economic growth. Waterwise's UK Water Efficiency Strategy to 2030 highlights the relevance of the NHH market with its tenth strategic objective being an increased motivation for business water-saving.

This is why policymakers have increasingly looked to the NHH sector to play a significant role in managing demand. The Environment Act introduced a target to reduce overall NHH water use by 9% by 2038, relative to a 2020 baseline. It's assumed that metering, efficiency improvements, and behavioural change will help us to hit this target. Ofwat has introduced performance measures for companies to reduce NHH demand to deliver this target. The underlying assumption is that demand reduction can help reconcile continued economic growth with tightening water constraints, allowing businesses to expand while overall water use falls. It is worth noting that our analysis does not make any judgement on the value or merit of such targets, it simply seeks to understand whether targets will be hit or not, and the consequent impact on the available headroom for development across the country.

However, there remains limited understanding of whether these assumptions will materialise, and whether the NHH sector is on track to meet these targets, or indeed whether the targets themselves are realistic given current trends and business behaviour. Our analysis suggests that while reductions have been achieved in the past, progress may be slowing or stalling. At the same time, many businesses are planning to expand output, often implying increased water demand.

[8] https://waterwise.org.uk/about-us/#section-3

[9] MOSL Interim National Metering Strategy for the Non-Household Market Strategic Panel

The worst case scenario is one in which growth is curtailed not by a lack of investment or demand, but by an inability to secure sufficient water supply for new or expanding businesses.

This research seeks to shed new light on these questions. It examines whether current trends in NHH water use are consistent with meeting the 9% reduction target by 2038; the likely consequences of falling short of planning assumptions in water deficits and economic growth; the degree to which existing water resource planning assumptions translate into real constraints on business activity and development; And crucially, how business users themselves understand their own water use.

It brings together trend analysis of NHH water use, water balance modelling of demand reduction targets and water deficits, economic modelling that looks at the impact these deficits could have on growth, drought risk, and new polling of business decision-makers. In doing so it aims to assess whether the current policy framework is compatible with sustained economic growth.

CHAPTER TWO:

The Cost of Missing the 9% Target

1. Trends in non-household water use

The first question Public First sought to answer related to whether current trends in NHH water use are consistent with meeting the 9% reduction target by 2038.

There are an increasing number of examples of water supply slowing or reducing development; North Lincolnshire Council were urged to reject a planning application for a hyperscale data centre near Scunthorpe due to water resource pressures[10]. Similarly, in 2024, the construction of a Cancer Research Hospital on Cambridge Biomedical Campus was temporarily halted because of water supply. The EA's 2025 October Water Resources Framework[11] itself said that "some water companies are already removing guarantees to reliable supplies from mains connections to leisure companies - golf courses, horse racing, sports fields - as pressure on their networks grow."

These instances suggest that a knock-on effect of a failure to meet water supply targets could have a significant economic impact. To answer this question, Public First carried out trend analysis on Water Company Annual Return data submitted to and published by the Environment Agency. This data was extracted from data submitted between 2005/06 to 2023/2024 as part of the Annual Review of water company WRMPs in England.

Methodology

Our key measure of NHH water use is the following: the sum of 'total measured non-household water delivered' and 'total unmeasured non-household water delivered'. These variables are in turn a combination of total consumption and underground supply pipe leakage (USPL) which measures the total water lost between the point of delivery from the water company, which is also the point of charge, and the tap of the NHH purchaser[12].

This measurement reflects the nature of the demand reduction target for the NHH sector – a 9% reduction on 2019/2020 levels by 2038 and 15% by 2050 - published by the Retailer Wholesaler Group Water Efficiency Sub-Group[13] (RWG WE Sub-Group). The

[10] Anglian Water objects to Elsham Wolds data centre plan - BBC News
[11] Water Resources Framework 2025
[12] Water resources 2023-2024: analysis of the water industry's annual water resources performance - GOV.UK
[13] Microsoft Word - RWG WE Road map revision - Nov 2023 - FINAL formated

target does not include reduction in leakage before the charge point and as such is to be met only by a reduction in end consumption and a reduction in USPL that is the responsibility of the customer. At scale, the 9% and 15% targets are to be met through improving the efficiency of the NHH water market. However, the targets are applied to total water use rather than any measure of water efficiency.

As other research has outlined[14] the Covid pandemic caused household water use to increase above trends, and non-household use to reduce. Due to the significant disruption to water use caused by the Covid pandemic it has been necessary to carry out the trend analysis over an extended period of time and to rely primarily on the estimated water use submitted as part of the annual review.

Findings

Observation of the data indicates that NHH water use has been declining for most water companies during the period 2005 to 2023. **Figure 1** illustrates the trend during this time period by water supplier. As the Figure indicates there is a steady decline between the years 2005 and 2012 for most before a flattening off during the following years up until 2019. 2020/21 - a year significantly impacted by the Covid pandemic - saw a big reduction, before NHH water use increased over the following few years.

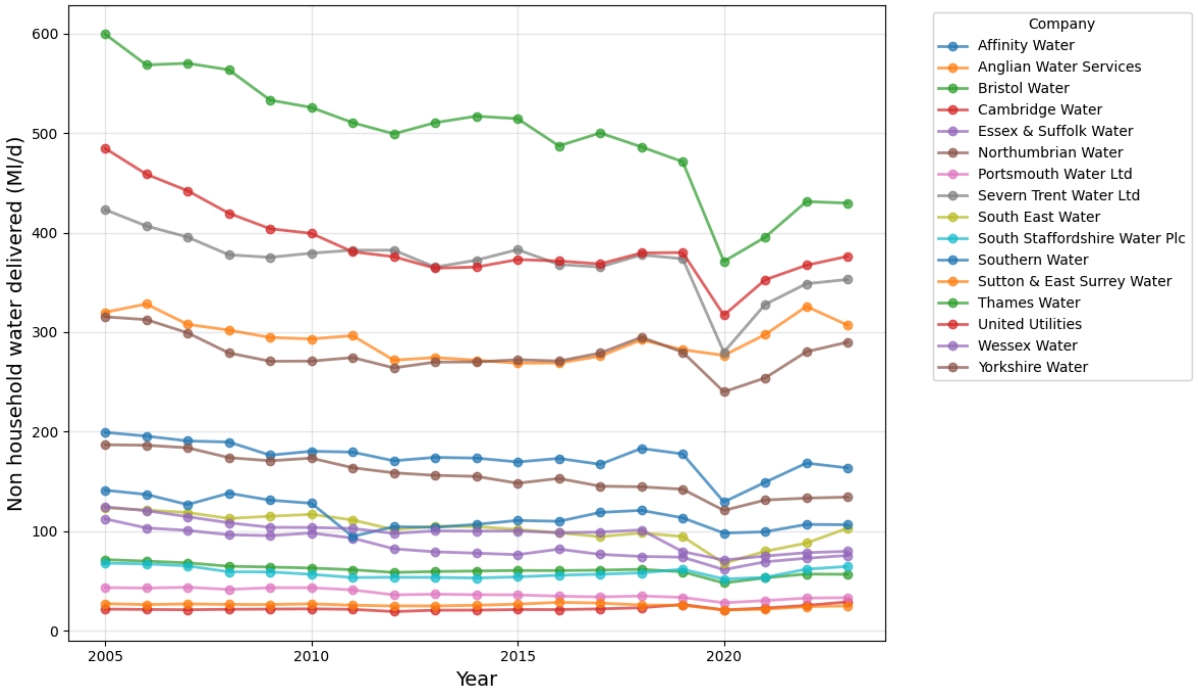


Figure 1: Non household water delivered by water company

In this section we investigate these trends further. Firstly, we use a log linear regression

[14] Collaborative water sector study on the impact of COVID on water use (2463) – Artesia Consulting

that allows us to estimate the average annual percentage drop in water use over the full period. Secondly, we use a log quadratic form that allows us to model the annual percentage drop **and** how this drop flattens out over time - this provides a much better model for the trend These methods allow us to understand both ***the first order rate of decline***, as well as the ***second order rate of change of decline***

The rate of decline in commercial water use is slowing down

Observation of the data suggests NHH water use has declined over the period 2005 to 2023. We investigate this trend by first modelling the decline using a simple log linear structure.
Using this model, we can see that the long-term annual trend in measured and unmeasured water delivery in the NHH sector over the period 2005 to 2023 is -1.35% per annum. This implies a total drop during an 18-year period - the period of time for which the 9% target is to be achieved - of 21.7%. Ignoring the period from beginning to end of the restrictions imposed by the Government during the Covid pandemic, carrying out the analysis between the years 2005 and 2019, suggests an average annual drop of 1.30%.

It is worth outlining however that much of this reduction occurred in the first decade of the 21st century, with more recent improvements occurring more slowly. Between 2013 and 2023 for example, the annual rate of NHH water use reduction was 0.96% per annum. Were the more recent ten-year trend to be applied to the period 2019 to 2037, this would equate to a 15.9% drop - meaning the NHH sector would still easily surpass its 9% target.

Commercial water use trends vary significantly by region and supplier

Beyond the headline use figures, there is significant variation within the data by water supplier during this period, although almost all do indeed decline. Figure 2 illustrates the annual growth rate of NHH water use by company over the period 2005 to 2023. Five companies achieved an annual reduction in water use during this period of over 2% - Essex and Suffolk, Wessex Water, Northumbrian Water, South East Water and Portsmouth Water. The growth in water use in Cambridge is likely caused by the significant population growth that has occurred in the area during this period, and the growth in the economy.

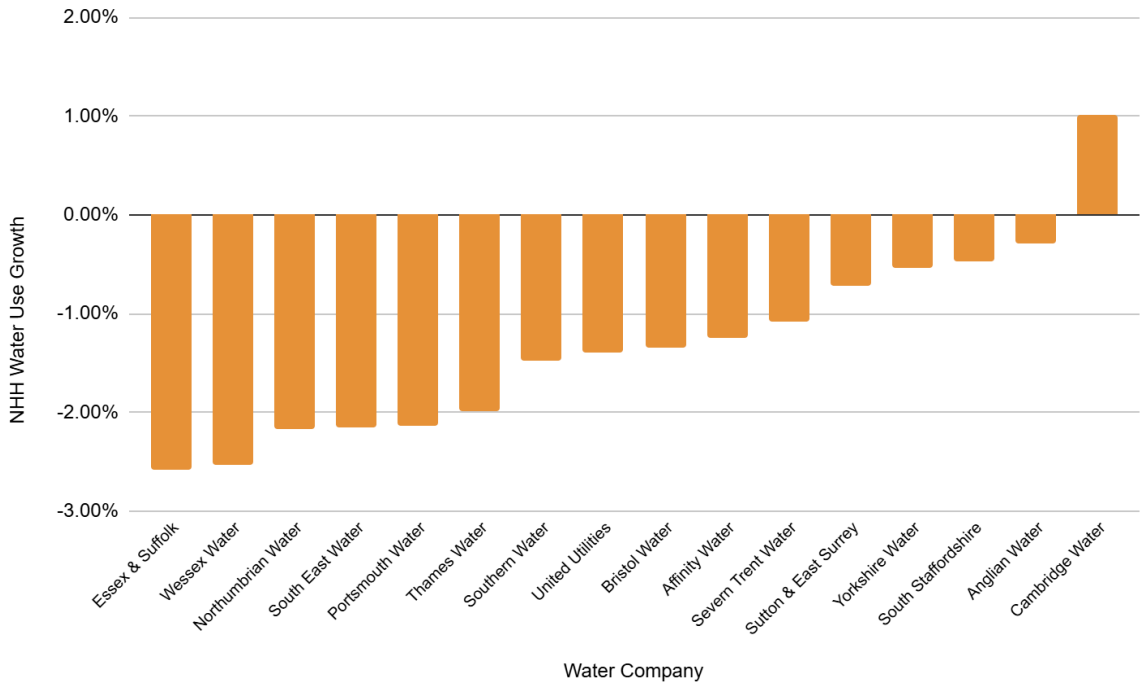


Figure 2: Average annual water use growth of water companies over period 2005 to 2023

Analysing the slowing rate of decline

The decline in the rate at which water use is falling identified above suggests the need to employ a more complex model to account for the curvature. Clearly, the trend is towards a slowing rate of decline and, in this way, we can understand the likely long-term change in NHH water use trends. The typical method of accounting for this second order rate of change is to introduce a quadratic into our semi log form, explained further in the appendix.

This model allows us to understand ***both*** the percentage decline at any point as well as the rate at which this decline is changing. The method allows us to more accurately understand the longer term trends in water use and project them into future years. As Figure 3 demonstrates below, most companies experienced significant falls in NHH water use in the years immediately after 2005, followed by a scenario in which those rates of decline themselves steadily declined.

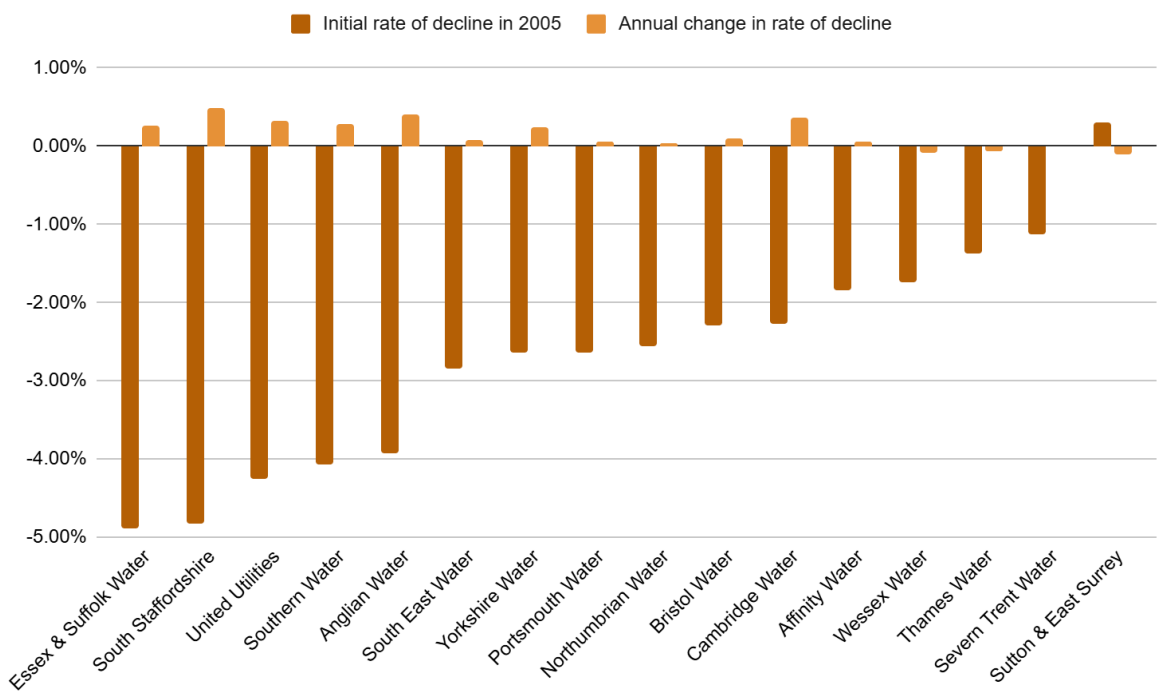


Figure 3: The first and second order rate of change of water use between 2005 and 2023

Taken together, we find the initial decline in NHH water use is 2.66% with a rate of change of 0.15% per annum. Interestingly, this would imply that by 2024 NHH water use is no longer declining. As is illustrated in Figure 4, below.

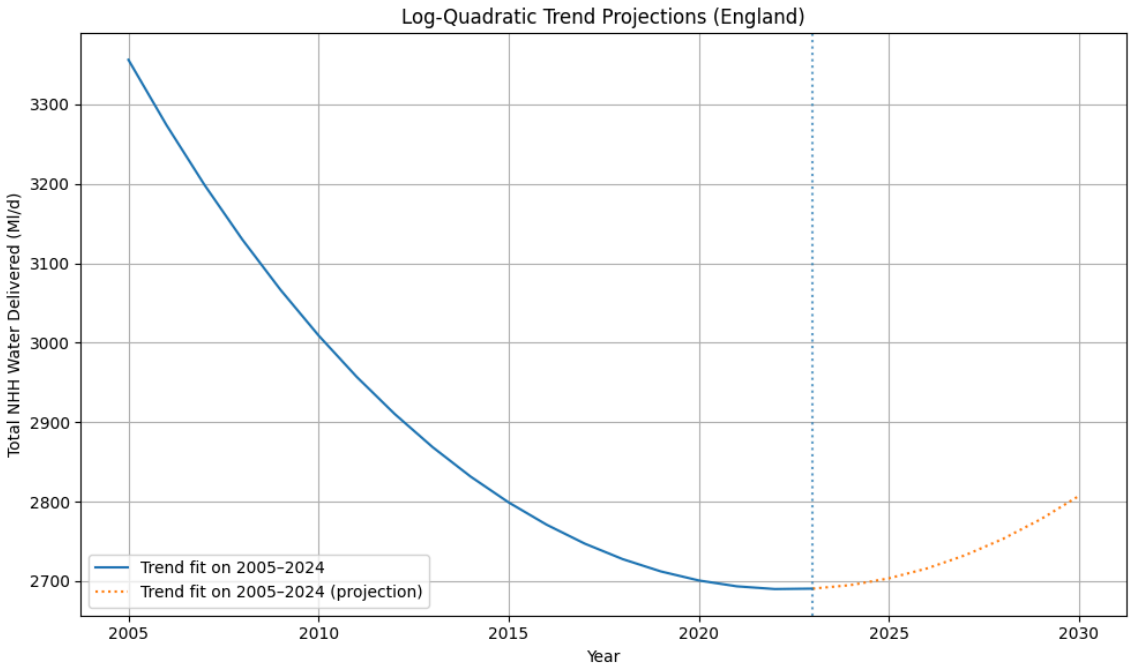


Figure 4: Log quadratic trend projections for NHH water use in England

This high rate of decline in water use during the period 2005 to 2015 is likely caused by the introduction of 'easy wins' in the management of commercial water use. This would have included the roll-out of metering, more efficient appliances in the hospitality sector, and manufacturing processes which, for the first time, treated water as a valuable and scarce input. We suggest the slowing down of this rate of decline is likely caused by the limited opportunities to introduce similarly impactful processes.

Further on in this report we estimate the potential knock-on impact this reduction in the rate of decline has on the available supply-demand balances across England; and ultimately on the economy.

Trends in planned NHH water use

The apparent stalling in water use reduction that has occurred over recent years is of particular note when we look at the water use planned for in Water Resource Management Plans. In this section we analyse trends in the supply demand balance modelling carried out by water companies.

Using a simple semi log form we estimate that over the period 2025 to 2037 the annual rate of decrease over all water companies is 0.38%. This implies a drop of 7.0% over the period 2023 to 2037, leaving a 2% deficit to the target.

Figure 4 illustrates the log linear trend in planned NHH water use growth for all water companies, with most baking in significant annual reductions. For many water resource zones (WRZs) in areas of limited supply headroom, these reductions are crucial for ensuring the supply-demand balance is not compromised.

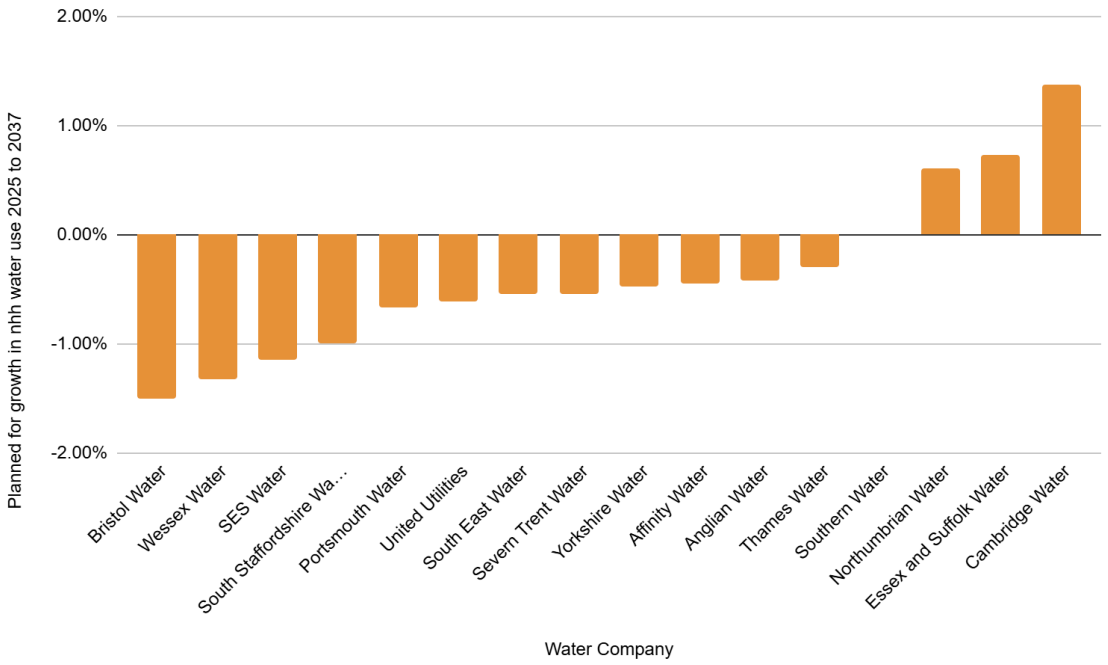


Figure 5: Planned for growth in NHH water use (WRMP 2024)

Trends in water use by sector

In order to understand trends by sector, we carried out trend analysis using data supplied by the Market Operator (MOSL) relating to water consumption. This data is collected from water wholesalers and retailers and covers commercial, industrial and public sector properties connected to the water network. We use the measure 'annual water consumption', which refers to the total volume of clean, potable water used by NHH customers over the course of a year. It represents the metered water drawn through commercial connections and as such is the equivalent of measured and unmeasured non-household water delivered variable used by the water companies.

SPID count refers to the number of active Supply Point Identifiers in the NHH water market. A SPID is a unique code assigned to each commercial water or wastewater connection. Counting SPIDs gives a measure of how many business supply points exist in a given area or dataset, offering an indicator of the size and structure of the commercial water customer base. This is not the same as the variable NHH properties collected by the EA from water companies.

The MOSL data is used primarily because it allows us to break down NHH water use by sector. This allows us to compare water use, the efficiency of water use, and how these have trended over the past six years, across sectors.

Figure 6 illustrates the total water use by sector and the total water use per unit of GVA generated within that sector - a measure that illustrates the relationship between GVA and water intensiveness. Manufacturing, accommodation and food services, professional services and the wholesale and retail sectors are the most intensive users. Water use per unit of GVA is highest for accommodation and food services - including hotels, restaurants, bars and cafes - and leisure activities.

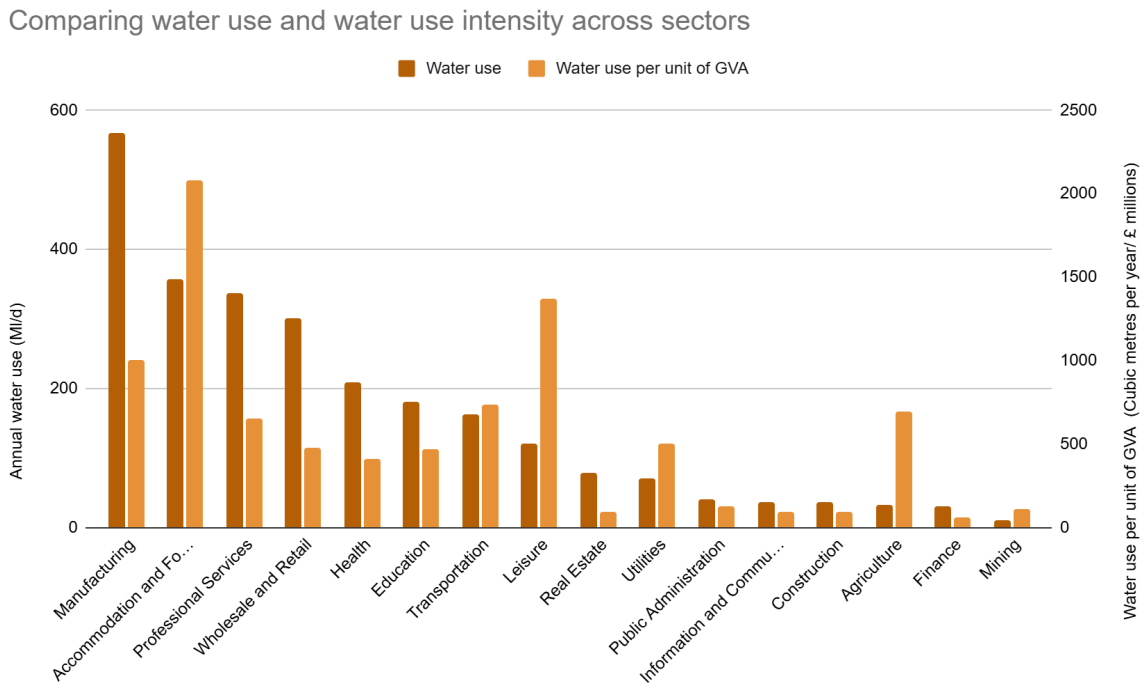


Figure 6: Water use and water use intensity by sector

This is a general picture on a sectoral basis; it does not analyse the relationship between sector and region. However, from a qualitative perspective, these findings imply that any policymakers wanting to vastly expand key water intensive sectors of the economy, must examine how water supply balances can be boosted to accommodate such growth, as there is a risk that without doing so, there could be significant strain on the water system's capacity to facilitate development.

A measure of water use intensity can also be used to track how the efficiency of water use changes over time. By calculating the total water use per total SPID - the measure of the total number of commercial water use connections - we can see if each connection is being used more efficiently over time. It is worth noting this is not an appropriate measure to compare sectors - which are vastly different - but rather the way to analyse trends in efficiency by sector.

Figure 7 illustrates the annual change in total water use by sector from 2018 to 2023 and the annual change in the measure of water use intensity that takes water use per SPIDS. It demonstrates that good strides have been made in energy and transportation sectors, as well as in information and communication, and manufacturing.

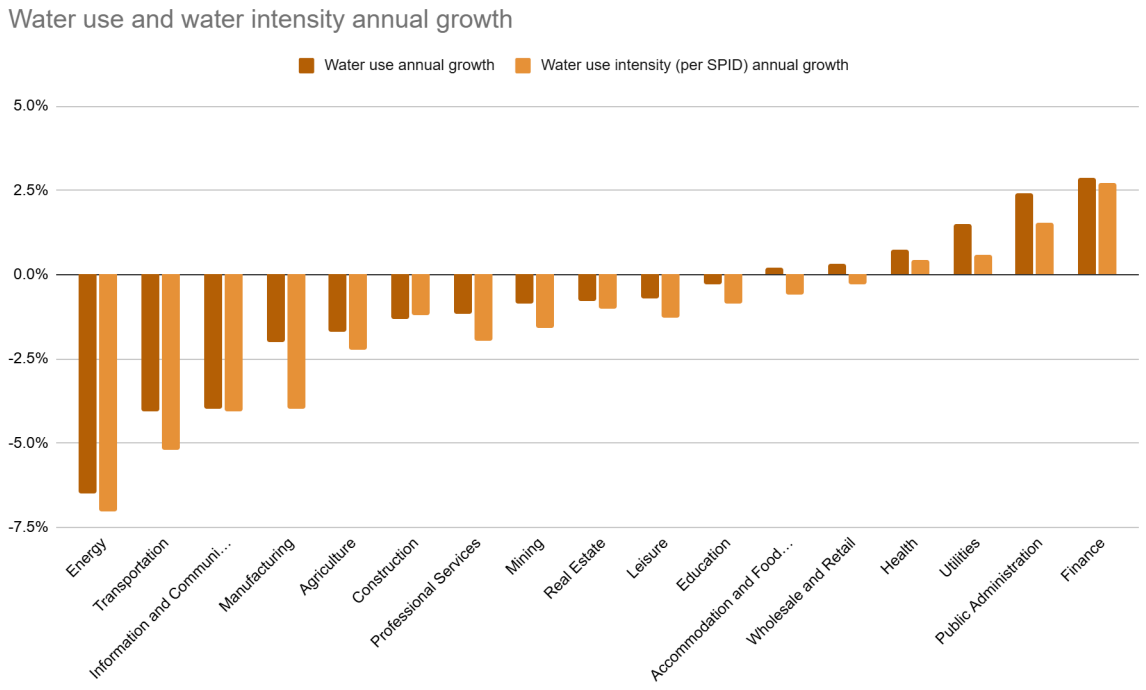


Figure 7: Five year growth in water use and water use intensity by sector (2018 to 2023)

2. The economic cost of failing to meet 9% reduction in NHH water use

As demonstrated in the last section, the past 20 years saw an initial steady fall in NHH water use after which it has been steadily flattening. There could be many reasons for this. The most reasonable explanation is that the move to renewables has led to a strong increase in the energy sector and transportation. Similarly, the move towards information and professional services and away from manufacturing has led to reductions in our domestic use. However, recent growth in water-intensive industries, such as AI and Data Centres, poses an ongoing challenge.

Although the impact of Covid muddies trends over the most recent period, it is not unreasonable to suggest that total NHH water use in England will be flat going forward without further policy intervention. In fact, our trend analysis suggests this might already have happened.

About the 9% target

The 9% reduction target in non-household water consumption by 2038 set by the Environment Act 2021 forms part of the Government's 2025 Environmental Improvement Plan. The target is intended to cut overall water demand to manage limited water resources in aid of better water resource management, environmental protection and long-term sustainability. Lowering business water use is one measure

alongside others such as leakage reduction and regulatory intervention.

For the avoidance of doubt, **our analysis does not make any judgement on the value or merit of the 9% target**, it simply seeks to understand whether targets will be hit or not, and the consequent impact on the available headroom for development across the country. One thing is clear, the capacity for water supply companies to facilitate the total demand reductions targeted over the next 15 years is dependent on them overseeing a reduction in total NHH water delivered (something that by any measure is not within their control).

We modelled the likely impact of failing to meet the trends set out in WRMPs. We measured the concomitant impact on headroom and water deficits by WRZ, according to our trend analysis. We then modelled the impact this could have on economic growth through curtailment on commercial development. The analysis was carried out by WRZ, making use of the detailed modelling present in WRMPs. The findings are outlined below.

The impact of steady future water use

Our trend analysis above suggests that the downward trends in total NHH water use in England over the past 20 years has come to a halt. To model the impact of this going forward we fix the total water use for England over the next ten years at 2025 levels.

We do this by applying a percentage increase in water use for each WRZ that is equal to the percentage increase that you would need to apply to planned water use in the WRMPs for the whole of England to get the total planned for water use in 2025. This ensures that all WRZs are equally affected in percentage terms.

Using the Public First aqua-economic model, we calculate for each WRZ what this means for additional water use. The model then uses the supply demand balance for each WRZ to estimate the deficit that this causes for each WRZ (that is the total amount of additional water required above the supply demand balance available), before converting this to blocked commercial growth and ultimately blocked GVA growth. We provide a full methodology in the appendix.

Results

Under this scenario, our modelling estimates that the total additional water required by 2035 were trends to remain flat would be 102.2 Ml/d, and aggregate water deficit generated in water scarce WRZs would be 13.7 Ml/d. The water deficits would occur in 36 WRZs, illustrated in Figure 8.

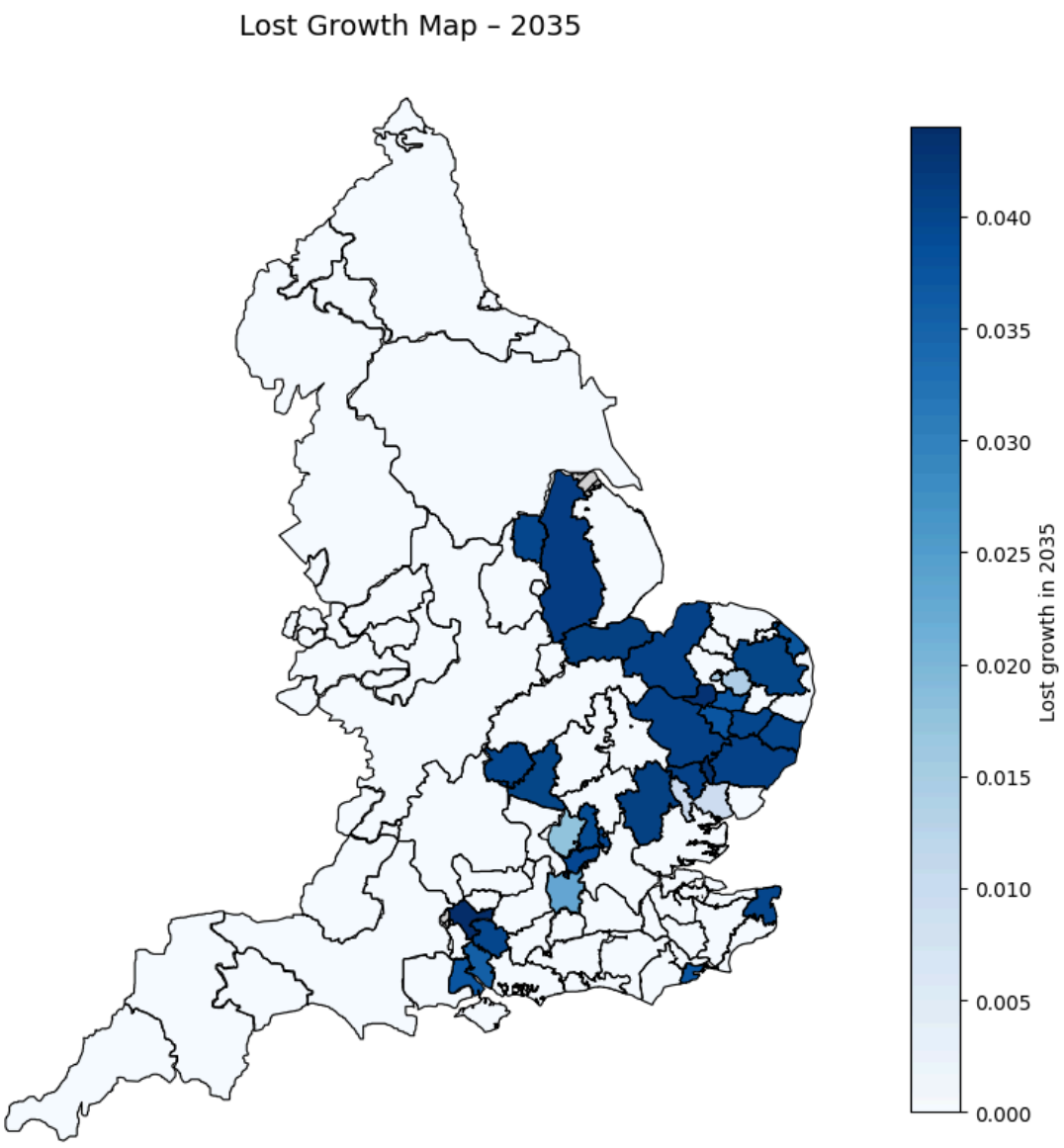


Figure 8: Lost growth by WRZ caused by flat NHH water use

These water deficits would affect 95 local authorities, as illustrated in Figure 9. Were these deficits to lead to reduced commercial growth, this could cost the English economy **£10.1 billion in economic growth by 2035.** This represents 0.46% of the total economic growth forecast in that period.

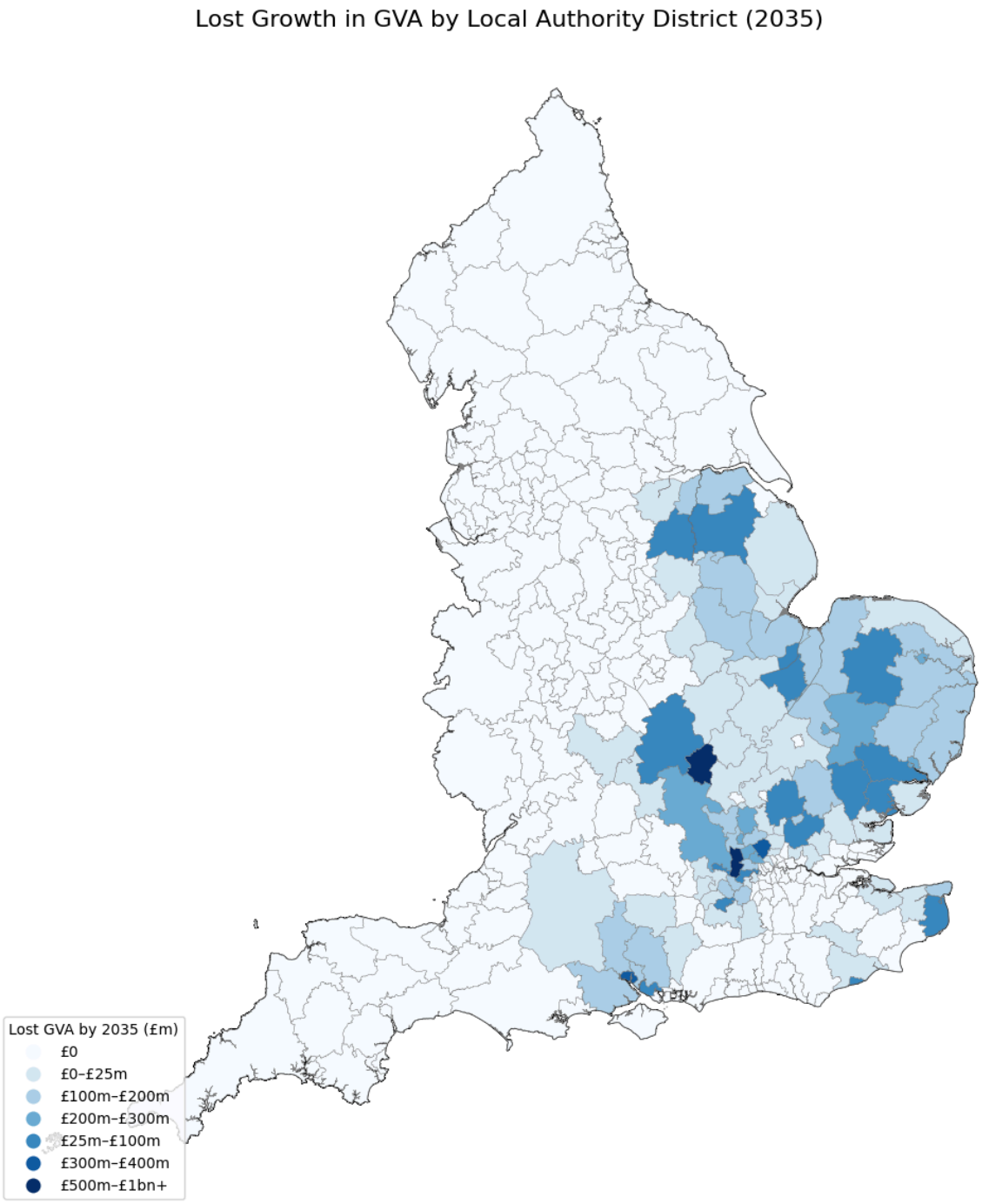


Figure 9: Map showing economic growth at risk were historical trends to continue

The loss in GVA varies significantly around the country. Unsurprisingly it is the South East and the East of the country that is affected the most, where water scarcity is the biggest problem. However, lost GVA is particularly high around London due to these being the areas where commercial growth is expected to be highest and productivity levels are high.

Milton Keynes is likely to experience the biggest loss, at £715 million of GVA by 2035. London could be impacted by the potential for restricted growth in Hillingdon, Barnet, Brent and Harrow.

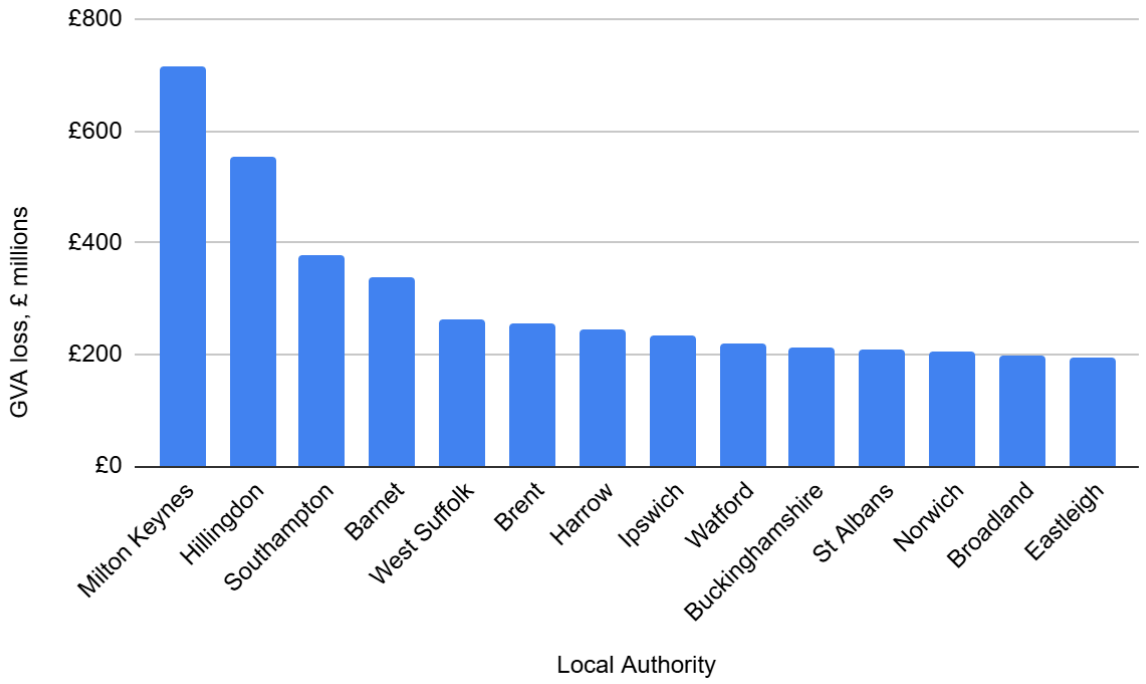


Figure 10: Economic growth at risk were historical trends to continue, by local authority

The Impact of achieving only half the planned for NHH water use reductions

We also carried out sensitivity analysis based on NHH water use achieving stronger downward trends than expected. We modelled the impact of achieving a total England wide aggregate reduction that is half what is planned for in the WRMPs, in effect the midpoint of our steady water use projection and the planned for water use.

The total additional water required to meet the additional demand of this trend would be 51.1 Ml/d. This would create a water deficit of 6.7 Ml/d ***relative to what has been planned***. This last point is crucial, we do not expect there to be a literal water deficit - rather one that represents a reduction in ***the expected available supply per day at that time.*** This could potentially cost the economy up to **£5.1 billion** in lost economic growth, focussed mainly in the Southeast as Figure 11 shows.

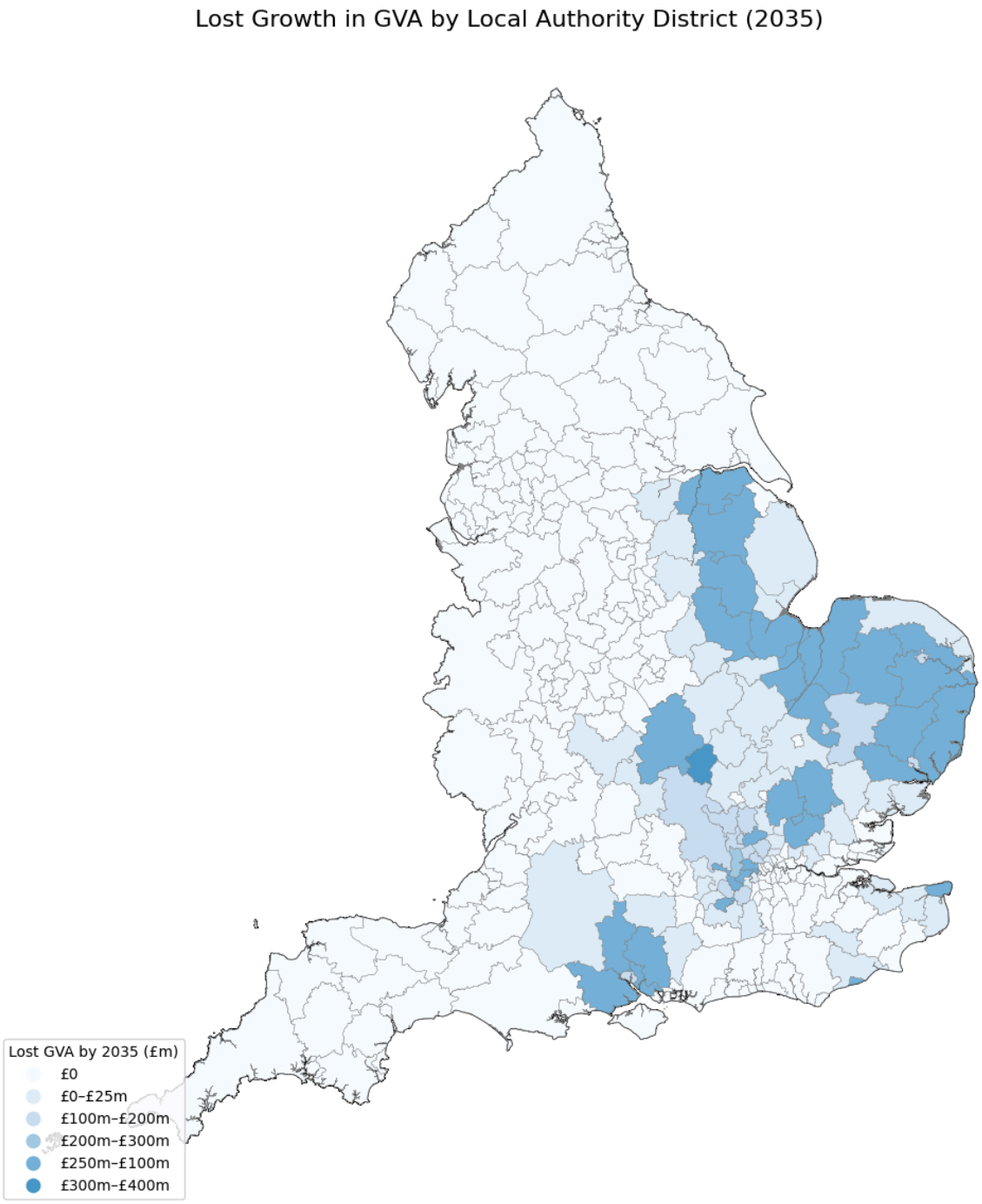


Figure 11: Map showing economic growth at risk were historical trends to be half

The impact has a similar geographical distribution but with a lower impact. The impact by local authority varies slightly due to the extent to which WRZs are already close to zero balance, before the additional pressure put on by fewer NHH water use efficiency gains.

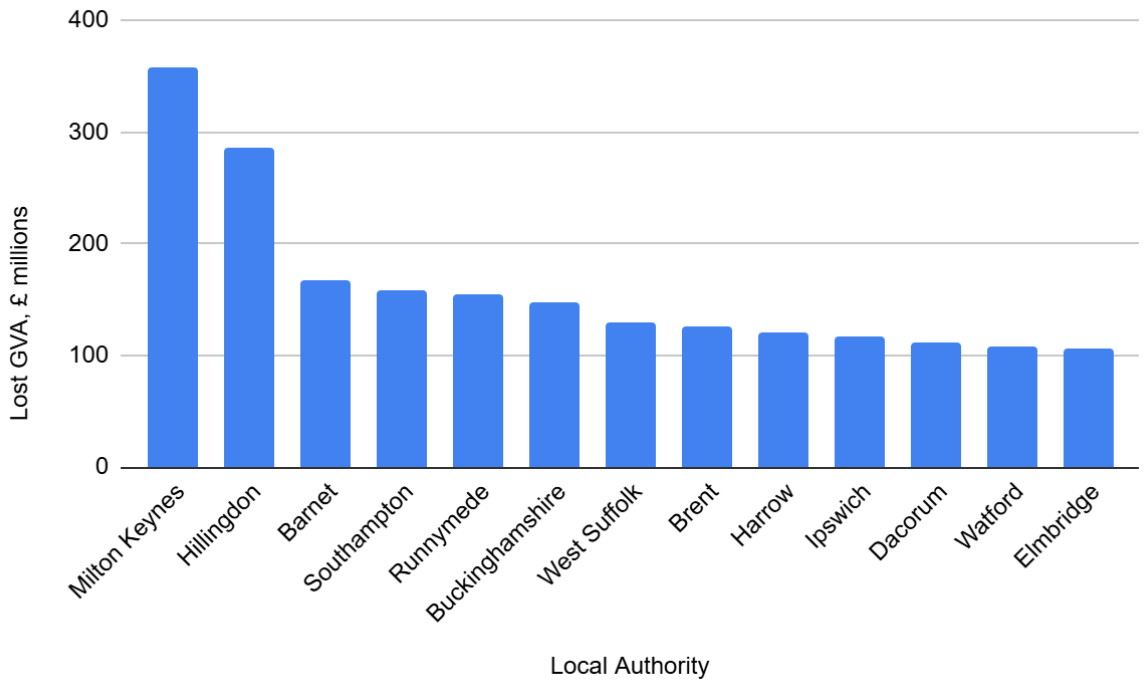


Figure 12: Growth at risk were projected reductions to be half planned by local authority

Economic benefits of planning for a 1-500 year drought

Whilst our modelling above analyses long-term trends, immediate short-term access to water is essential to NHH operations. From manufacturing to hospitality access to water is the most fundamental element of the production process, without which it would be impossible to operate.

Water companies have been asked to plan for 1-500 year drought events as part of the efforts to build resilience into the system against extreme weather events. Under a 1-500 year drought event it is highly likely that all non-essential use will be curtailed for at least a short period. Failing to plan for such a drought could therefore have a significant economic impact.

The next chapter describes the results of polling we carried out to get business perspectives on commercial water use and water scarcity. However, we also made use of this poll to investigate the likely impact of these types of droughts on the economy. We calculated that on average businesses in the **UK will lose on average 23.2% of**

their revenue and 26.9% of their economic activity during this two-day period, if a drought forces all business water use to be curtailed. To take the top three Local Authorities above as examples this equates to the following GVA loss over two days:

- **Milton Keynes:** £40m over two days
- **Hillingdon:** £39m over two days
- **Barnet:** £25m over two days

This demonstrates the potentially severe, albeit highly localised impacts of short-term intensive droughts. Applied across the many local authorities within catchment areas at risk of drought, it demonstrates the economic value that might be derived from anticipatory investment in drought resilience and the value of preparedness for 1-500 year drought events.

CHAPTER THREE:

Business Perspectives

The policy framework governing water resources in England increasingly relies on reductions in demand, including within the NHH market. This approach requires businesses to be both willing and able to adapt. This requires an acceptance that efficiency improvements are compatible with growth, and that firms have the information, incentives, and capacity needed to become more efficient.

Likewise, much of the policy debate around water scarcity treats businesses as a homogeneous source of demand to be managed through targets, incentives, and regulation. Yet NHH water use is ultimately determined by the decisions of individual firms, taken by people responding to commercial pressures, risk perceptions, and operational constraints. Whether demand reduction targets are achievable in practice depends not only on technical potential or historic trends, but on how business decision-makers understand water scarcity, how salient the issue is relative to other challenges, and whether they feel equipped to act.

To explore these issues, Public First conducted a poll of 586 business decision-makers across the UK, weighted to be representative by region and firm size. The survey examined recent trends in water use, expectations for future demand, perceptions of risk, and awareness of water efficiency measures.

This chapter ultimately uses the findings from this research to answer these questions. It examines how businesses perceive water reliability and scarcity, how water use is changing within firms, and whether organisations feel prepared for future water-related risks. It also considers the gap between stated interest in reducing water use and the practical ability to do so. Together, these findings provide a basis for understanding how well-placed businesses are to meet NHH water use targets going forward.

Businesses do not yet see water reliability as a major priority - despite recognising it as a growing risk

When asked to assess the challenges facing their business, water reliability does not currently rank among the most pressing concerns for most firms. This reflects the fact that, for the majority of businesses, water supply remains largely reliable on a

day-to-day basis. However, as Figure 9 demonstrates, 17% do see it as a top three concern, which is a significant proportion - around 1 in every 6.

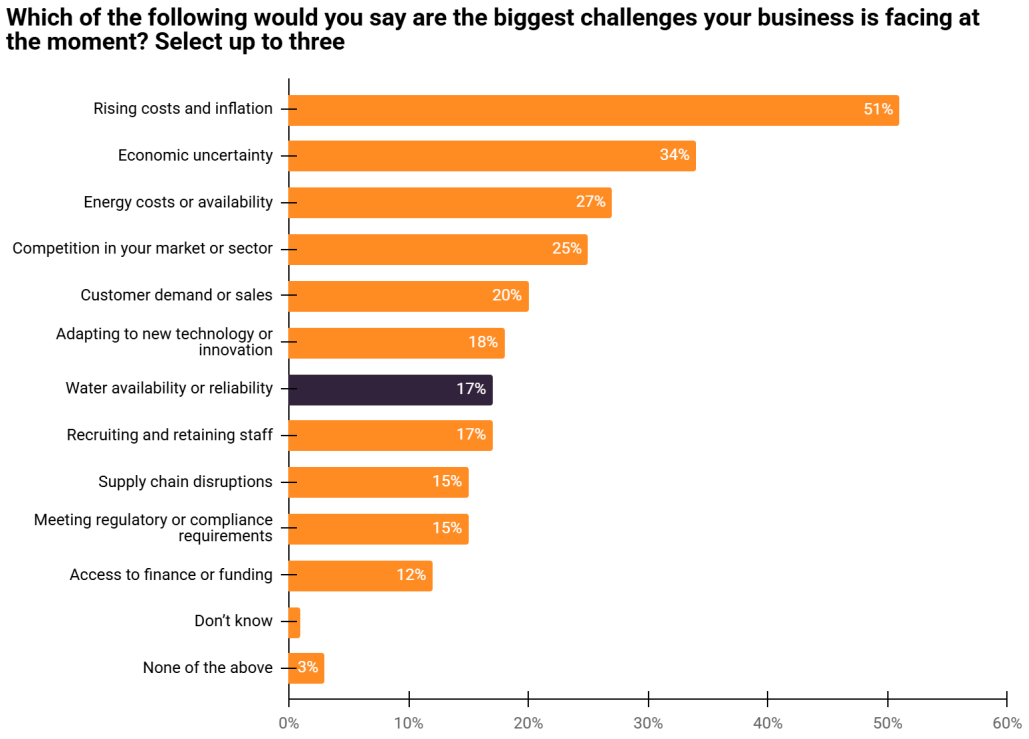


Figure 9: Top three challenges facing businesses at the moment

Beneath the headline picture there are indications it presents a growing area of concern in some areas. Around one in ten UK business leaders report that their business operates in an area with unreliable water supply. This rises to approximately one in seven among businesses located in the Midlands and East of England. While these proportions are modest, they are notable given the fact that even localised unreliability can have outsized effects on investment and expansion decisions.

This finding suggests that water scarcity is generally not yet seen as a constraint, but is already a material issue for a non-trivial subset of businesses. As water pressures intensify, this group is likely to grow.

Businesses think their water use has risen in recent years and will continue to rise

Despite success on demand reduction to date, as shown by our modelling exercise in Chapter Two, many businesses report that their water efficiency has worsened in recent years. Roughly half of all business decision-makers we polled say their

organisation's water intensity has increased over the past five years. This trend is particularly pronounced in the South and North of England as shown in Figure 10.

Among businesses that describe themselves as highly water-dependent[15] the picture is more stark: 85% report an increase in water intensity over the same period. These self-reported trends broadly align with the aggregate data analysed elsewhere in this report, which show that reductions in NHH water use have slowed or stalled in recent years. The implication is that at a firm level, the underlying drivers of water demand-led and sectoral growth as well as operational change are currently outweighing efficiency improvements in the minds of business users.

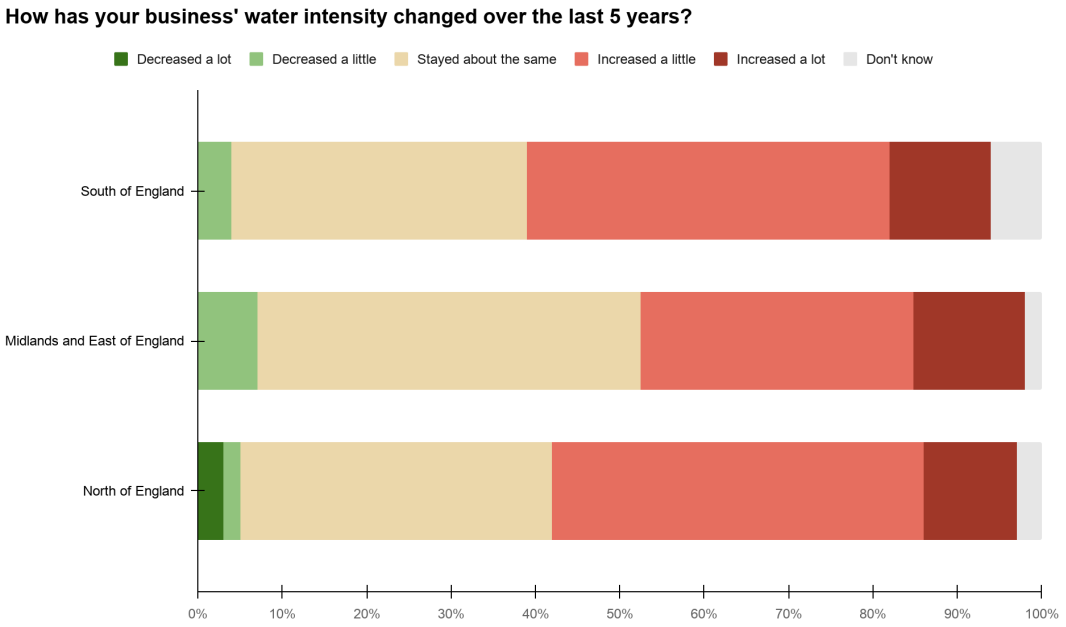


Figure 10: Self-reported business water intensity changes over five years by region

Looking ahead, many businesses expect water use to rise further. 38% of business leaders say their business plans to increase its total water usage over the next five years. In the South of England, this rises to 46%, as seen in Figure 11.

Importantly, these planned increases are not primarily attributed to inefficiency or waste. Among those expecting higher water use, two-thirds (66%) say this is driven by anticipated increases in output. For most businesses, water use grows as production grows. As a result, reducing water use is often seen as secondary to commercial

[15] *This is a self-reported category. It includes all respondents who responded 'Yes definitely' to the question 'Would you describe your business as having a high dependence on water?'*

imperatives.

This helps explain why, despite rising concern about water scarcity, a majority of businesses say that reducing water usage is not currently a strategic priority. Without changes to incentives, guidance, or constraints, business or sectoral growth is likely to continue to translate into higher water demand.

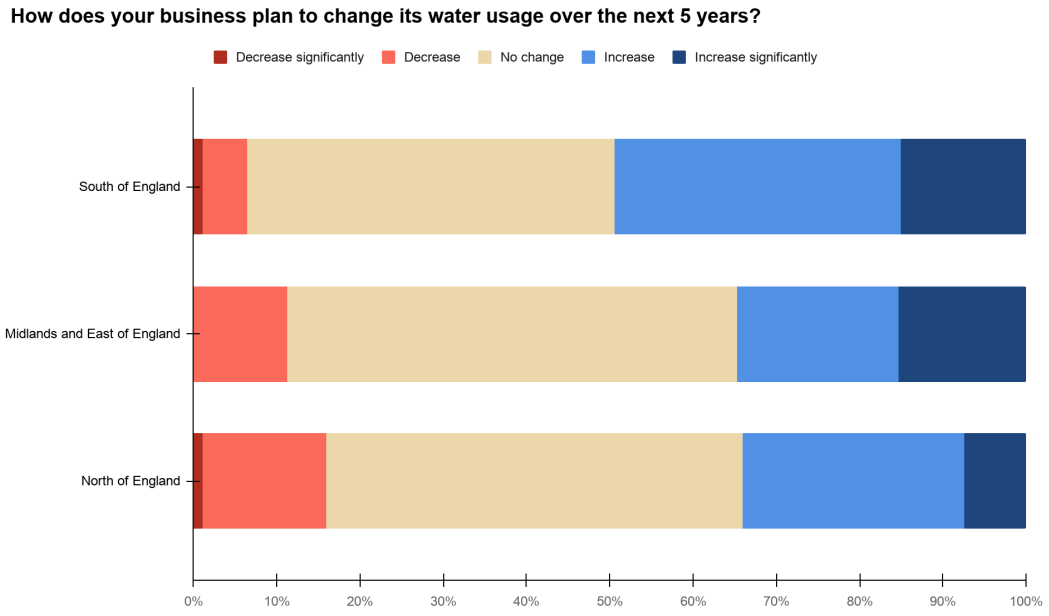


Figure 11: Business plans to change water use over five years by region

Many businesses don't feel prepared for water scarcity challenges going forward

61% of business leaders say that water shortages pose a risk to their business, rising to 72% among firms with more than 250 employees. Roughly one in every three say they are more concerned now about UK water shortages than they were in the past.

But despite this growing awareness, many businesses do not feel prepared. Nearly a third of all respondents say their business is not ready for water-related challenges. Among highly water-dependent firms, this rises to 42%. This preparedness gap is particularly concerning given the potential for even short-term disruptions to have large impacts on day-to-day operations of firms, outlined in Figure 12. The majority of respondents say that a two-day water shortage would have a significant impact on their business, affecting everything from production and service delivery to staffing and customer relationships.

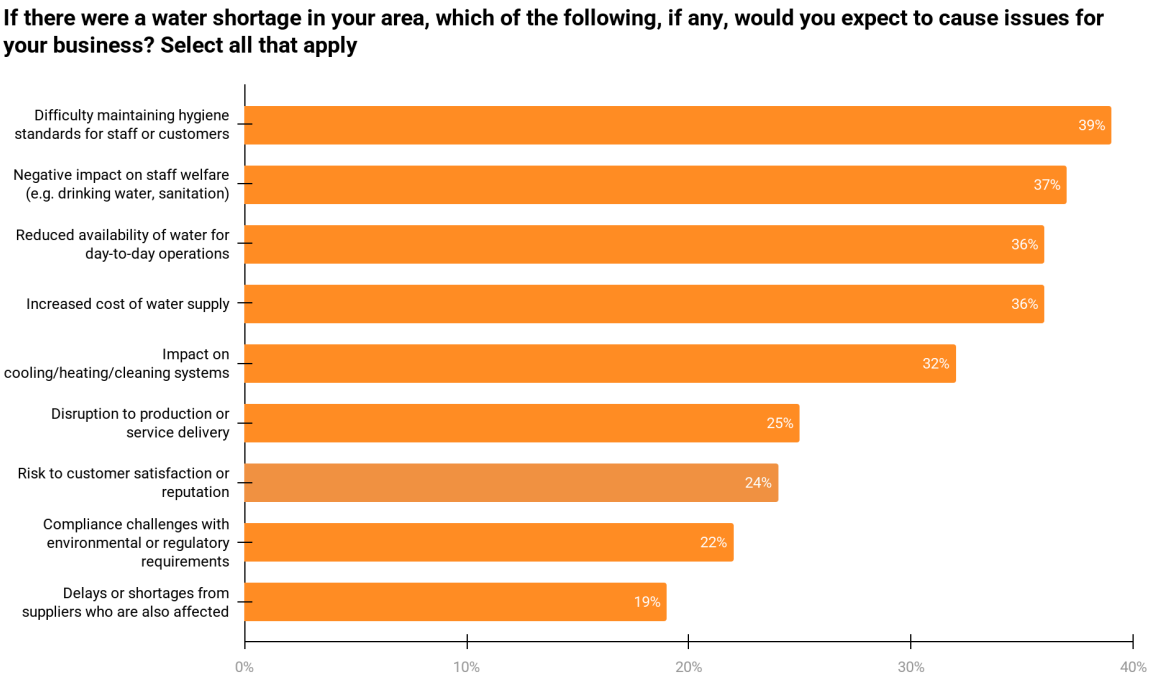


Figure 12: Business views on the impact of water supply interruptions

Figure 13 below gives an indication of the material economic impacts of the limitations on day-to-day operations as suggested by businesses. Over 60% of business users would see a moderate to very large impact on their revenue with an even greater proportion of two-thirds seeing a moderate to very large impact on their productivity.

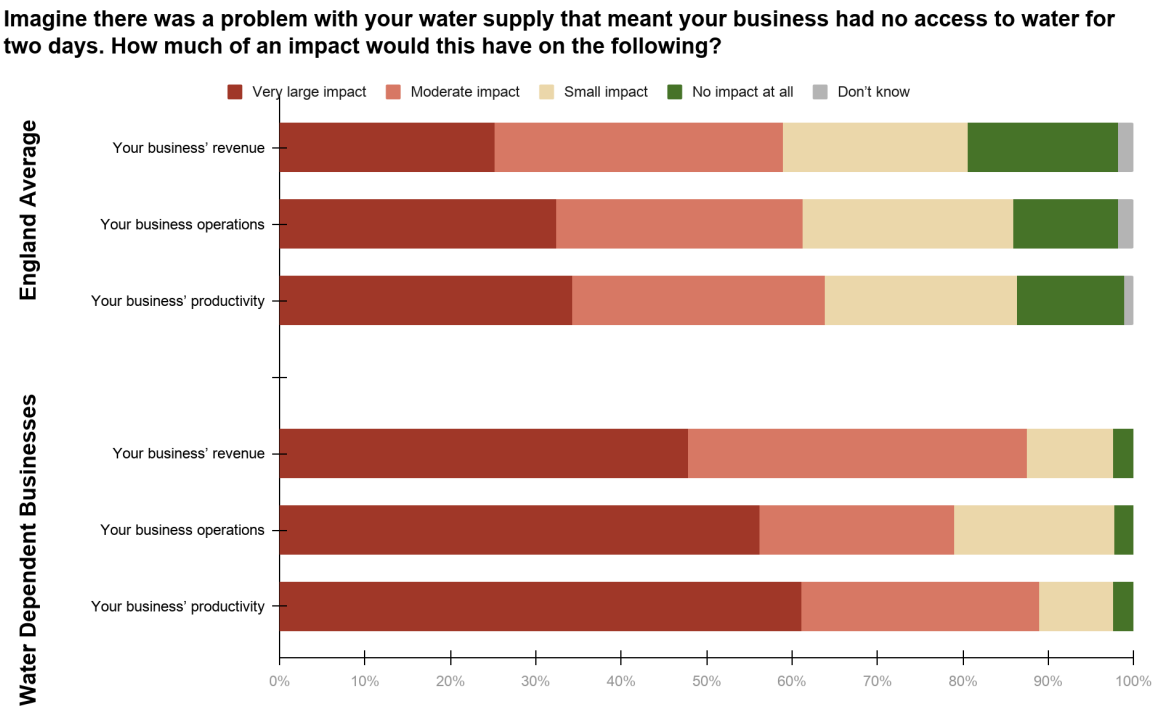


Figure 13: Business views on the monetary impact of water supply interruptions

Most businesses want to be more water efficient

These findings reinforce the economic modelling presented elsewhere in this report, which shows that even brief periods of curtailed NHH water use could result in substantial losses to economic output. They also underline the importance of resilience planning not just for extreme, long-duration droughts, but for shorter disruptions that may become more frequent.

Looking to the future, half of business leaders believe that water shortages of this kind will become increasingly common. 42% expect shortages that specifically affect their own operations to occur more frequently and among highly water-dependent businesses this rises to 60%. Among those businesses that consider themselves highly dependent on water, 86% say they are concerned about these shortages.

When asked which regions they believe are most at risk of drought over the next decade, respondents most frequently cited Greater London (31%), followed by the South East (25%) and the South West (19%) as seen in Figure 14. These perceptions closely mirror the areas where water scarcity is already most acute and where the economic consequences of constrained development are likely to be greatest.

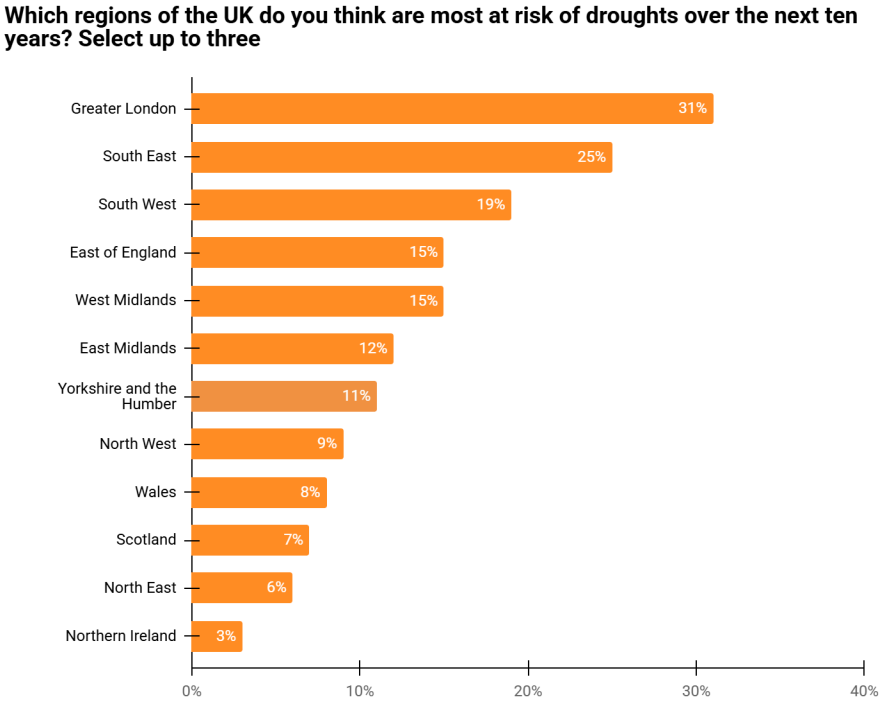


Figure 14: Regions businesses see as most at risk of drought over the next 10 years

Many businesses are unsure how to become more water efficient

Encouragingly, the majority of businesses see value in increasing efficiency. 59% of business leaders believe it would be worth investing in ways to reduce their water usage without undermining their business output. However, willingness to invest does not necessarily translate into action, particularly where firms lack clarity on what measures are effective or how to implement them.

One of the most striking findings from the polling is the gap between interest in reducing water use and the ability to do so. 62% of businesses say they are interested in reducing their water intensity, rising to 77% among highly water-dependent firms.

However, among those who express interest, 21% say they would not know how to achieve meaningful reductions. This knowledge gap is particularly evident among smaller businesses, which are less likely to have dedicated sustainability staff or access to specialist advice. This may help to explain why our polling indicated that 33% say they haven't yet taken any steps to reduce their water consumption, despite believing that efficiency gains are possible and desirable.

The particular measures businesses have or may be interested in implementing to

improve efficiency are detailed in Figure 15 below, which shows a consistent gap between interest and understanding in efficiency measures.

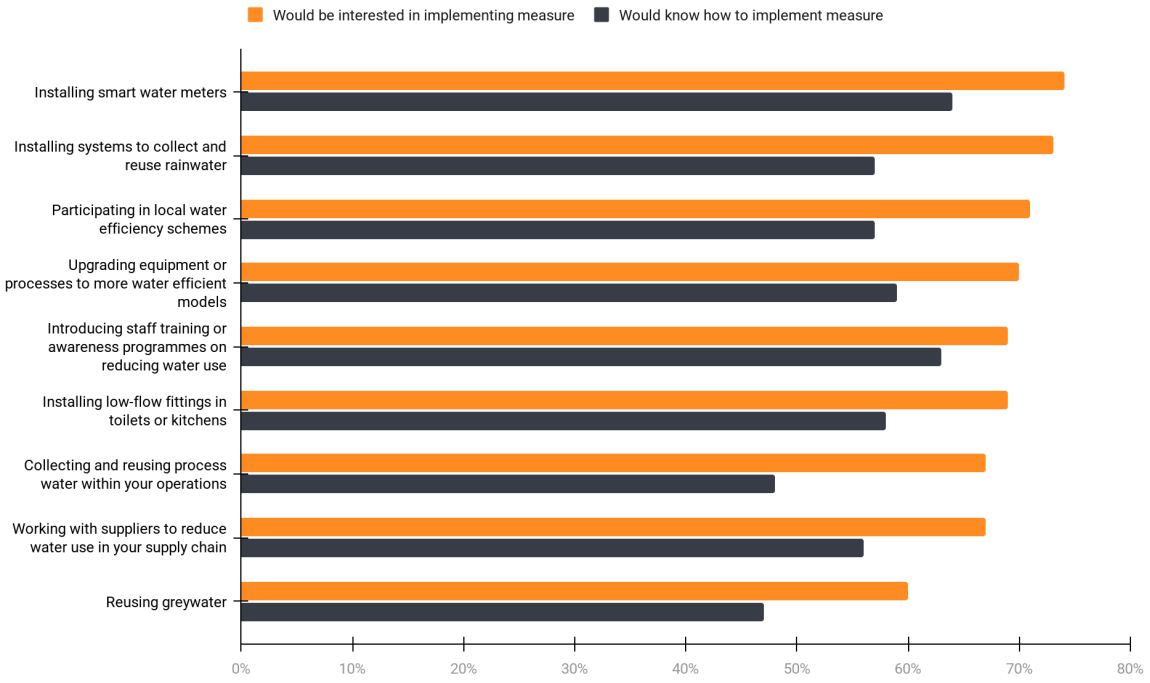


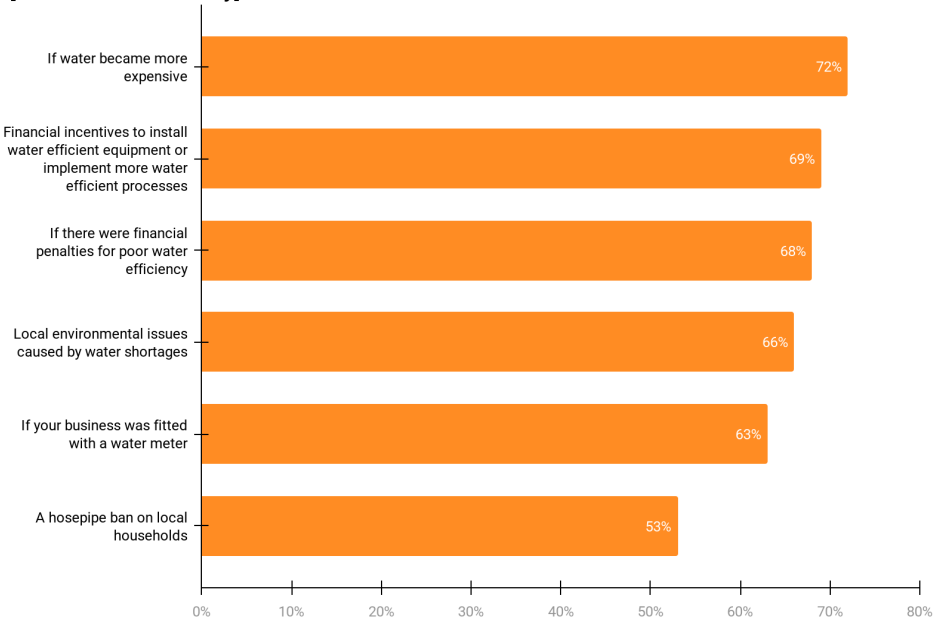
Figure 15: Knowledge and interest in applying water-saving measures

There is scope to do more to help businesses be more efficient

On average, decision makers believe their businesses could reduce their water usage by **15%** while maintaining current levels of productivity. This suggests that there is perceived "headroom" for efficiency improvements across the NHH market. However, without targeted support, clearer guidance, and stronger incentives, this potential is unlikely to be fully realised. The polling evidence points to a sector that is increasingly aware of water scarcity and concerned about future risk, but insufficiently equipped to respond.

Ultimately it is clear that the greatest incentive for businesses would be financial. Reduced water bills (72%), financial incentives for the installation of water-efficient equipment (69%) and penalties for poor efficiency (68%) would all be most likely to stimulate businesses to act, followed by water shortages themselves (66%).

Which of the following would make you more likely to change your business' water efficiency? [% who said more likely]



Conclusion

The findings in this chapter highlight that businesses broadly recognise water scarcity is becoming a more serious issue, and many are open to improving efficiency. Yet rising water intensity, strong growth expectations, and limited preparedness mean that demand reductions are not the default scenario.

If NHH water use continues to diverge from policy assumptions, the risk is not only that demand reduction targets will be missed, but that water scarcity will increasingly constrain economic growth in other areas and will in some cases curtail business expansions. Bridging the gap between awareness and action will therefore be critical.

CHAPTER FOUR:

Conclusion: Water Use and the NHH Market

This research tells a clear story. The rate at which businesses are improving their water efficiency has slowed dramatically since the mid-2000s and early 2010s. This means that previous reductions - on which current existing planning assumptions have been made - are far from a default scenario. The implication of a world in which targets are not hit would inevitably lead to more blocked business development in some areas of the country under the existing regulatory and policy framework, with a subsequent dampening effect on economic growth.

Polling insights suggest that businesses are to some extent aware of the oncoming issues in certain areas of the country, whilst being unsure of whether or how they might improve their businesses' water efficiency throughout their production processes. Despite an enthusiasm for change, businesses will always ultimately prioritise expansion and growth where they can, and this may well lead to targets at risk of being missed - and curtailed development further down the line.

This implies that, though it is by no means certain the trends will or will not be hit either way, the route to achieving them is through more action to show how businesses can do more to improve efficiency - whether through incentives, guidance or policy is not within scope of this report. Similarly out of scope are the merits of the targets themselves, as well as the wider framework which results in a scenario in which certain types of development are blocked due to water. This report simply looks at the regulatory framework's planning assumptions about behaviour and maps them against real-world behaviour, measuring whether they are accurately aligned - calculating the likely knock-on economic impacts if they are not.

Under the status quo the costs are significant - and this should stimulate policymakers and other key stakeholders to resolve this problem as soon as possible to ensure targets are not missed and growth is not lost.

Appendix: Methodology

Trend Analysis

Historical Water Use

Public First analysed long-run trends in non-household (NHH) water use using Water Company Annual Return data submitted to the Environment Agency as part of the Annual Review of Water Resource Management Plans (WRMPs). The dataset covers the period 2005/06 to 2023/24[16].

NHH water use is defined as the sum of ***total measured*** and ***total unmeasured non-household water delivered***, including underground supply pipe leakage (USPL) downstream of the charge point. This definition is consistent with the targeted NHH water use reductions included in the Environment Act, which estimate total delivered water and don't include upstream leakage, meaning the target is not in the direct control of water companies[17].

Trends were estimated using semi-logarithmic models. First, a log-linear specification was used to estimate the average annual proportional change in water use:

$$\log(W_t)=\alpha+\beta t$$

where W_t is total NHH water use in year t, and β represents the average annual percentage change.

To account for evidence that the rate of decline has slowed over time, a log-quadratic specification was also estimated:

$$\log(W_t)=\alpha+\beta t+\gamma t^2$$

Where β represents the annual percentage change in NHH water use from 2005 to 2006 and γ implies the second order change - in effect, the annual percentage change increases by 2 x γ each year. This formulation allows the rate of change in NHH water use to vary over time. Analysis was conducted at both national and water company level. Given the disruption caused by the Covid-19 pandemic, trends were estimated over extended periods, with sensitivity checks excluding pandemic-affected years.

[16] Environment Agency, Water Resource Management Plan Annual Review Data, 2025
[17] DEFRA, Environmental Improvement Plan, 2025

Trend in Planned NHH Water Use

Planned future trends in NHH water use were analysed using forward-looking demand projections contained in Water Resource Management Plans published in 2024[18]. These projections reflect water companies' assumptions about future efficiency improvements and demand management.

Using projected NHH water use for the period 2025 to 2037 a semi-log trend was estimated to derive the implied annual rate of change in planned demand:

$$\log(W_t)=\alpha+\beta t$$

where W_t now denotes planned NHH water use in year t and β the annual average percentage change. This analysis was carried out at both a water company level and aggregated to provide an England-wide trend that could be used to understand the extent to which planned water use is in line with the NHH water use reduction targets.

Trends in Water Use by Sector

Sectoral patterns of NHH water use were analysed using data provided by Market Operator Services Limited (MOSL), which records annual water consumption for non-household customers - data collected through the billing process. This data was used to estimate total water use by sector for 2023.

To compare the economic efficiency of water use, across sectors, Public First constructed a measure of economic water use intensity defined as:

Economic water use intensity = Water Use / GVA

Where GVA is Gross Value Added for each sector, data drawn from the ONS[19]. This metric indicates the amount of water used per unit of economic output, with higher values indicating a sector that uses a lot of water for limited economic value.

Trends in water use efficiency over time were assessed by calculating water use per Supply Point Identifier (SPID):

Water use intensity = Water use / SPID count

where SPID is the number of active non-household water connections in each sector and year, data provided by MOSL. Changes in this measure over time were used to assess whether sectors are becoming more or less efficient in their use of water.

[18] Environment Agency, Water Resource Management Plan Supply-Demand Balance Forecast Collated Data, 2025

[19] ONS, Regional gross value added (balanced) by industry, 2025

Impact of Water Scarcity

Additional water use and water deficits

We used the Public First Aqua Economic Model (AEM) to investigate at a Water Resource Zone (WRZ) level the likely impact that current trends in NHH water use are likely to have on:

- Additional NHH water use
- Water supply deficits
- Economic growth

The AEM draws on data from Water Resource Management Plans (WRMPs) for every Water Resource Zone (WRZ) in England, covering the years 2019 to 2036. We use the variables that describe non-household water use, the number of NHH properties, and the supply-demand balance.

We use the AEM to investigate the impact of water use remaining fixed over the next ten years, a scenario that our trend analysis suggests is likely. To do this we calculate for each year from 2026 to 2035 the percentage increase in aggregated England-wide planned for water use required to match 2025 levels. We then apply this percentage increase to each water resource zone for each year, so that each WRZ shares equal weighting. The total **additional water use** required is calculated for each WRZ by subtracting the planned for water use from our modelled scenario.

The **water deficit** is calculated for each WRZ by subtracting the supply-demand balance from the additional water use and ignoring values that are negative. This represents the amount of additional water supply required beyond that available in the target headroom.

Economic Growth at Risk

To estimate how these water deficits could impact economic growth, we first convert water deficit into NHH properties deficit and find this as a percentage of total NHH properties for each WRZ - this is our measure of blocked commercial growth.

To allocate modelled economic impacts from Water Resource Zones (WRZs) to local authorities, Public First constructed a geospatial mapping framework linking WRZ boundaries to statistical and administrative geographies.

First, WRZ geospatial boundaries were overlaid onto Middle Layer Super Output Area (MSOA) boundaries. Where an MSOA intersected multiple WRZs, a weighted average of lost economic growth was calculated for that MSOA, with weights proportional to the area of overlap between the MSOA and each WRZ.

Second, local authority–level impacts were estimated by aggregating MSOA-level results. For each local authority, lost economic growth was calculated as a

population-weighted average of lost growth across all MSOAs within the authority boundary, using MSOA population data to weight each area's contribution[20].

This approach ensures that WRZ-level impacts are consistently and proportionately translated into local authority estimates, reflecting both spatial exposure to water scarcity and the distribution of population and economic activity.

To estimate lost GVA by local authority we applied the lost growth estimates to estimates of GVA[21]. To estimate GVA lost in 2025 prices and in 2025 levels of GVA, we adjusted for inflation using GDP deflators from ONS[22], and chained volume measures of GVA, also from the ONS[23]

Economic impact of 1 in 500 year droughts

To calculate the impact that a 1 in 500 year drought would have on local economies, we made use of polling questions included in the business decision makers survey. We asked the following:

"Imagine there was a problem with your water supply that meant your business had no access to water for two days. How much of an impact would this have on the following:

1. Your business's revenue

2. Your business's productivity

We assigned percentage values to the responses, assuming that a very large impact was a loss of 50%, a moderate impact was a loss of 25% and a small impact was a loss of 10%. By calculating the average loss we were able to estimate the average loss in revenue and the average loss in production were businesses to have no water over two days. To estimate the loss to annual GVA we took the two day percentage loss, divided by 250 (working days in a year) and multiplied by 2. We then applied this annual loss to estimates of local authority GVA using the same sources described earlier in this methodology note.

[20] OFS, Middle layer Super Output Area population estimates, 2025
[21] Office for National Statistics, Regional gross value added (balanced) by industry: local authorities by ITL1 region, 2025
[22] ONS, UK quarterly national accounts data tables, 2025
[23] Office for National Statistics, Gross Value Added at basic prices:chained volume measures:Seasonally adjusted, 2025