24th ANNUAL
LEAKAGE CONFERENCE

4 – 5 DECEMBER 2023
BIRMINGHAM & LIVESTREAM

Organised by
lodestar

Media partner
THE WATER REPORT
POLICY | REGULATION | COMPETITION

Syrinix Logo Artwork.ai

Meet up with our exhibitors and other delegates

aqualogic water conservation

BERMAD

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MUELLER

OVARRO CONNECTING TECHNOLOGIES

SME WATER

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TECCURA SOFTWARE

TECHNOLOG

THE WATER REPORT POLICY | REGULATION | COMPETITION

Housekeeping

- Turn **phones/devices** to silent or off please
- **Q&As -** Raise your questions through:
  - **In the room - Roving microphones**
  - **Livestream – via Slido**
- We will also be **seeking your views through SliDo polls**
  - **Get the Slido app – use the handle #2749424**
- **Feedback forms: online form has been emailed to you on Monday …here's the link** https://www.leakageconference.co.uk/feedback-form

  plus you have a hard copy within your Event Guide

Conference welcome

Bob Taylor

CEO

Portsmouth Water

The Water UK Leakage Routemap

An interactive session with updates on the Routemap’s five workstreams

Introduction

David Jacobs

Leakage Strategy Manager

Anglian Water

The Water UK Leakage Routemap

Glen Mountfort
Director of Technical Consulting
WRc

Dene Marshallsay
Director
Artesia

Joe Sanders
Senior Technical Director
RPS

Delivering on the commitments of the leakage route map

Leakage Conference 2023

Chair

David Jacobs, Leakage Strategy Manager, Anglian Water

Project Team

Joe Sanders, Senior Technical Director, RPS

Dene Marshallsay, Director, Artesia

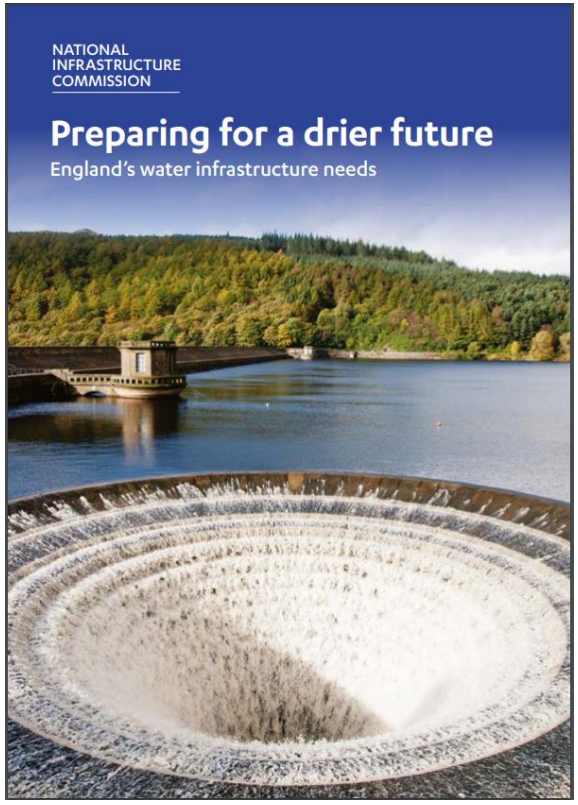
Glen Mountfort, Director of Technical Consulting, WRc

Jo Parker, Technical Director, Watershed Associates

Overview

David Jacobs
Leakage Strategy Manager
Anglian Water

Recap of Leakage route map need



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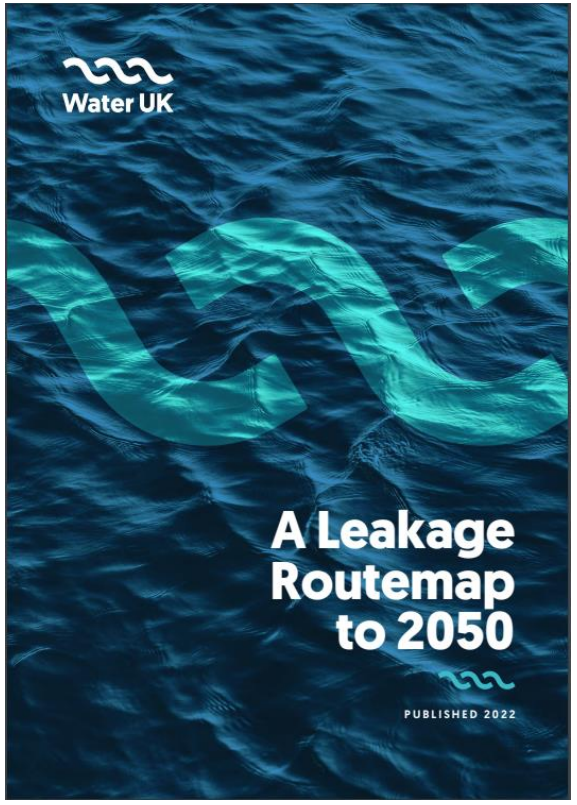
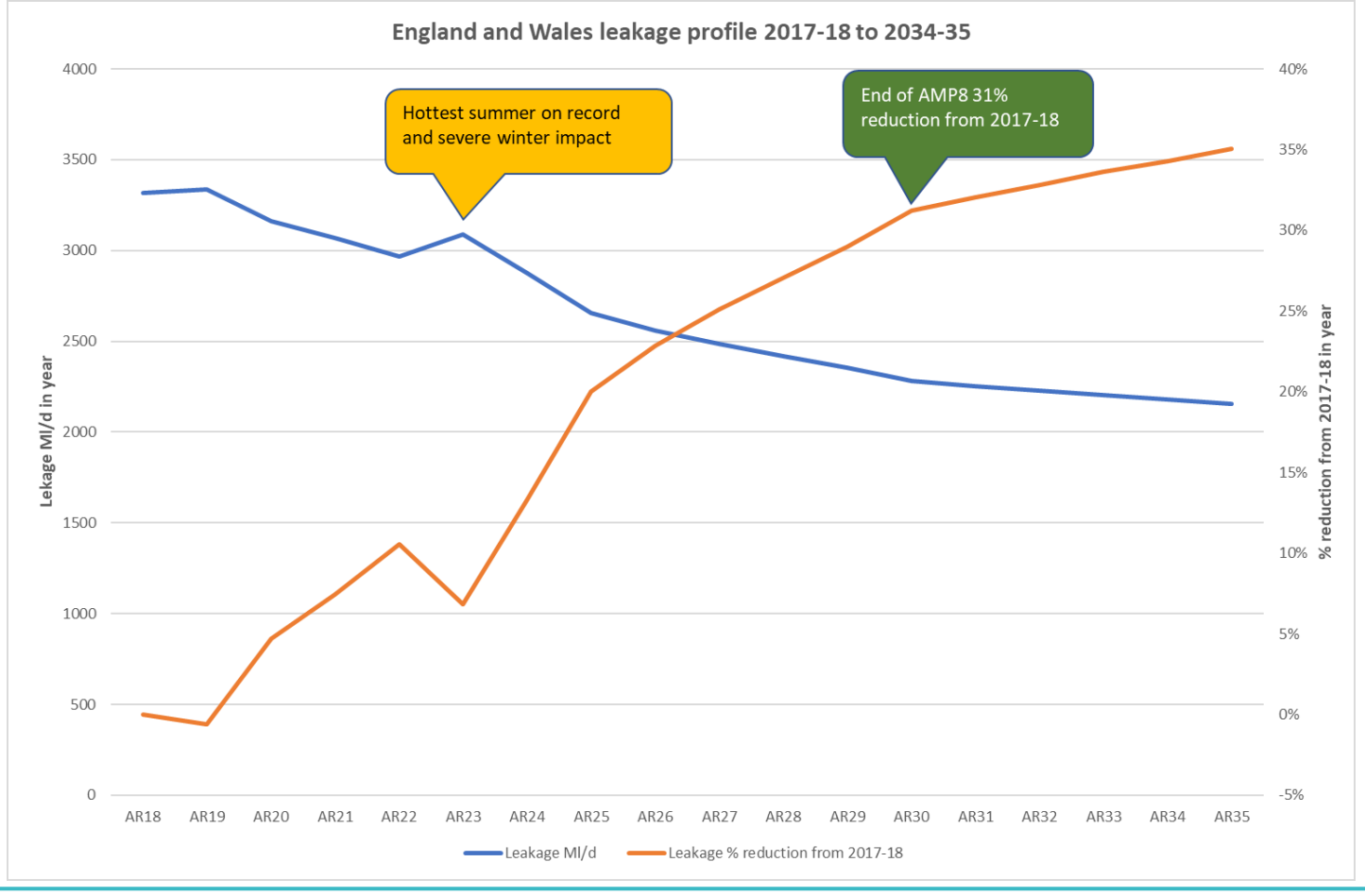


https://www.water.org.uk/sites/default/files/wp/2022/03/Water-UK-A-leakage-Routemap-to-2050.pdf

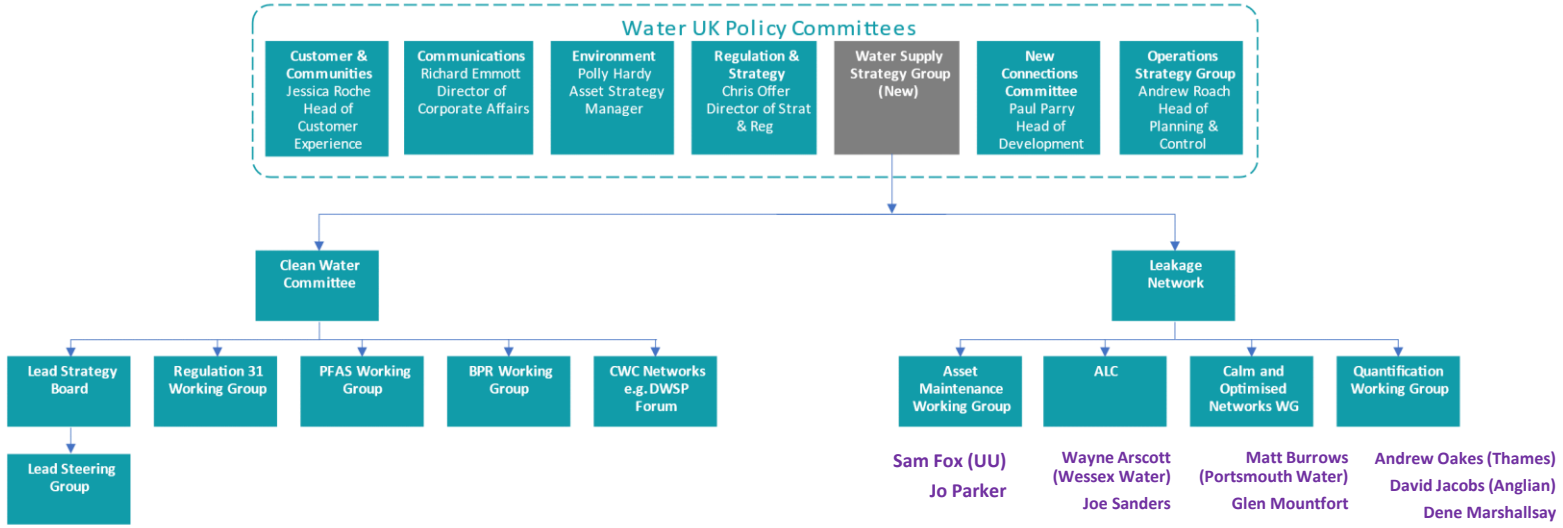
PR24 business plans



Plans submitted, subject to agreement with regulator, drive 31% reduction in leakage by 2029/30

The Routemap workstreams

Water Supply Governance (Proposed)



- One main project area in each workstream proposed by the workstream leads
- Delivered by consultancy companies
- Completion by March 2024

Prevent

Calm and optimised networks

Glen Mountfort

Pressure Management

1. Gather data and insights from those companies who are have case studies in relation to understanding or resolving issues relating to calm and optimised networks (further to previous work through UKWIR).

2. Combine and analyse the evidence

    - seek to compare benefits on a like-for-like basis and presenting information in a way that is appropriate (e.g. NPVs, ROI, ratios to avoid the need to share commercially sensitive information such as unit costs per individual items or assets).

3. Derive a standard matrix for consistently defining calm and optimised networks

    - to consistently present where a company or system is currently and also incorporate where it could be potentially (which may vary between different systems/regions/companies). This will seek to incorporate commonly available pressure data as well as transient data and other variables in a risk and opportunity matrix.

4. Prepare a report describing the findings and future improvements

    - This would summarise the state of the sector's current knowledge, and how this could be improved and updated in the future. This will set out high-level guiding principles and checklists relating to what companies could consider in relation to understanding and managing networks in a calm and optimised manner

Summary of the key issues

- Physical constraints, 3rd party requirements
- Justifying expenditure & ROI challenges
- Lack of understanding (cause/effect, benefits)
- Lack of policy and strategy, conflicting measures and metrics
- Unclear roles and responsibilities & ownership (silo'd approaches)
- Lack of common standards & definitions
- Data & Information – lack of consistency for sharing success and failure
- Communication – customers are part of the holistic system
- Training and experience

Desired future state

Best-value for company & customers

Real time monitored with dynamic and intelligent control

Designed, operated and maintained as a holistic system

Intrinsically calm and resilient as standard

Optimal and understood with clear definitions and standards

Technologically advanced delivering efficient, optimal and low energy networks

Proactively managed communications and education

Clear policy, strategy and justification for expenditure and needs

Project Tasks

Project Task	Requirement
1. Develop a standard and consistent matrix to define the “calmness” of a network and any subsequent improvements made	Matrix with supplementary guidance notes to ensure consistency in terms of use of data inputs, assessment of the calmness of systems and simple, visual outputs that can be shared to enable schemes/projects to be compared and improve the understanding on costs, benefits and risks over time
2. Standard template for sharing information between companies	To agree an appropriate level of detail that could be shared without releasing commercially sensitive information but to enable confidence that the costs-benefits were derived consistently and to demonstrate the benefits in a clear and understandable way.
3. Research into current practices across different functions and departments – to understand the extent to which network calmness is considered by capital delivery teams (e.g. pumps, treatment, engineering guidelines, standards) and development of high-level guiding principles.	To ascertain what practices are currently taken by companies, in relation to calm networks from an operations or capital delivery perspective (new and maintenance schemes) and set out some high-level guiding principles and checklists.

Approach

- Workshop (online) – calm and optimised network matrix – to present draft thinking from the team and discussion with stakeholders.
- Interviews – 5 x water companies volunteered to discuss in greater detail at the Water UK leakage network meeting and dates being arranged to explore what data/information they have and explore factors that are considered when delivering different designs or upgrades
- Questionnaire – feedback on a draft case study template to ensure the level of detail is useful and appropriate but also considering practicalities.
- Workshop and interview dates being arranged
- Open to anyone who is passionate about the subject to input

Factors under consideration that influence network calmness

High risk = lots of - basic pumps /valve operations /hydrant operations / Mains bursts.

High potential = network with high pressures /high flow velocities /Large main diameters / erratic demands /few connections

/valve operations /hydrant operations / Mains bursts

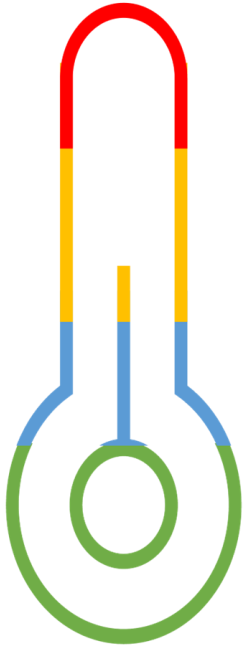
Low potential = network with low managed pressures /steady flow velocities due to even demand /appropriate main diameters for

Low risk = Ramped variable drive pumps / managed network operations / Robust Mains conditions

High potential = network with high pressures /high flow velocities /Large main diameters / erratic demands / few connections

pumps / managed network operations / Robust Mains conditions

Low potential = network with Low managed pressures /steady flow velocities due to even demand /appropriate main diameters for need, surge protection considered



Thoughts on a calm network matrix

Network and assets - root cause factors	**Score**	***Potential (energy factors)***	**Score**	***Mitigation factors***	**Score**
Pump control	4	Min pressure	3	Mains material	3
Network operations	3	Average pressure	2	Surge protection	5
Control valve operations	4	Max pressure	3	Trained staff	4
Mains bursts	5	Min velocity	3	Proactive design processes	5
Commercial demand	5	Max velocity	4		
		Average velocity	3		
		Average transient magnitude	2		
		Average transient duration	3		
		Average time between transients	2		
TOTAL	**4**		**3**		**4**
COMBINED RISK SCORE					**50**

- Draft matrix being compiled prior to workshops and industry engagement in early Jan 2024
- To consider the system in relation to the factors that could cause issues such as transients, factors that relate to the potential to cause harm to the network relating to energy and factors that could mitigate or compound the potential impact

Appropriate level of detail for case studies– what is practical?

- The matrix will form a key aspect of case studies – to show before and after some form of intervention
- Need to find a balance between sharing non-commercially sensitive information but demonstrating cost-benefit case/ROI.
- Also needs to consider what is practical – it may be better to share a 2 page summary of basic information than a dossier full of academic, scientific and engineering detail that ends up being a barrier to companies sharing case studies.
- Interviews will be held with 5 x volunteer companies (room for one or two more if they desire) to explore areas such as ownership of network calmness and how different functions and departments do or don't factor network issues such as transients into their design and implementation of new assets or in upgrade of existing assets (along with operational processes and practices).

Awareness

Quantification of background leakage and customer supply-side leakage

Dene Marshallsay

Smart meter - CSPL

1. Gather data and insights from those companies who are rolling out smart metering or have data from trials

2. Combine and analyse the evidence

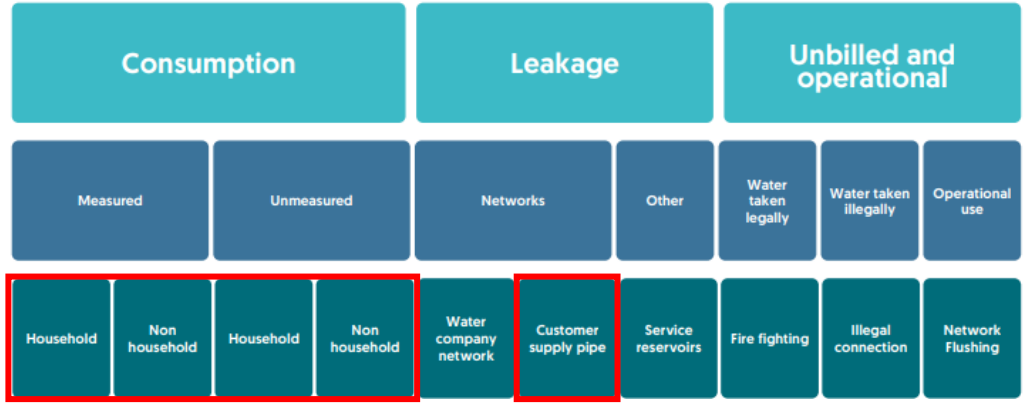
    - Investigate how to make best use of the evidence to allow companies to make better estimates of the potential losses on customers' infrastructure and hence on their own networks.

3. Prepare a report describing the findings and future improvements

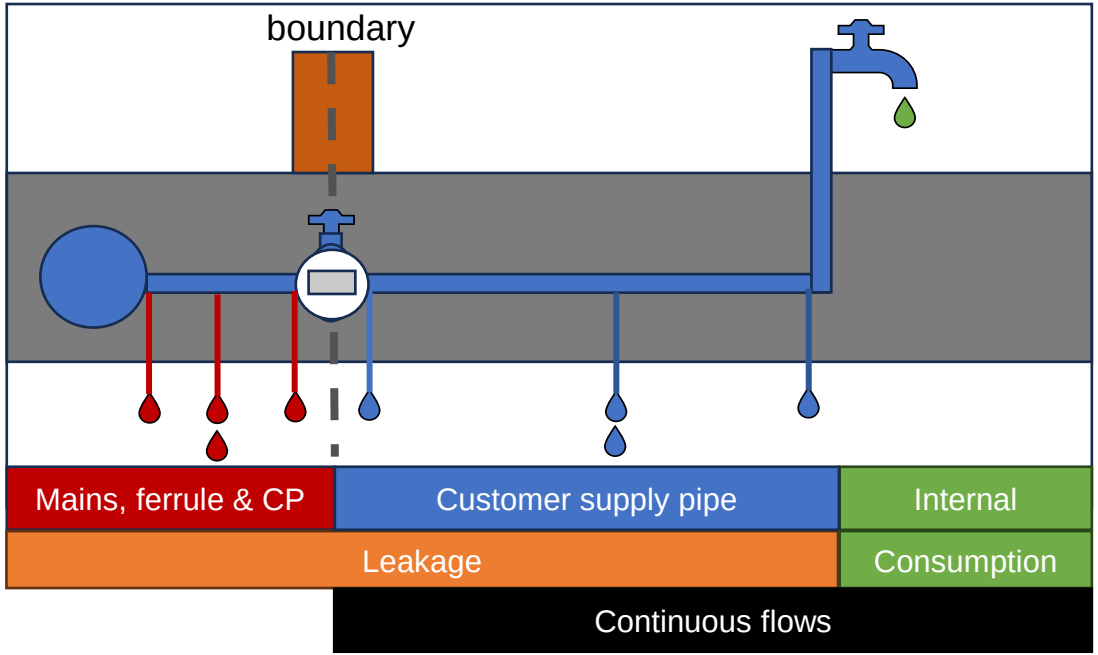
    - This would summarise the state of the sector's current knowledge, and how this could be improved and updated in the future.

Context

- Underground supply pipe leakage is estimated to be 25% of reported leakage and reduction is needed to reach 2050 targets
- Plumbing losses and wastage contribute to customer demand and can be reduced without influencing customers' daily lives
- Since properties are typically measured externally, these values cannot be measured directly
- Total continuous flow into properties can be measured to infer these values
- Smart meter data is being used to help us understand these values



Continuous flow definition



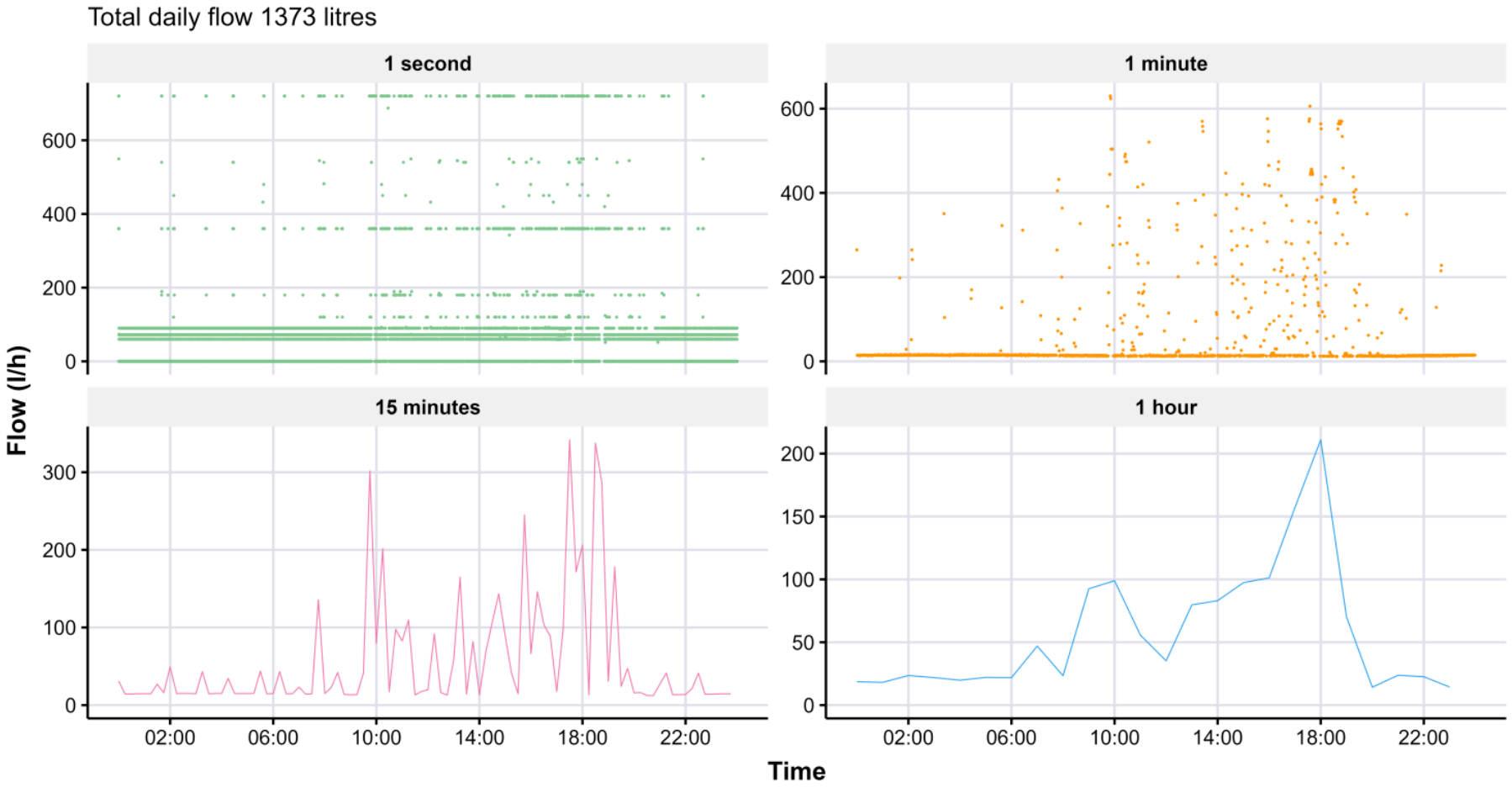
We can use smart meter data to identify continuous flows on infrastructure owned by the property owner (supply pipes and internal plumbing).

Continuous flows mostly consist of:

- Underground supply pipe leaks
- Plumbing losses or wastage from water using devices

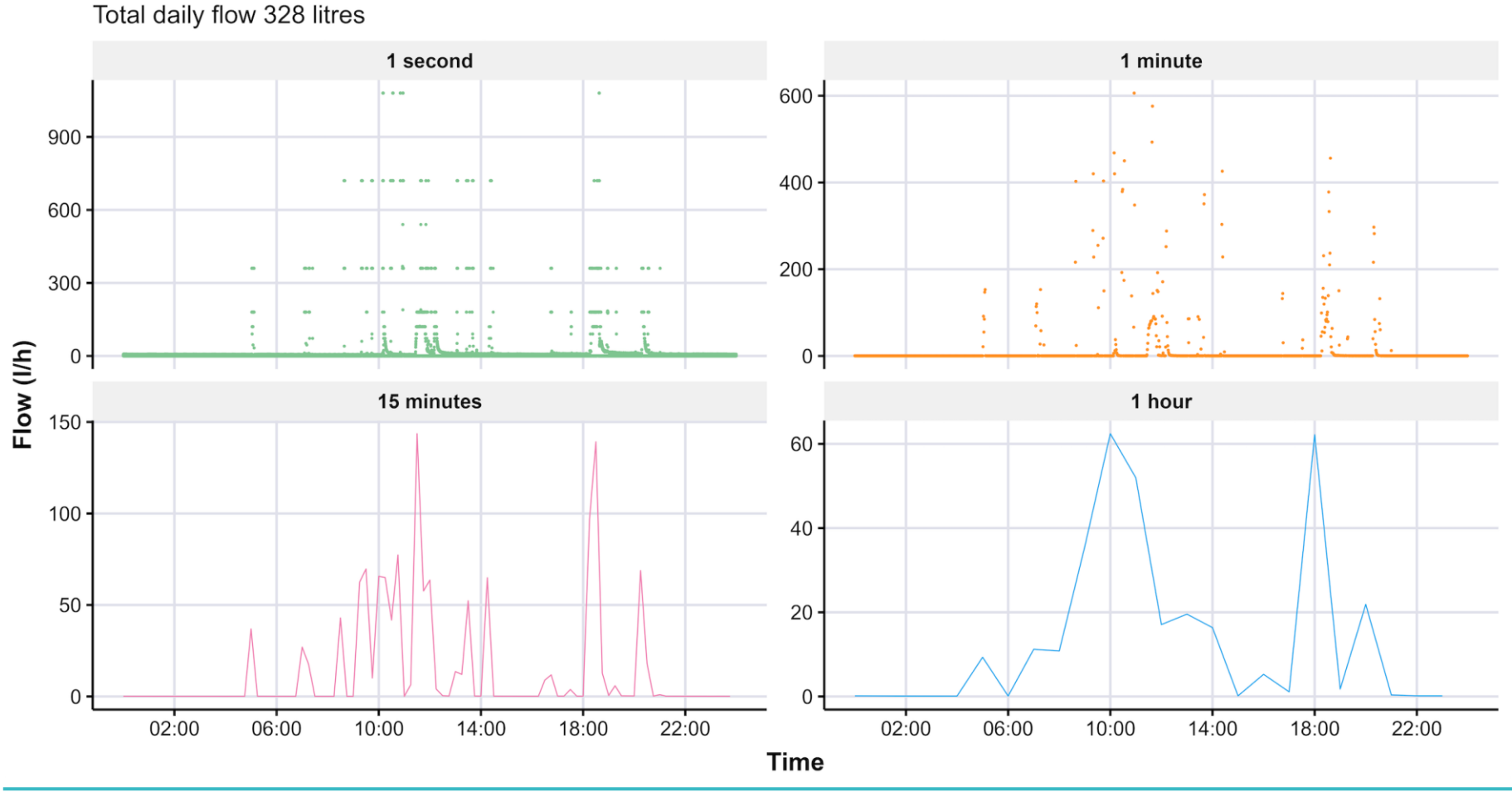
They may also contain some legitimate water use

Hourly smart meter data can be used to define continuous flow

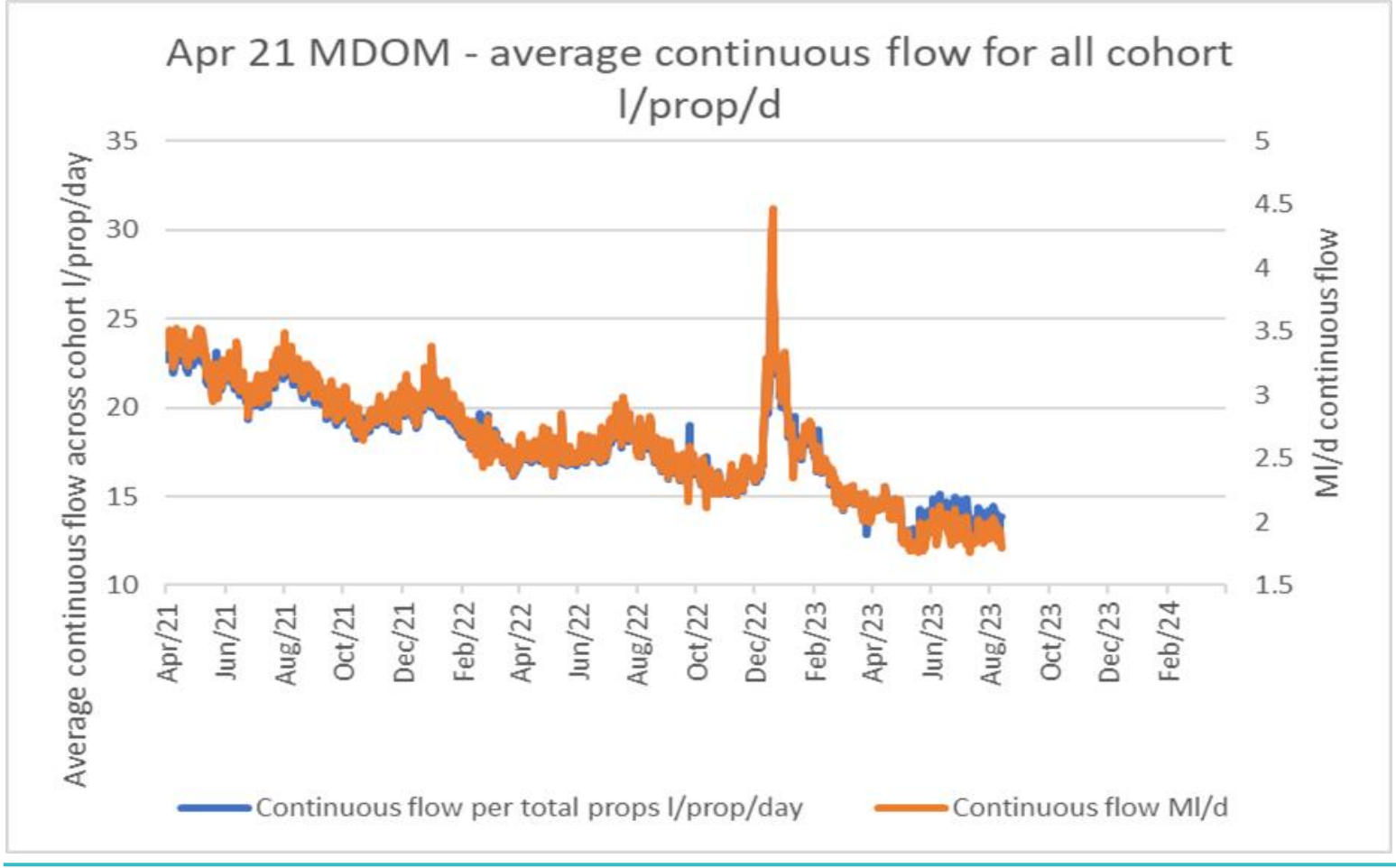


We can check the reliability of continuous flow algorithms by using high resolution data

Not all properties have continuous flow!



Smart meter data from Anglian Water



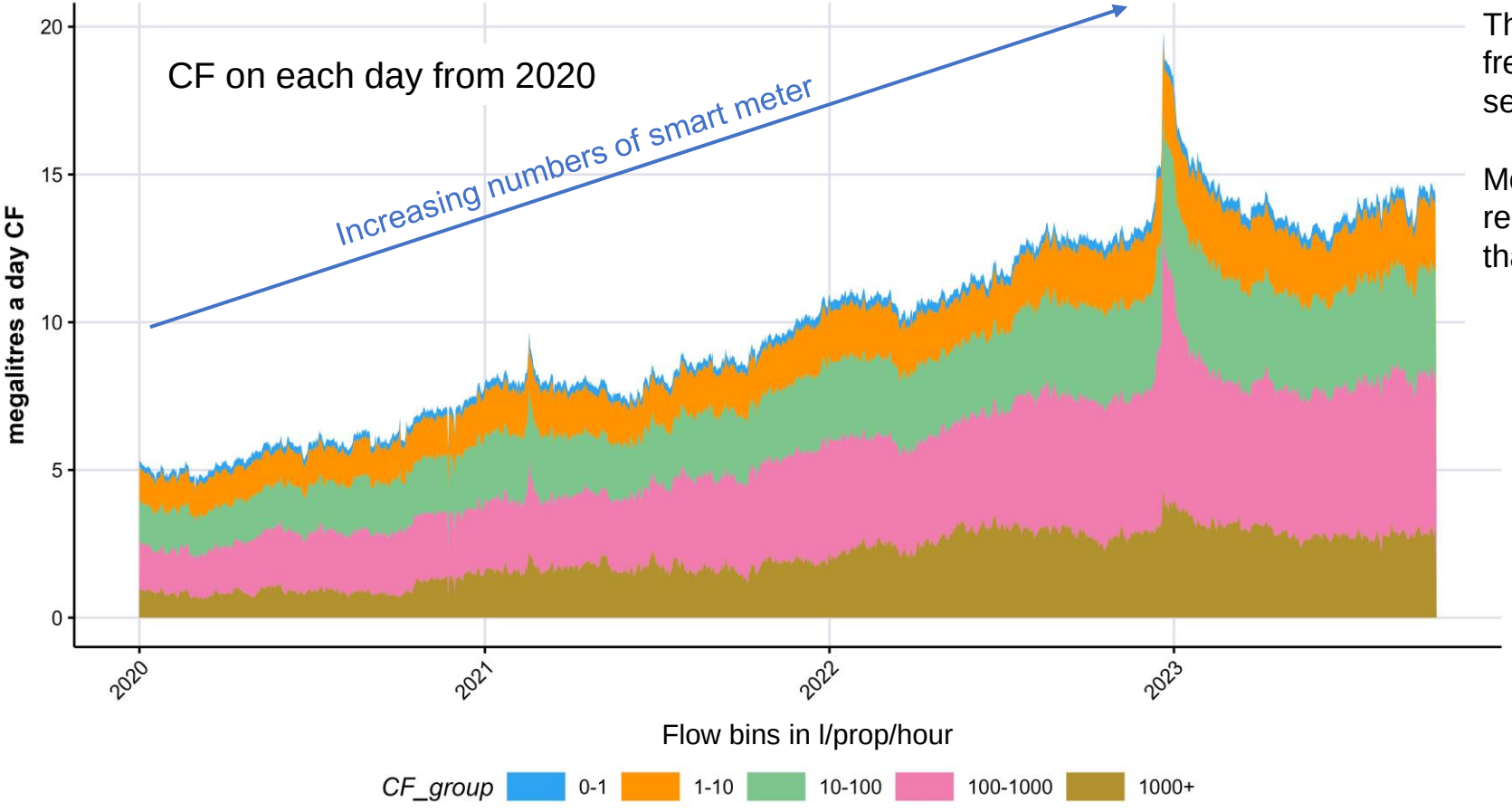
Gradual decrease in CF over time as customers repair leaks on plumbing systems or supply pipes.

8% of properties with CF reducing to 5%.

Saving 1.5 Ml/d of CF.

The large peak in Dec 2022 is the impact of the freeze thaw event.

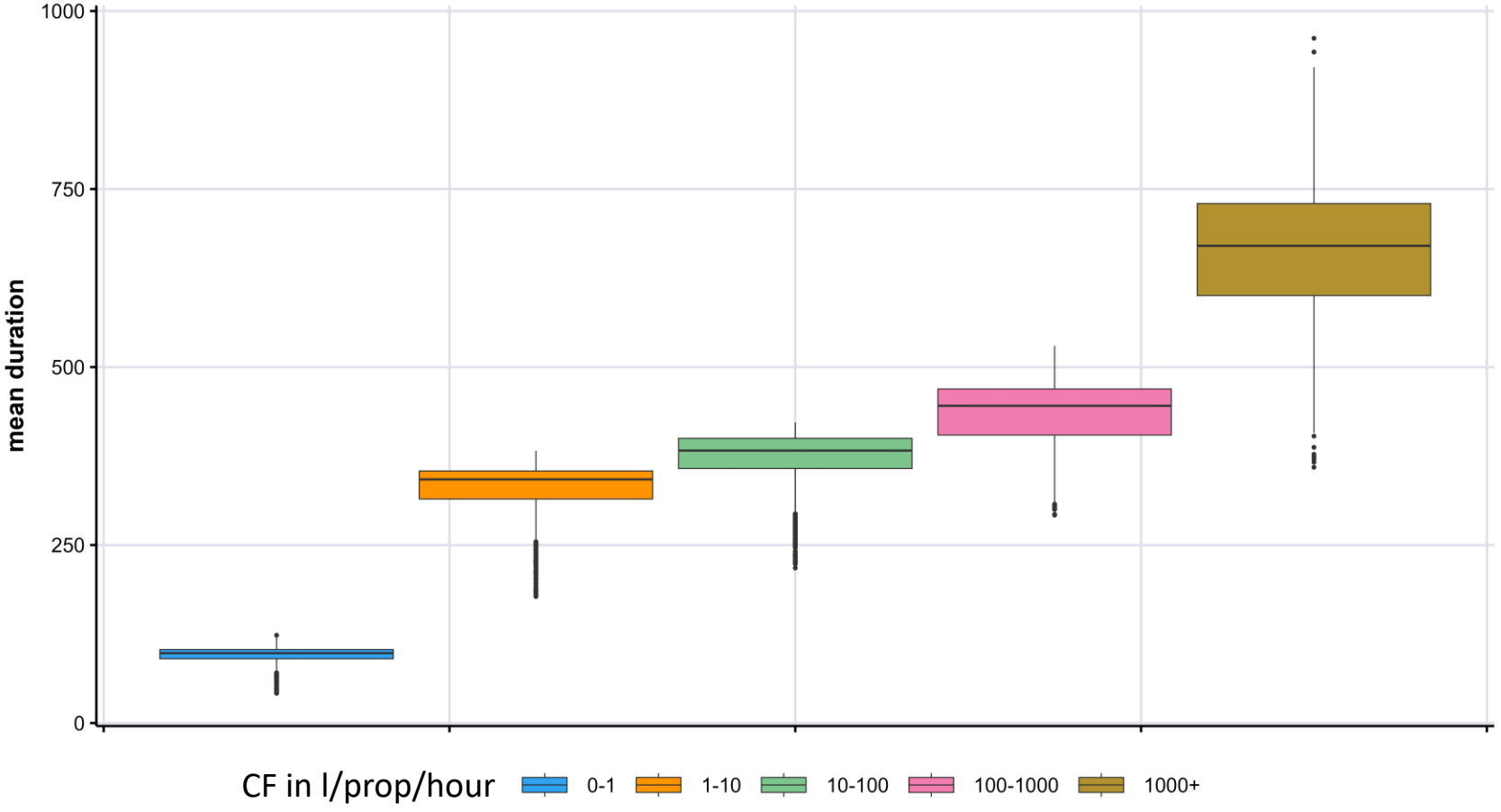
Data from Thames Water smart meters separated into flow bins



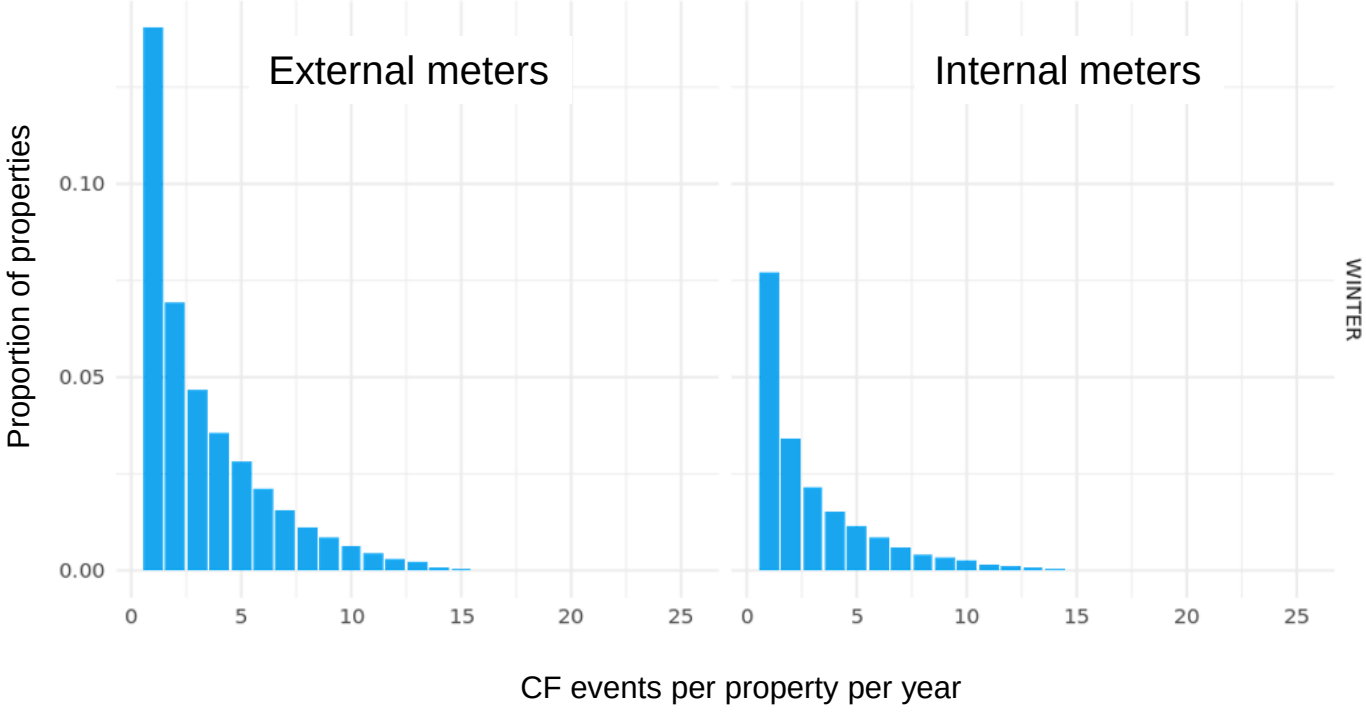
The impact of the Dec 2022 freeze thaw event can be seen.

Most of the freeze thaw related CFs are greater than 100 l/prop/hour.

The largest CFs also run for the longest duration



How does CF compare when looking at internal and external meters



A significant number of properties have multiple instances of CF in a year.

These are probably plumbing loses or wastage (i.e. not supply pipe leaks).

The distributions for external meters (measuring USPL and plumbing loses) are similar to the distributions for internal meters.

Key findings and next steps

- From the data looked at so far, there appears to be some consistency in the continuous flows across areas, however there are some biases in the data. We also need to consider non-household CF.
- Work is ongoing to improve the guidance on range of CF that could be expected
- Current estimate is that there is potentially 500 – 1000 Ml/d of CF
- CSPL and plumbing systems, water use devices (e.g. leaky loos) contribute to losses or wasted water
- We need to consider how to manage and most effectively reduce demand from this infrastructure to meet demand reduction targets

Locate

ALC and network management

Joe Sanders

ALC

1. Derive a standard set of KPIs to measure ALC/technology performance

- So that all the data that is needed can be collected then a standard small set of KPIs need to be measured to allow for true performance at an individual level, technology level and company level. These need to require minimal input from technicians and minimal ambiguity around poor or good performance.

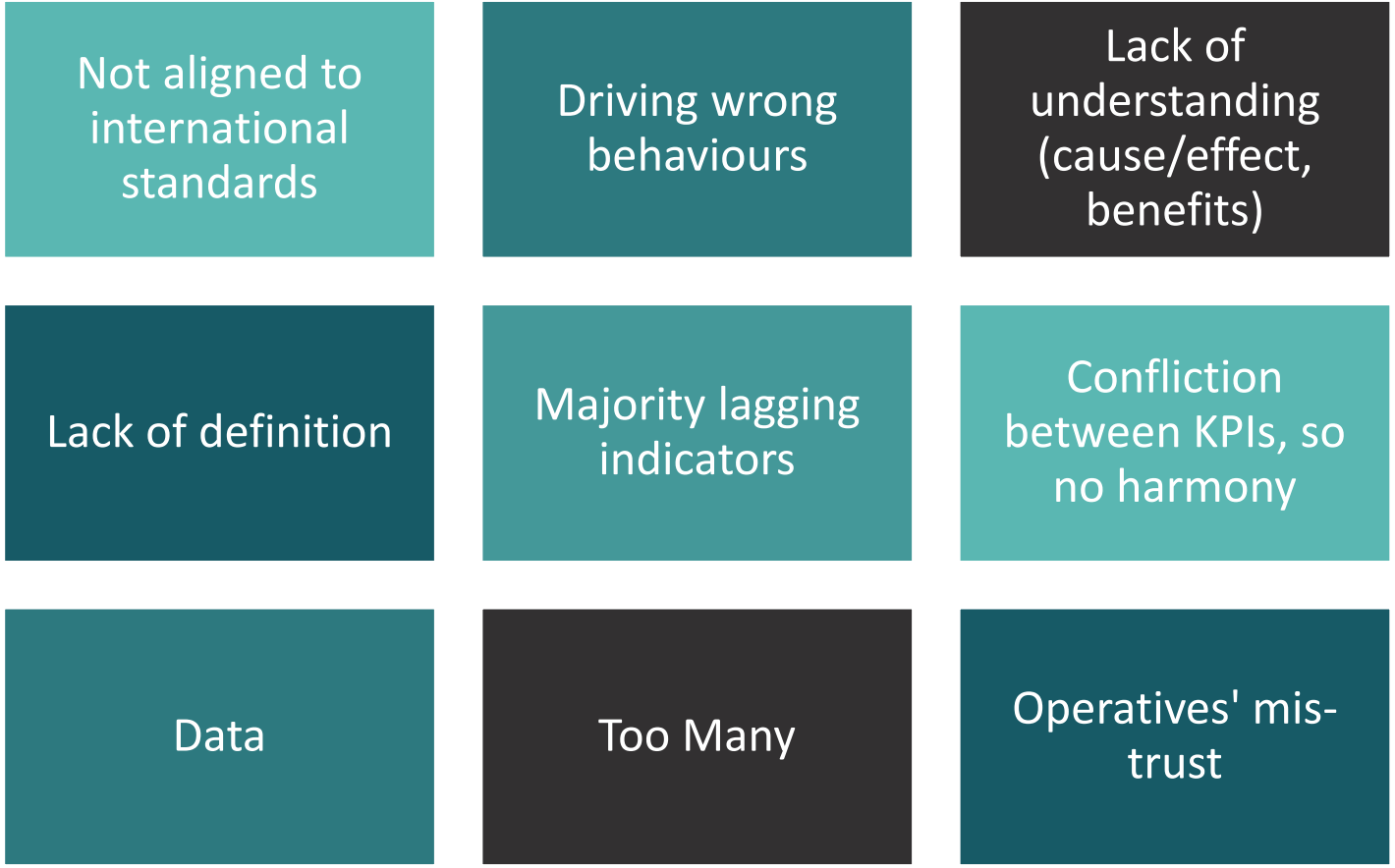
2. Standard approach to trialling new technology and processes

- Design a standard approach to assess technology and new processes, using the above metrics and scientific test design. Allow benefits to be fully assessed as well as looked at against trials of technology else where.

3. Best practice and technology use cases case studies

- Collate all the case studies that have been done over the last few years and put them into a standard format and in a place that can be accessed by all. These will have metadata search and hosted on the Spring website (already agreed and development done)

Summary of the key issues with current KPI suite



Potential KPIs

- Volume/Time to locate
- Volume found as a % of target
- Repair time
- POI related KPIs
- Technology efficiency index
- Targeting effectiveness
- Quality of repairs
- Customer leak time to resolve

Proposed Trial Process

1. Baseline
   - What is expected performance – without intervention and normal intervention
2. Identification of normalising areas or work streams
   - Normalises impact of weather, repair speeds and other external factors
3. Determine the data that needs to be collected and the method that will be used
   - This will include network related factors
   - Operative time, etc
4. Perform the trial for an “appropriate length of time”
   - Will vary for different technologies and processes
5. Analysis of results
   - What worked, what were the issues, operative feedback
6. Share

Mend

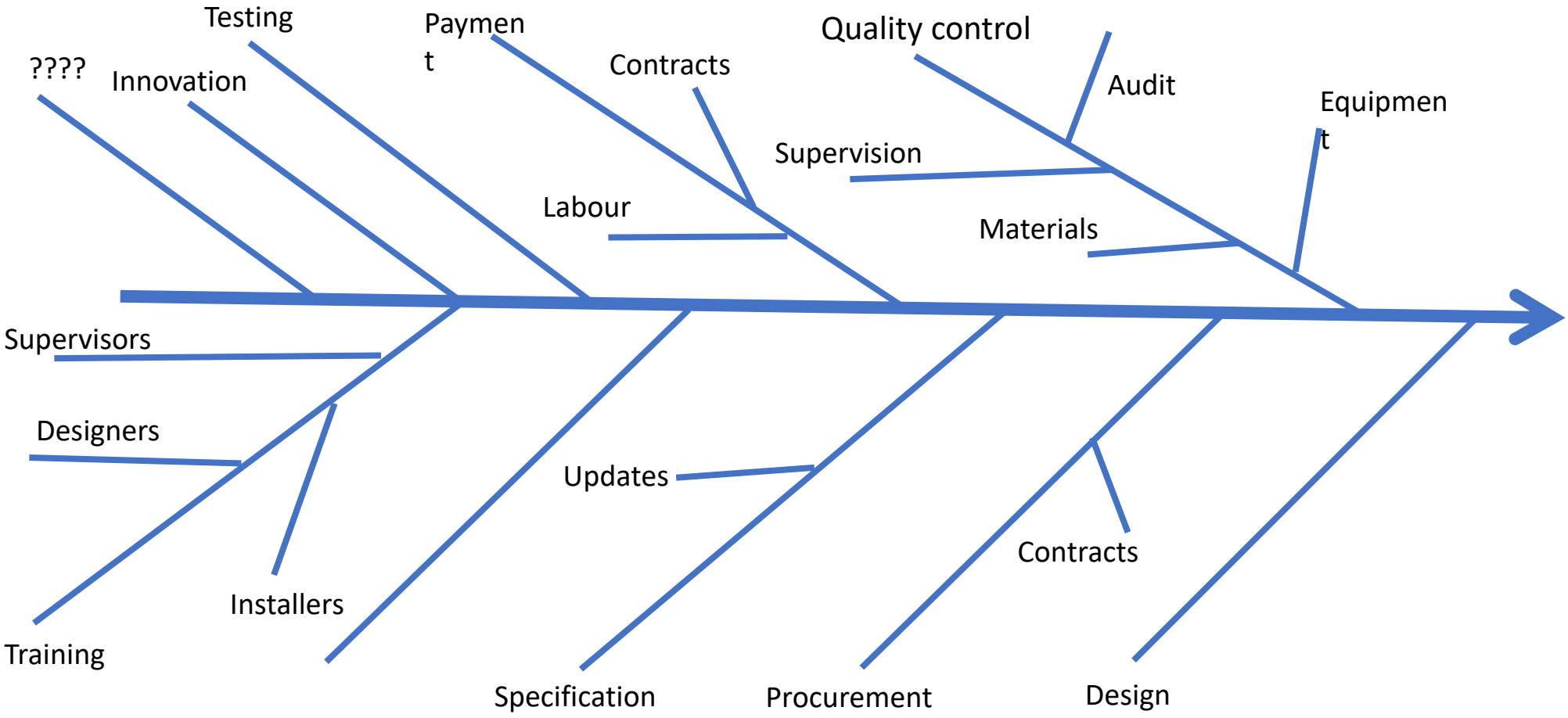
Asset maintenance and renewal

Jo Parker

Asset Management - 3 hour rule

1. Project Start up including workshop
    - What was in Business plans about 3hr
2. Derive costs for example projects with and without 3 hour rule.
3. Collate customer feedback to support 3 hour view
4. Collate water company arguments for and against the 3 hour rule
5. Prepare position statement to argue against 3 hour rule for particular planned work and get all water companies to sign up to it

Repairs, renewals and new lay – what affects the quality?



Summary of business plans

Customers are concerned about major disruption of 2 days plus

Younger bill payers desire more mains replacement

Unplanned interruptions are not acceptable

Innovation needed to be reduce carbon from renewals

Mains renewals programmes to reduce interruptions to supply

Impact on NHH customers of interruptions higher

High level business plan assessment

- Based on the figures in PR24 submission approximately 8,000km will be replaced or relined in AMP8
  - 0.4% of the network each year
  - Asset life of 225 years
- Estimated to cost £6bn over the period
  - That’s the same investment as the total of Affinity Water and South East Waters plans combined
- Initial assessment has shown that the this could be lowered to £4bn if more online replacement could be done (that would require a longer than 3 hour interruption)

Strategy

Decision framework and scenarios, and costs of adaptive pathways

Glen Mountfort

Factors driving targets

Political

Environmental

Social

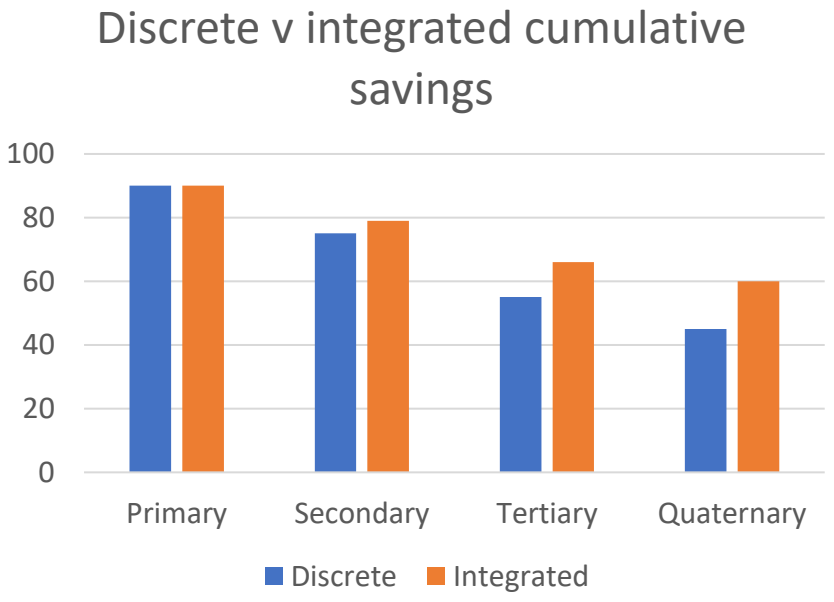
Legislative

Technological

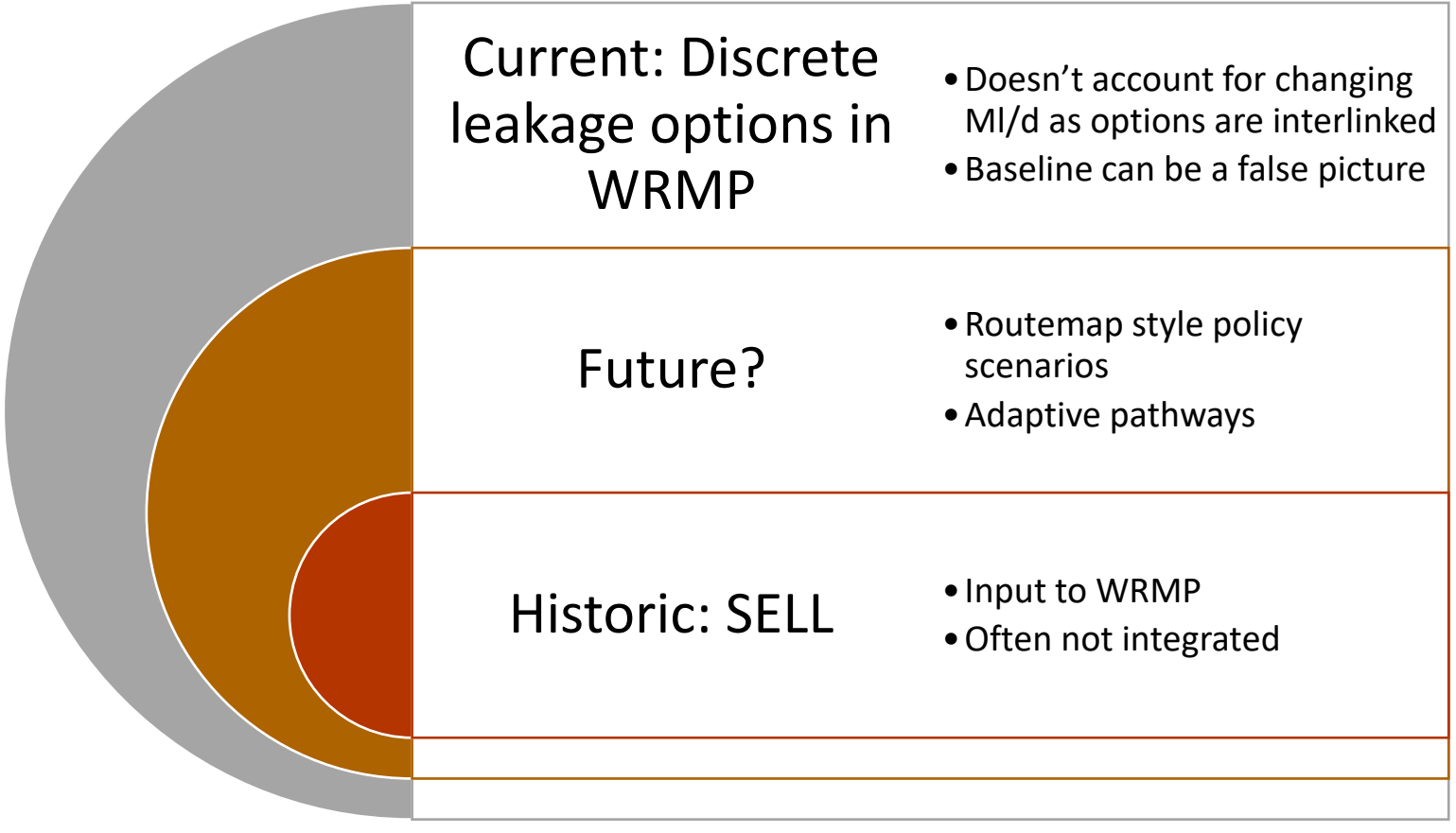
Environmental

Some of the challenges

- Baseline – doesn't really address if the future is different in terms of leakage (> development/population, climate change impact on networks), supply pipe deterioration
- Discrete options – demand management and particularly leakage options rarely done in isolation
- Making one intervention then reduces the saving from 2nd, 3rd, 4th options – liable to overstate the potential benefits and carries risk that the overall £/Ml saving won't deliver targets
- Complex interdependencies of having discrete options in the WRMP – how optimal is the WRMP process in terms of demand options really?
- Difficult to deal with such interrelationships across PALM



Integration of leakage options in WRMP



Q&A

Led by David Jacobs, Leakage Strategy Manager, Anglian Water

Q&A Discussion

Led by David Jacobs

Leakage Strategy Manager

Anglian Water

The Water UK Leakage Routemap

Glen Mountfort
Director of Technical Consulting
WRc

Dene Marshallsay
Director
Artesia

Joe Sanders
Senior Technical Director
RPS

The Water UK Leakage Routemap: Q&A and discussion

The Regulator’s perspective

Ian Pemberton

Principal Engineer, Water Engineering Science and Technology

Ofwat

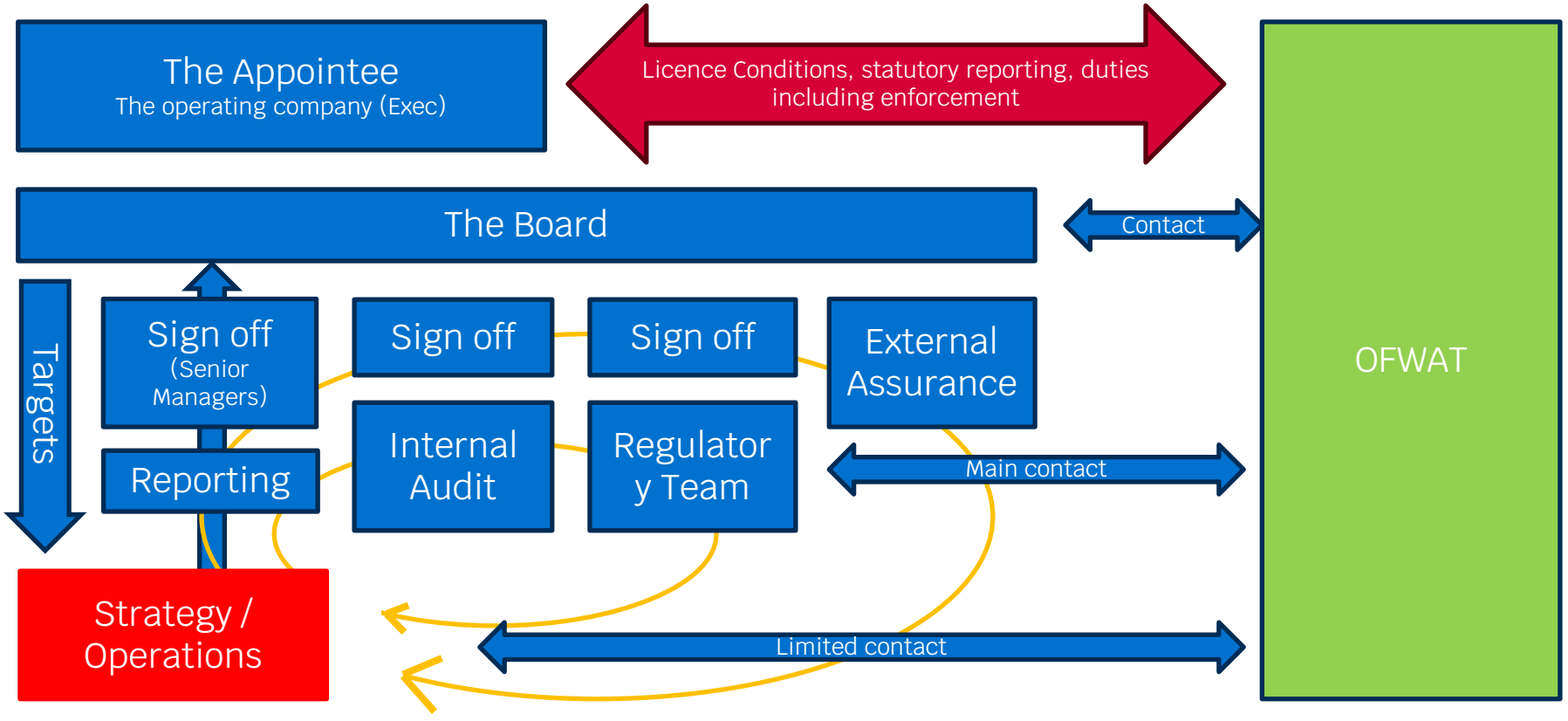
Leakage – The Regulator's Perspective

Ian Pemberton
December 2023

Ofwat

“Your scientists were so preoccupied with whether they could, they didn’t stop to think if they should.”

Typical structure of communications between Ofwat and the companies



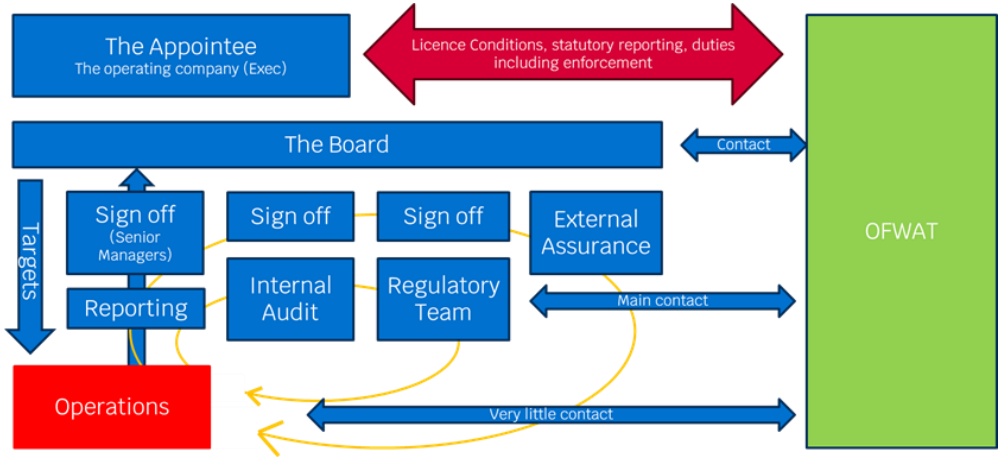
Assets, rights and resources

P12 To enable it to carry out the Regulated Activities the Appointee must, at all times, act in a manner which is best calculated to ensure that it has in place adequate:

P12.1 financial resources and facilities;

P12.2 management resources; and

P12.3 systems of planning and internal control



Why companies should care about complying.

- Getting it right pays
  - Companies who meet performance commitments get reputational benefits and may get ODI payments.
  - Companies who do not meet commitments may be subjected to ODI payments.

- Additional Scrutiny
  - Ofwat have powers to request further information to meet our duties.
- Enforcement action

  - Failure to meet commitments could indicate contravention of licence conditions.
  - Companies could become the subject of an investigation and ensuing enforcement action

Leakage – more than half did not meet Performance Commitment in 2022-23

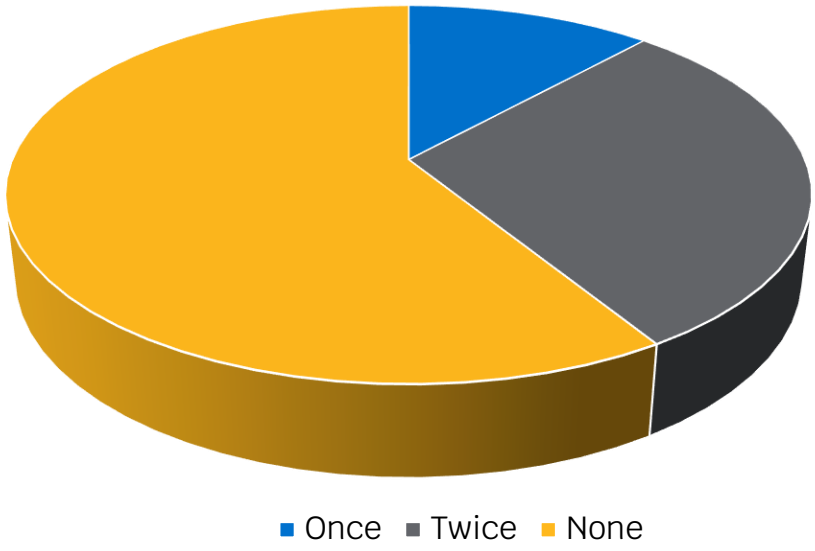
Company	Performance (three-year average)	
	Actual	Commitment
	% Reduction from baseline	
Anglian Water	-7.5	-8.5
Dŵr Cymru[4]	11.5[4]	-7.3
Hafren Dyfrdwy	-4.4	-6.4
Northumbrian Water[2]	-3.7; -7.5	-6.0; -7.2
Severn Trent Water	-9.3	-5.7
South West Water[4]	-9.1	-9.0
Southern Water	-0.2	-9.0
Thames Water	-10.7	-14.1
United Utilities	-5.9	-3.7
Wessex Water	-9.3	-6.9
Yorkshire Water	-9.5	-9.4
Affinity Water	-15.8	-14.0
Bristol Water	-9.3	-15.8
Portsmouth Water	-2.8	-9.2
South East Water	-0.6	-2.0
South Staffs Water[2]	-9.4; -16.7	-7.8; -8.0
SES Water	-8.7	-6.2
Sector	**-7.2**	

So, what could we read into that?

- So, what could we read into that?
  - Targets are sitting around the right level?
  - They are not so easy – not every company is hitting them every time
  - Failure to hit targets sends a poor message to stakeholders.
- Companies are still not doing enough?
  - Are the exec making the right resources available to operations?
  - The line of sight between Exec and Operations, are you listened to?
- There was exceptional weather in the period?
  - Companies are not equipping themselves / issues with resilience
  - It was not exceptional, failure of resilience?
  - The ODI mechanism and payment limits don't drive the right behaviours?
  - It's more cost effective to fail that to invest to hit

https://www.ofwat.gov.uk/publication/water-company-performance-report-2022-23/

Restatement of leakage figures

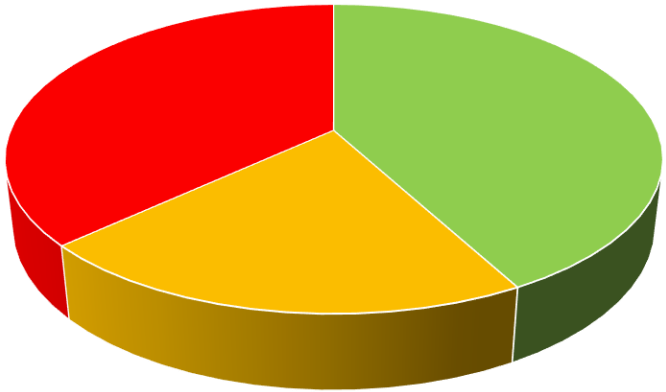


- Between 2020 and 2023 More than a 1/3rd of companies restated at least once.
- This includes restating baseline
- The In Period Determination considers the case submitted by the company and the evidence to support that case.
- We don't do forensic analysis ***as part of the In Period Determination***.
  - Your duty under Condition M

Licence condition M	**A Licence condition on provision of information, requiring appointed water companies to provide Ofwat with information it reasonably requires to carry out its functions**

Compliance with PR19 Methodology
(~half of the non-compliance is due to Water Balance Gap >2%)

Compliance with PR19 Reporting Guidance



Green Amber Red

16e Water balance discrepancy
<2% = Green
>2% and <3% = Amber
>3% = Red

Annex A: Compliance Checklist

A company is required to complete this checklist for submission with its value of annual average leakage.

The elements of each component to be assessed separately based on the following rules:

Compliance for elements is reported against:

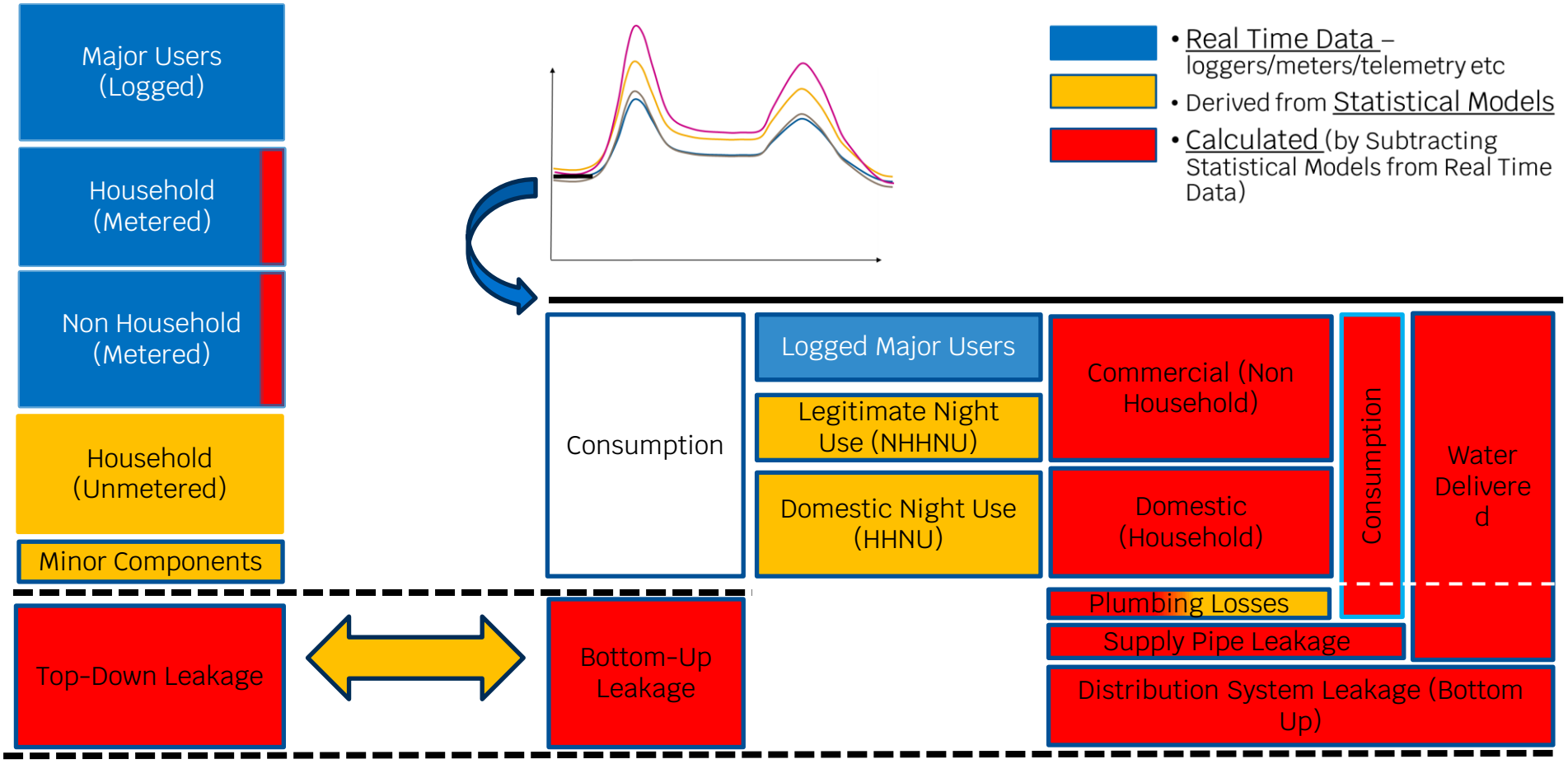
R	Not compliant with the guidance and having a material impact on annual average leakage
A	Not compliant with the guidance and having no material impact on annual average leakage. For example, a material impact might be assessed as more than 1% of the reported value. A company should set out its approach to assessing whether an impact is material or not.
G	Fully-compliant with the guidance

An overall RAG to be assigned for each component based on the following rules:

Compliance for overall components is reported against:

R	There are one or more red elements in the component or the combined effect of amber elements is considered to produce a material impact.
A	Half or more of the elements in the component are amber and the combined effect of the amber elements is considered not to produce a material impact.
G	More than half of the elements in the component are green

Water Balance



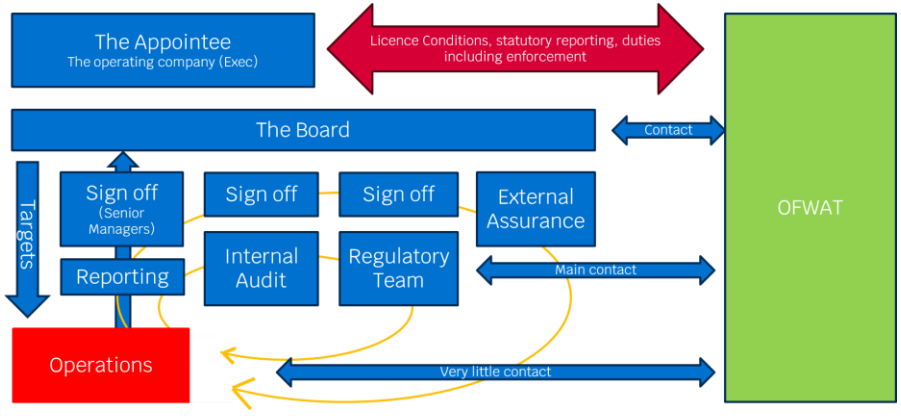
Points to Note on External Assurance And MLE

Licence condition M	A Licence condition on provision of information, requiring appointed water companies to provide Ofwat with information it reasonably requires to carry out its functions

- What is being externally assured?
  - The methodology?
  - The input data?
  - The uncertainties or the calculation as presented to them?
- What is their brief?
  - Are you getting best value from your external assurance?
- What advice do the external assurers give to you and how do you process that?

- Fully measured components such as distribution input should have a range from 2% to 4%;
- Mainly measured with some estimated adjustments such as measured volumes with supply pipe losses and meter under-registration: from 2.5% to 5%;
- Estimated using detailed and reliable methods such as distribution leakage and unmeasured household (including PCC): from 8% to 12%;
- Broad estimates not fully detailed or reliable such as trunk main leakage and water delivered unbilled components: from 20% to 50%.

Little contact between Ofwat and Water Company Operations



Assets, rights and resources

P12 To enable it to carry out the Regulated Activities the Appointee must, at all times, act in a manner which is best calculated to ensure that it has in place adequate:

P12.1 financial resources and facilities;

P12.2 management resources; and

P12.3 systems of planning and internal control

Thank you and questions

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