

26th Annual Leakage Conference

BIRMINGHAM
MONDAY 24 NOVEMBER 2025
TUESDAY 25 NOVEMBER 2025

Policy and Industry Initiatives

Organised by
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Media partner
THE UK WATER REPORT
POLICY | REGULATION | FINANCE

Chair’s welcome



Geoff Darch

Head of Strategic Asset Planning

Anglian Water



Welcome to over 230 delegates from 80 organisations.
An incredible community of leakage expertise

Advizzo | Affinity Water | Aganova | Agua-Tek | Anglian Water | Aqualogic | Arqiva | Artesia | Ashridge Engineering | AtkinsRealis | Atmos International | AVK | Bermad |Binnies | Bristol Water | Cla-Val UK | Cross8 | Crowder Consulting | Dayworth Consulting | Dwr Cymru | Edge Hill University | EEDN | Environmental Protection Agency (EPA) | Essex & Suffolk Water | FiberSense | FIDO Tech | Focus Sensors | FYLD | Global Water Intelligence | Gutermann | GWF | Highlow Water | Hubbell Aclara | HULO | HWM Global | Hydraulic Analysis | Hydrosave | Hydrotech Water Services | International Water Specialists | LeakSolve AI | Lightsonic | M Group Water (Network Infrastructure) | Manx Utilities | Northern Ireland Water | Northumbrian Water | Ofwat | Optimatics | Origin Technology | Ovarro | PN Daly | Portsmouth Water | Rawwater | Rotork | Scottish Water | SES Water | Severn Trent Water | SmartValve | SME Water | South East Water | South Staffordshire Water | South West Water | Southern Water | Stantec | SUEZ | Synthotech | Technolog | Tetratech RPS | Thames Water |UKAEA | United Utilities | University of Exeter | University of Sheffield | Water UK | Watergate | Watershed Associates | Wessex Water | Williams Tucker | WLLS | WRc | Yorkshire Water

Chair’s welcome



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GWI GLOBAL WATER INTELLIGENCE

Housekeeping 1

- Turn **Phones/devices** to silent or off please
- **No fire alarms** expected
- **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 #4474324 (info sheet on your table)**

First poll – use Slido

- **Do you think the industry will hit the 50% leakage reduction target for 2050?**

- **What do you see as the number 1 priority to drive leakage improvements in AMP8?**

We'll come back at the end of today with the results and we'll compare to last year's

Housekeeping 2

- **Feedback forms**
  - **Hard copy within your Event Guide and QR code on your table to access online (editable PDF or online form on Survey Monkey)**

Policy and industry initiatives

Reforming the water industry: The water resources policy landscape



Jon Chappell

Head of Water Resources and Planning

Water UK

Reforming the water industry: The water resources policy landscape

Monday 24th November

Water UK

The very big picture



Context

- Once in 30 year review of the sector
- Made 88 recommendations:

"This sector requires fundamental reform on all sides – how we manage the demands on water, how the system is regulated, how companies are governed and how we manage the critical infrastructure on which we all rely." - Sir John Cunliffe

Strategic direction for the water system & regulatory reform

The problem: Trade-offs made implicitly by regulators, lack of coordination between regulators, and artificially keeping investment down to reduce bills.

Cunliffe solution:

- New Ministerial Statement of Water Industry Priorities
- Creation of a super regulator including an engineering focus – it would support investability, long term infrastructure resilience and the sustainability of the water system.

Water system planning

The problem: Too many plans, inconsistent scenarios and inability to work cross sector

Cunliffe solution:

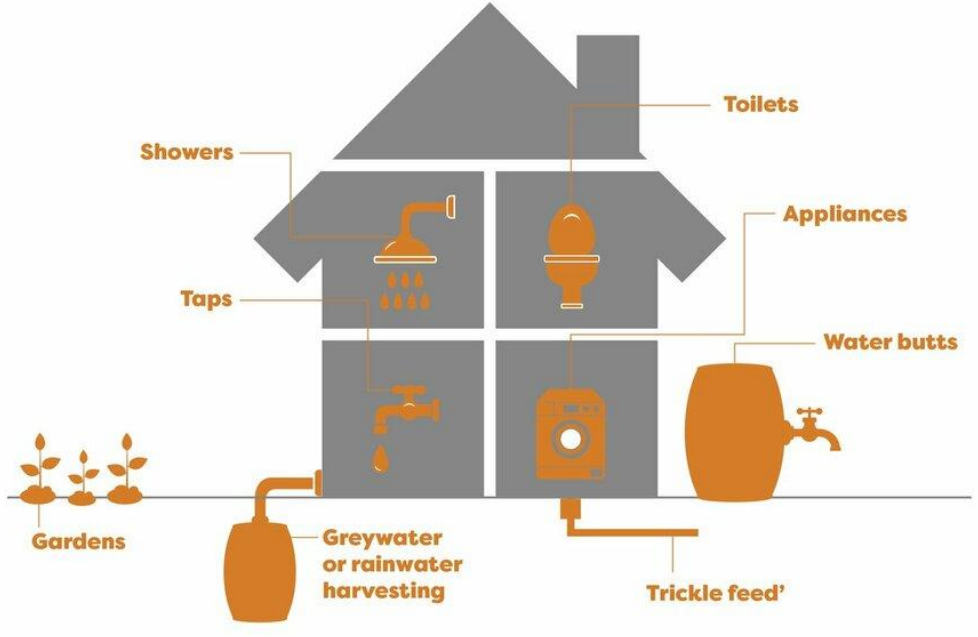
- Regional system planners with powers of direction over sources of funding outside of the water sector.
- 9 plans down to two: Water supply and water environment.
- Central planning function to coordinate – including consistent planning scenarios.

Legislative framework

The problem: Complex and sometimes conflicting environmental regulations (e.g. double treating water in reservoirs)

Cunliffe solution:

- Review of current framework of regulation
- Constrained discretion to achieve the best outcomes for the environment
- More sustainable approach to drainage and wastewater management including a **rainwater strategy**.



Challenges

- Disruption in the transition & uncertainty for investors
- A continuation of past approaches e.g. WRMP 29 guidelines
- Growing urgency – three droughts in seven years.



Next steps

- White paper before Christmas
- Transition plan and strategic policy statements in the new year
- More detail to come – e.g. the nature of water supply plans.





Q & A

Leakage reporting: An update from Ofwat



Ian Pemberton

Principle Engineer

Ofwat

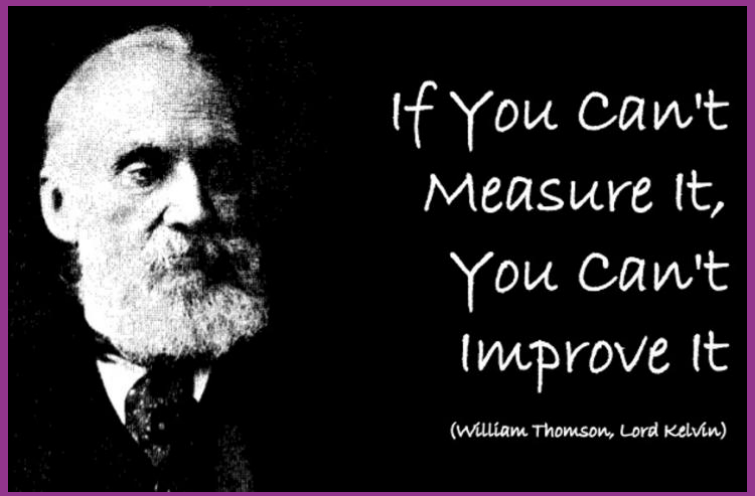
Leakage Reporting –

An update from Ofwat

Ian Pemberton
December 2025

Ofwat

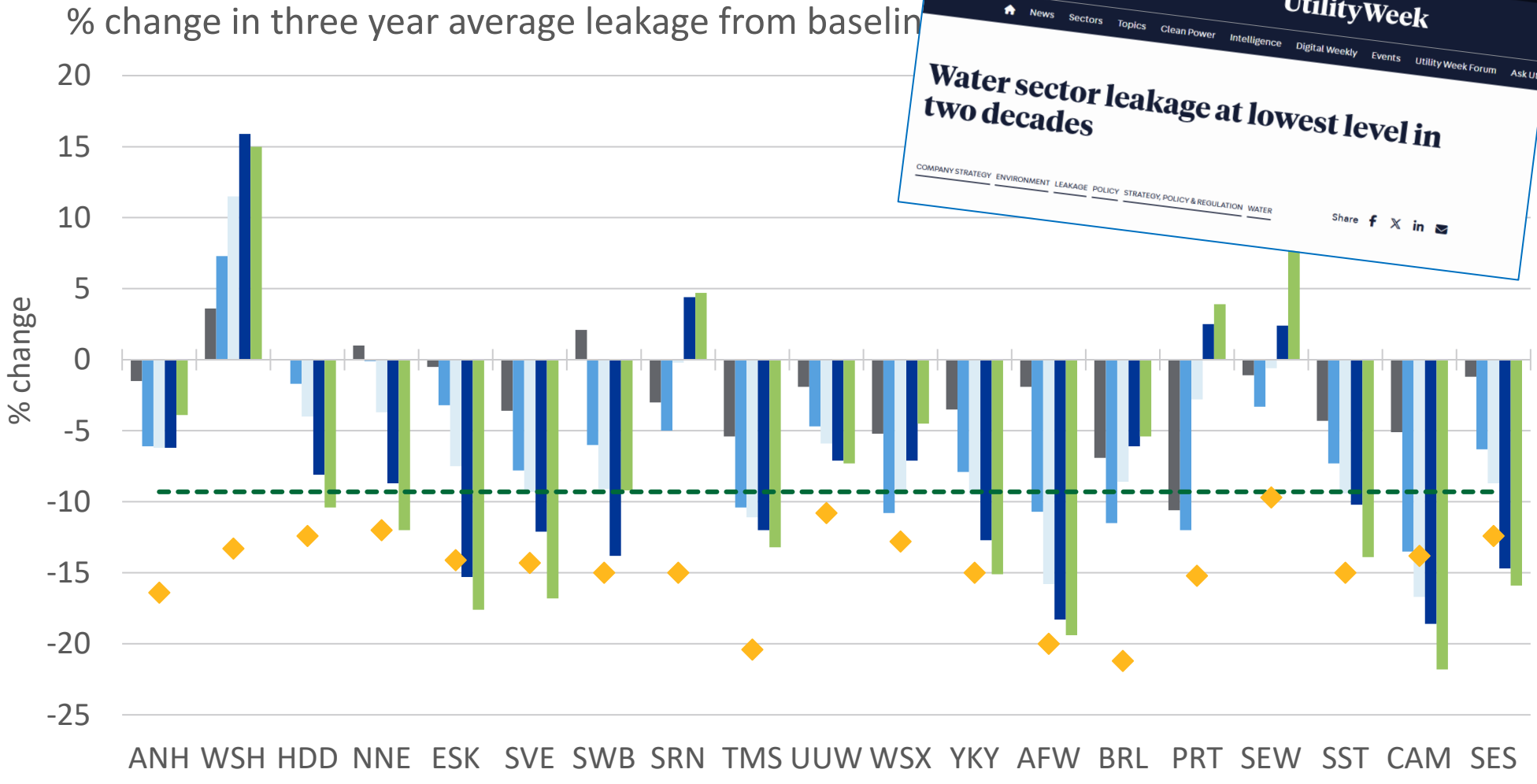
Why are we (still) doing this……..



- Why isn't leakage 'solved' – 25 years post privatisation?
- Why is leakage still important?
- Why didn't we just stop when we reached ELL?
- Why is leakage still an 'estimation'?
- Why not just abstract more, transfer more or just desalinate?

Where are we now?

Performance across the 2020-25 period for leakage (2)



Logout

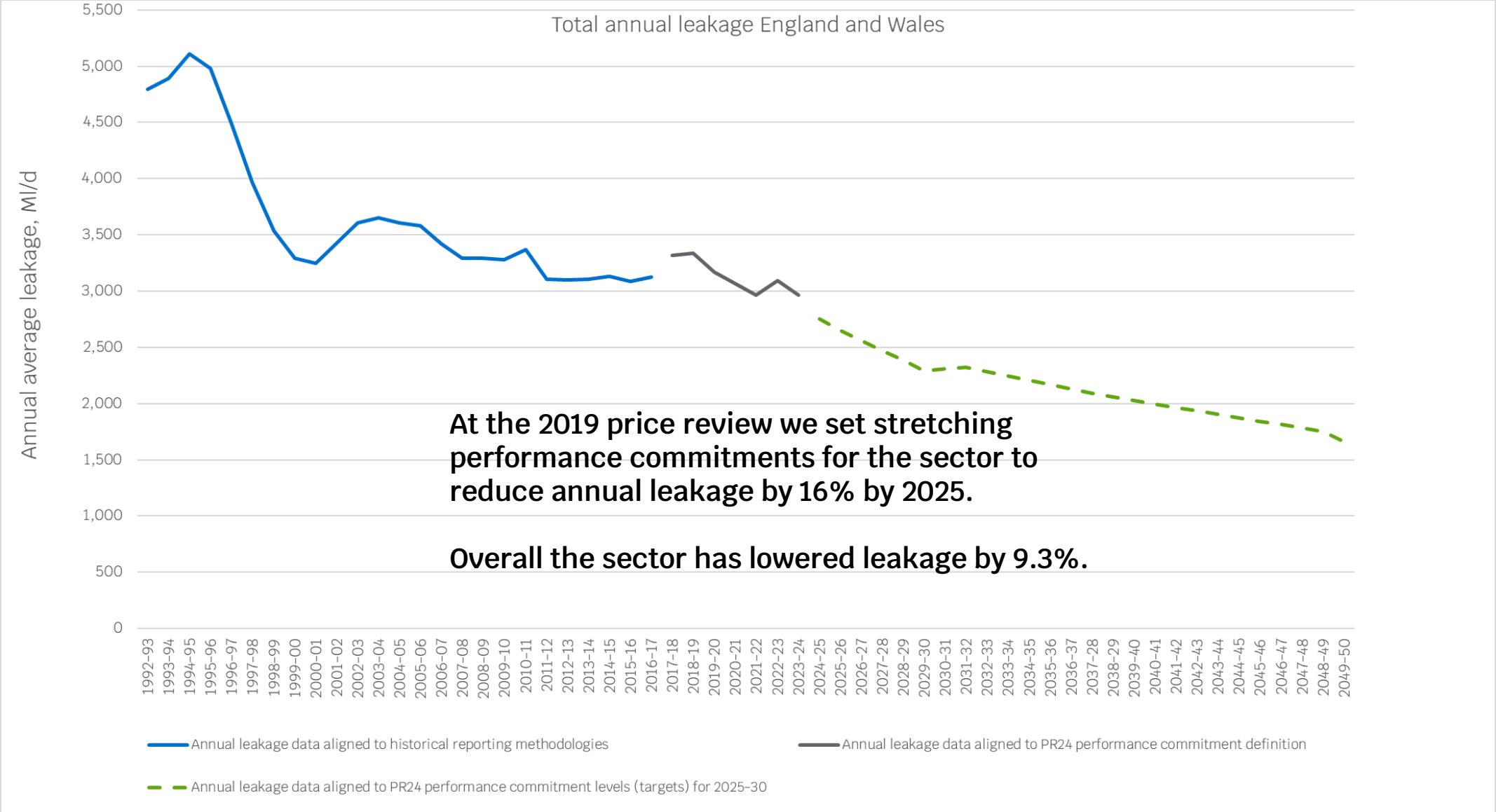
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Water sector leakage at lowest level in two decades

COMPANY STRATEGY ENVIRONMENT LEAKAGE POLICY STRATEGY, POLICY & REGULATION WATER

Share


Total annual leakage England and Wales
Annual average leakage, Ml/d
5,500
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
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2033-34
2034-35
2035-36
2036-37
2037-28
2038-29
2039-40
2040-41
2041-42
2042-43
2043-44
2044-45
2045-46
2046-47
2047-48
2048-49
2049-50
At the 2019 price review we set stretching performance commitments for the sector to reduce annual leakage by 16% by 2025.
Overall the sector has lowered leakage by 9.3%.
Annual leakage data aligned to historical reporting methodologies
Annual leakage data aligned to PR24 performance commitment definition
Annual leakage data aligned to PR24 performance commitment levels (targets) for 2025-30

The Leakage Reporting Methodology Review Project

Note 1 – This does not affect PR24 targets or finances
Note 2 - No reason why this should affect current leakage operations

Leakage Reporting Methodology Review Project – 8* Areas

i
Consider
Top-Down vs Top-Down/Bottom Up

ii
Accuracy of the components of the water balance

iii
Meter
Accuracy
(DI, zonal, DMA, Customer)

iv
Meter
under-registration
(What level is in customer best interest)

v
Smart Meter
Data
How to use, how to phase in

vi
Night Use
Allowances
(Smart meter data)

vii
Upstream
Losses
Develop best practice

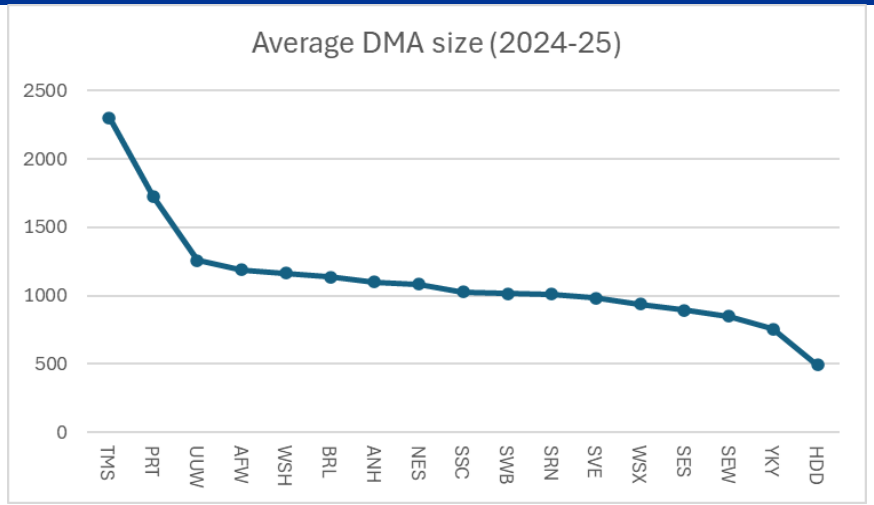
viii
International
comparison
(What can we learn from other countries)

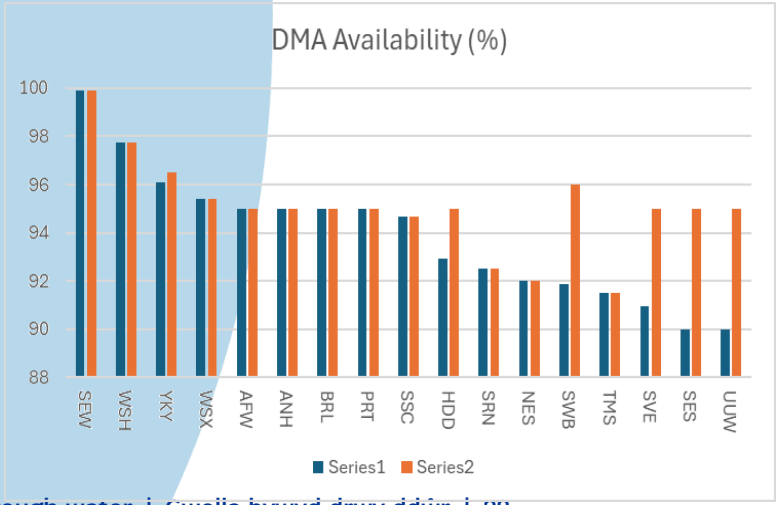
Supply pipe Leakage, plumbing losses and void properties

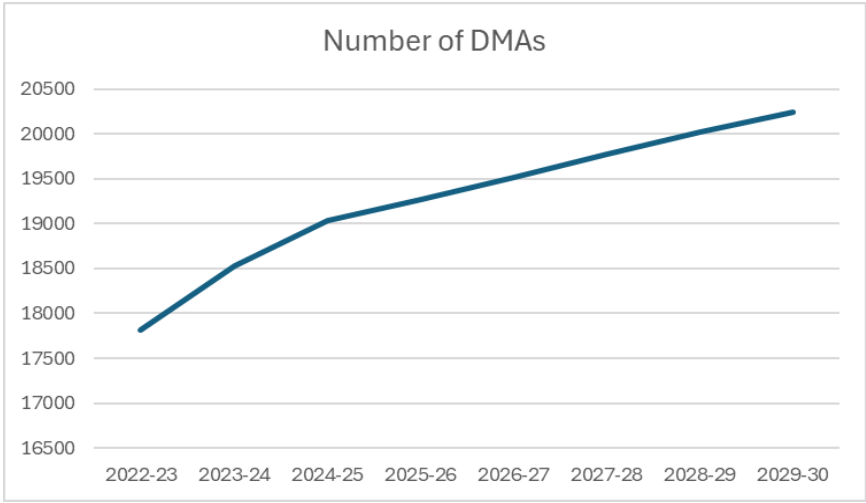


Top-Down / Bottom-Up leakage - DMAs





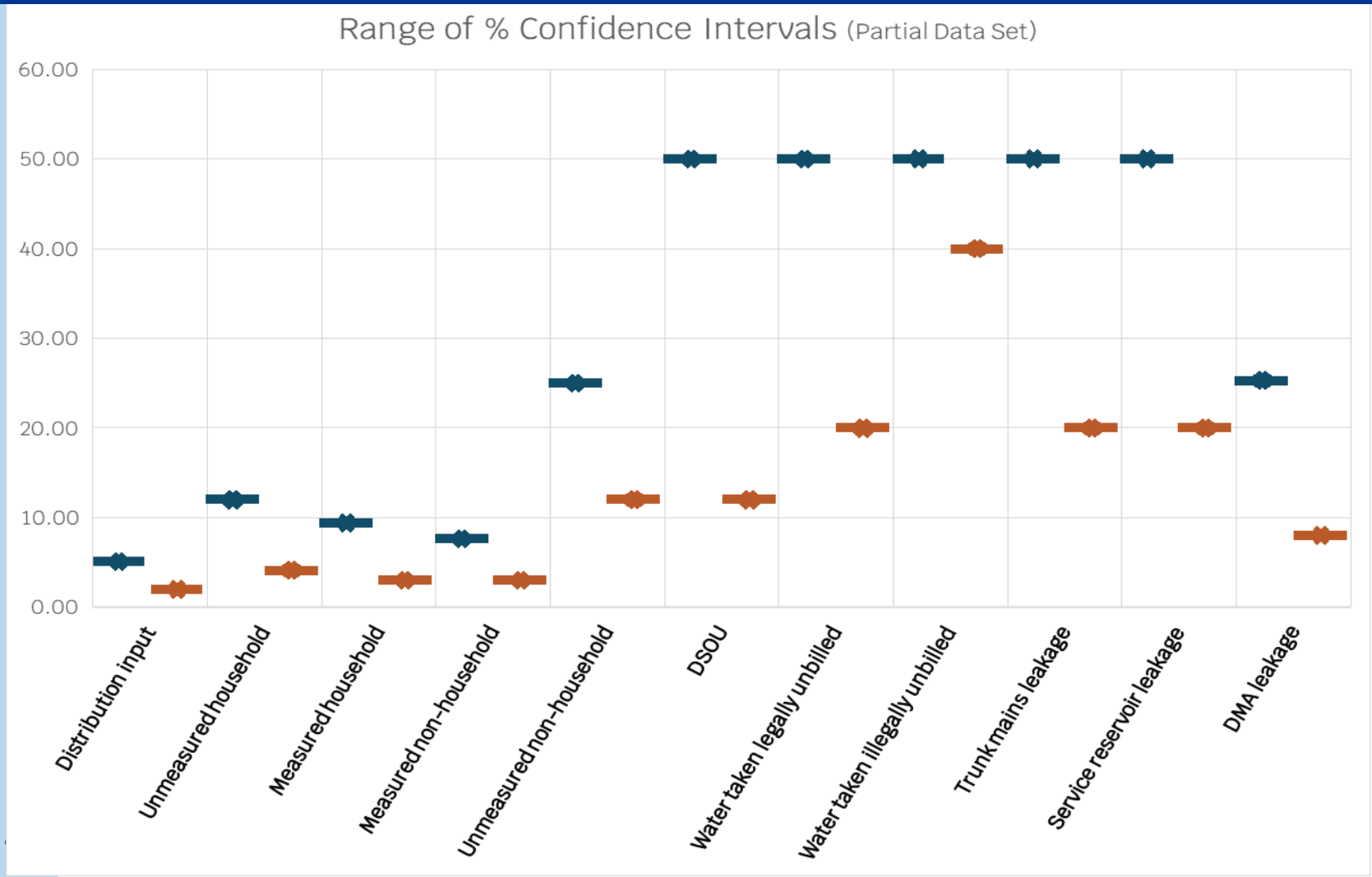




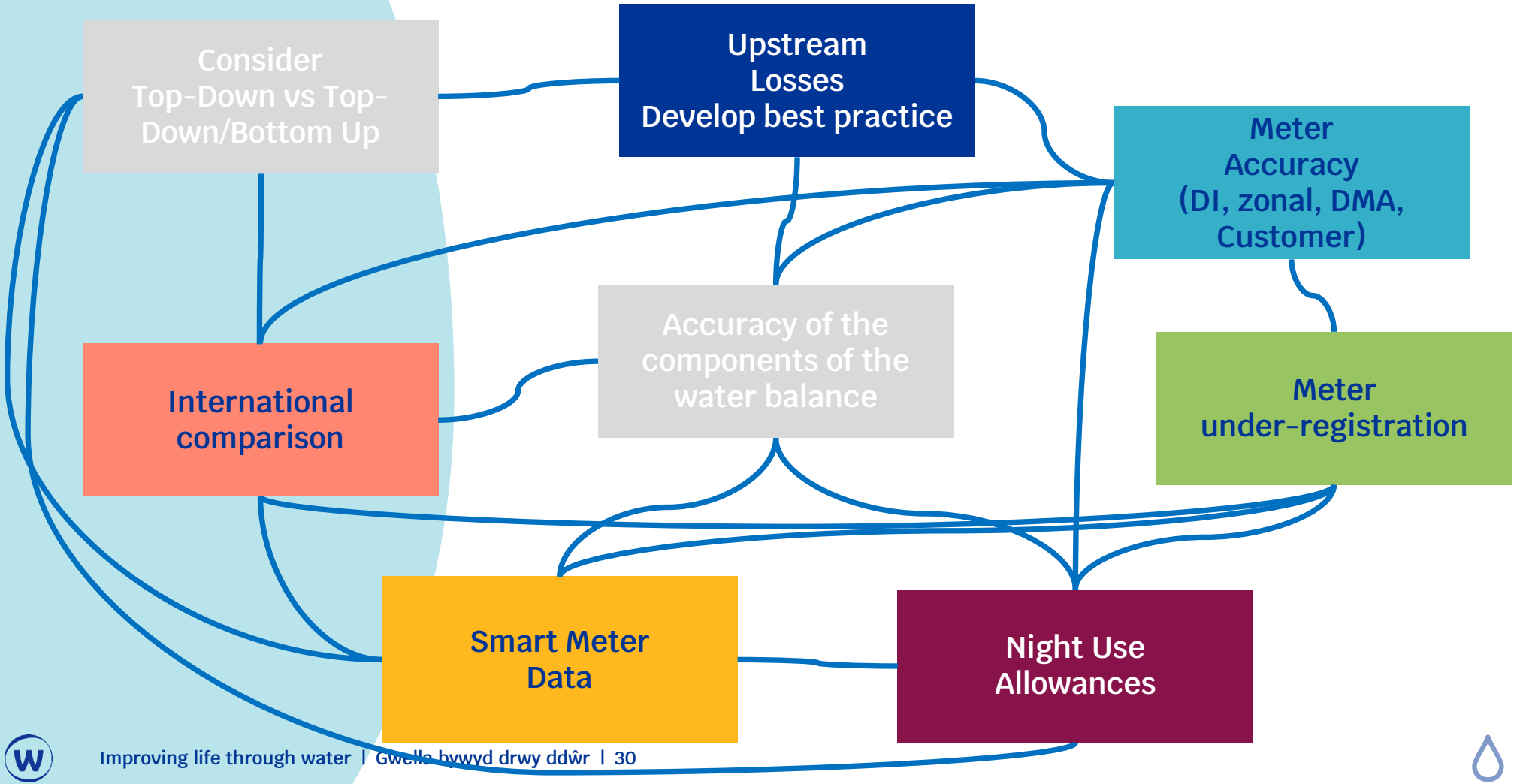


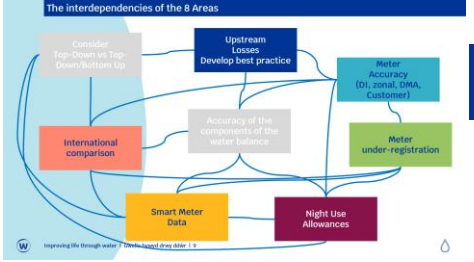
Accuracy of Components in the Water balance

Water Balance Line	Min	Max
Distribution input	2.00	5.09
Unmeasured household	4.10	12.00
Measured household	3.00	9.37
Measured non-household	3.00	7.67
Unmeasured non-household	12.00	25.00
DSOU	12.00	50.00
Water taken legally unbilled	20.00	50.00
Water taken illegally unbilled	40.00	50.00
Trunk mains leakage	20.00	50.00
Service reservoir leakage	20.00	50.00
DMA leakage	8.00	25.30



The interdependencies of the 8 Areas





Four Work Packages awarded

1) International comparison – **Awarded to HR Wallingford / IWS**
- Ensure that what we develop uses all current worldwide learning

- 2)Methodology for 'Upstream' leakage – **Awarded to Atkins**
  - What should upstream balances / monitoring look like – how will they be reported?
  - Mass Balance/MNF or otherwise

- 3) Metering and accuracy – **Awarded to WRc**
  - DI meters, Trunk Main meters, Service Reservoir Meters, DMA meters and Revenue meter
  - Accuracy / best practice, age, calibration and meter under registration.
  - Outline costs for everything to meet new standard

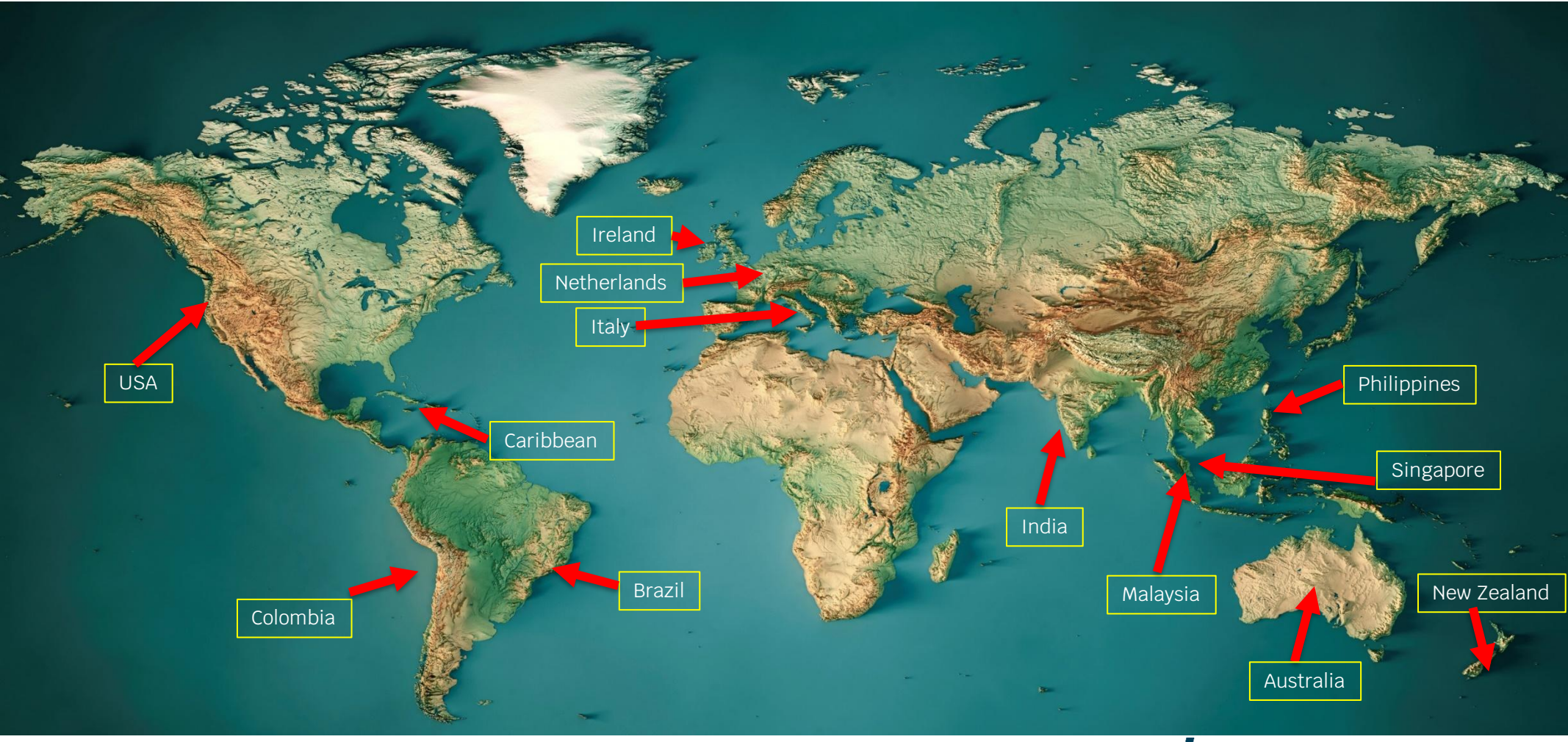
- 4) Smart Meter Data and Night Use allowances – **Awarded to HR Wallingford / Artesia**
  - How to incorporate into water balance and the leakage calculation

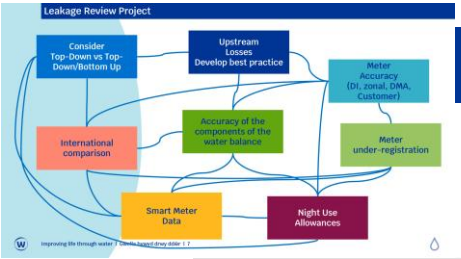
International Comparison

Reporting methodology

(note: this looks at ‘reporting methodology’ and not ‘actual leakage performance’)

List of Countries





International Comparison : Real and Apparent Losses

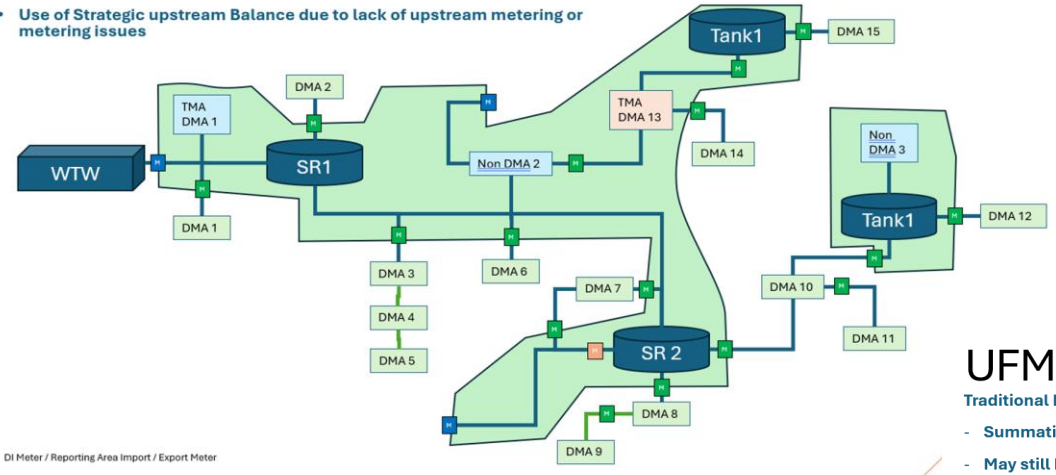
IWA Water Balance					England and Wales Water Balance			
System Input Volume	Revenue Water	Authorised Consumption	Billed authorised Consumption	Billed Metered Consumption	Billed Metered Consumption	Water Delivered	Water Delivered	Distribution Input
					less meter under registration			
					Plumbing losses			
				Billed Unmetered Consumption	Billed Unmetered Consumption			
	Non Revenue Water		Unbilled authorised Consumption	Unbilled Metered Consumption	Water Taken Legally unbilled			
				Unbilled Unmetered Consumption	Operational System Use			
					Minor Components			
		Water Losses	Apparent Losses	Unauthorised consumption	Water taken illegally unbilled			
				Customer meter inaccuracies		Distribution Leakage	Water Leakage	
				Leakage on Distribution Mains	Distribution Main leakage			
				Leakage on transmission Mains	Trunk Main leakage	Upstream Leakage		
			Real Losses	Leakage and overflows at reservoirs	Service Reservoir leakage			
				Leakage on service connections up to metering point	Customer Supply Pipe Leakage	Customer Supply Pipe Leakage	Water Delivered	

Upstream Leakage

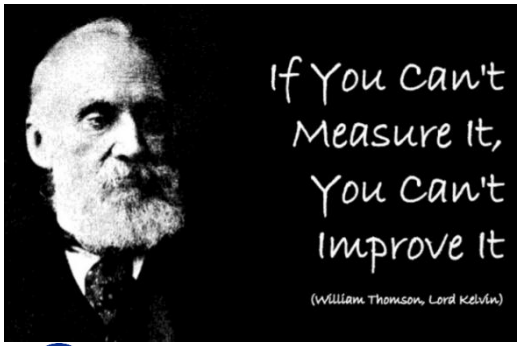
Trunk Main and Service Reservoir Leakage Reporting

1- Strategic Balance

- Traditional DMA – MNF method
- Use of Strategic upstream Balance due to lack of upstream metering or metering issues



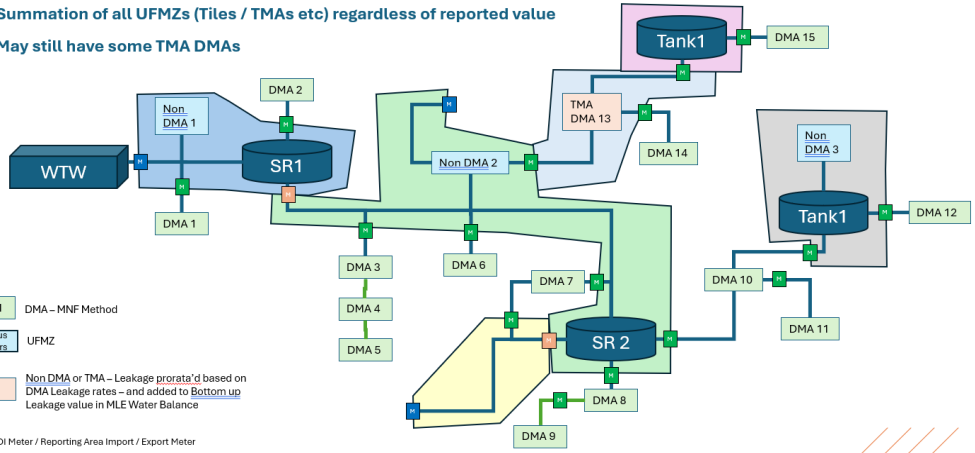
DI Meter / Reporting Area Import / Export Meter
DMA Import / Export Meter
Trunk Main meter



UFMZs

Traditional DMA – MNF method

- Summation of all UFMZs (Tiles / TMAs etc) regardless of reported value
- May still have some TMA DMAs



DMA 1 — DMA – MNF Method
Various colours — UFMZ
TMA 1 — Non DMA or TMA – Leakage prorata'd based on DMA Leakage rates – and added to Bottom up Leakage value in MLE Water Balance

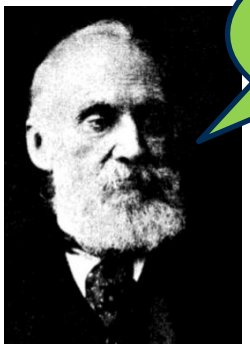
DI Meter / Reporting Area Import / Export Meter
DMA Import / Export Meter
Trunk Main meter

Smart Metering
Night Use

How much of the water balance is measured?

Water balance components		Comments
Distribution Input		Measured within year, with regular insitu meter checks (assuming all points of input are metered, otherwise yellow).
Water delivered: billed measured households		Measured across multiple years, includes MUR
	Minus underground supply pipe losses	Derived from models, may be red if data is non company specific
	Billed measured household consumption	Orange because of the USPL component
Water delivered: billed measured non-households		Measured across multiple years, includes MUR
	Minus underground supply pipe losses	Derived from models, may be red if data is non company specific
	Billed measured non-household consumption	Orange because of the USPL component
Water delivered: billed unmeasured households		Derived from samples and models
	Minus underground supply pipe losses	Derived from models, may be red if data is non company specific
	Billed unmeasured household consumption	Orange because of the USPL component, may be red if USPL is red
Water delivered: billed unmeasured non-households		Derived from models
	Minus underground supply pipe losses	Derived from models, may be red if data is non company specific
	Billed unmeasured non-household consumption	Orange because of the USPL component, may be red if USPL is red
Minor components	Water taken legally unbilled	Largely based on assumptions or industry data, some parts may be orange
	Water taken illegally unbilled	Largely based on assumptions or industry data
	Distribution system operational use	Orange if based on models using company data, red if assumptions
Total leakage	Upstream losses (TM&SR)	Some companies with flow balances could be yellow, those with BABE would be red
	DMA losses (include USPL)	MNF is probably yellow, but the NU component will be either orange or red

Key
Measured within year
Incomplete data, data not fully within the reporting year, potential bias
Based on modelled on company data
Poorly evidenced assumptions/non-company data



hr wallingford

What could a fully smart metered scenario look like?

Internal or wall box mounted smart meters

Water balance components		Comments
Distribution Input		Measured within year, with regular insitu meter checks (assuming all points of input are metered, otherwise yellow).
Water delivered: billed measured households		Measured within year
	Billed measured household consumption	Measured within year, no supply pipe leakage
Water delivered: billed measured non-households		Measured within year
	Billed measured non-household consumption	Measured within year, no supply pipe leakage
Minor components	Water taken legally unbilled	Largely based on assumptions or industry data, some parts may be orange
	Water taken illegally unbilled	Largely based on assumptions or industry data
	Distribution system operational use	Orange if based on models using company data, red if assumptions
Total leakage	DI minus billed volume and minus minor components	Green if minor components < X% of DI.

External smart meters (at the property boundary)

Water balance components		Comments
Distribution Input		Measured within year, with regular insitu meter checks (assuming all points of input are metered, otherwise yellow).
Water delivered: billed measured households		Measured within year
	Billed measured household consumption	Measured within year, supply pipe leakage in still modelled but is much smaller proportion than current figures
Water delivered: billed measured non-households		Measured within year
	Billed measured non-household consumption	Measured within year, supply pipe leakage in still modelled but is much smaller proportion than current figures
Minor components	Water taken legally unbilled	Largely based on assumptions or industry data, some parts may be orange
	Water taken illegally unbilled	Largely based on assumptions or industry data
	Distribution system operational use	Orange if based on models using company data, red if assumptions
Total leakage	DI minus billed volume and minus minor components	Green if minor components and supply pipe leakage is < X% of DI.

Key
Measured within year
Incomplete data, data not fully within the reporting year, potential bias
Based on modelled on company data
Poorly evidenced assumptions/non-company data

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Meter Accuracy
Meter Under Registration

Scope

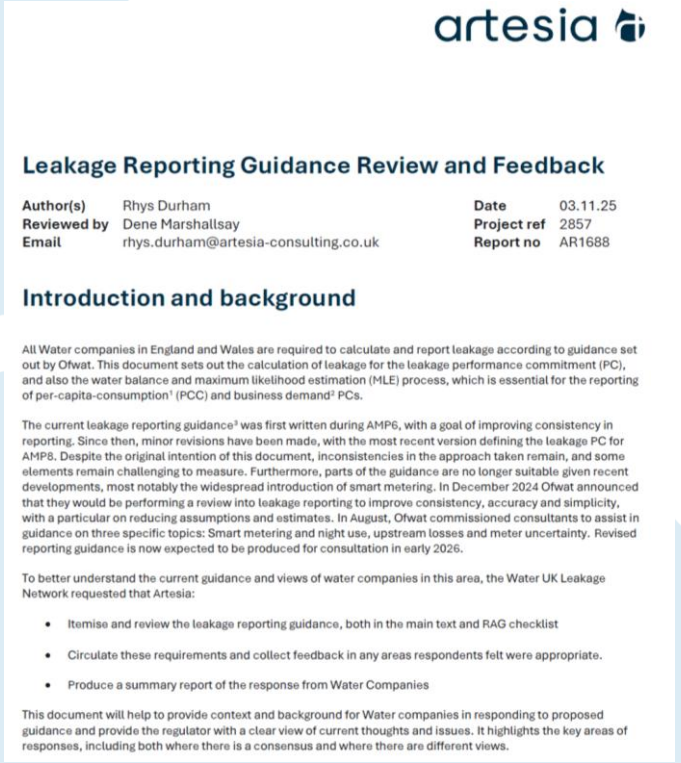
- Compile an anonymised analysis of the accuracy of metering used by each of the England and Wales companies for
  - Abstraction and Distribution Input meters
  - District Meter Area (DMA) meters
- Provide an opinion on what would be good and best practice
  - Provide outline cost estimates for companies to bring their metering up to both good and best practice
- Compile an anonymised analysis of the meter under registration that each of the England and Wales companies use for
  - Household daily consumption
  - Household night use (when flows are lower)
  - Non household consumption
  - Non household night use (when flows are lower)
- Develop good and best practice levels for meter under-registration.

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WP4 Meter accuracy

How companies should assess and assure meter accuracy

Feedback from Water UK Leakage Managers



artesia

Leakage Reporting Guidance Review and Feedback

Author(s)	Rhys Durham	**Date**	03.11.25
Reviewed by	Dene Marshallsay	**Project ref**	2857
Email	rhys.durham@artesia-consulting.co.uk	**Report no**	AR1688

Introduction and background

All Water companies in England and Wales are required to calculate and report leakage according to guidance set out by Ofwat. This document sets out the calculation of leakage for the leakage performance commitment (PC), and also the water balance and maximum likelihood estimation (MLE) process, which is essential for the reporting of per-capita-consumption[1] (PCC) and business demand[2] PCs.

The current leakage reporting guidance[3] was first written during AMP6, with a goal of improving consistency in reporting. Since then, minor revisions have been made, with the most recent version defining the leakage PC for AMP8. Despite the original intention of this document, inconsistencies in the approach taken remain, and some elements remain challenging to measure. Furthermore, parts of the guidance are no longer suitable given recent developments, most notably the widespread introduction of smart metering. In December 2024 Ofwat announced that they would be performing a review into leakage reporting to improve consistency, accuracy and simplicity, with a particular on reducing assumptions and estimates. In August, Ofwat commissioned consultants to assist in guidance on three specific topics: Smart metering and night use, upstream losses and meter uncertainty. Revised reporting guidance is now expected to be produced for consultation in early 2026.

To better understand the current guidance and views of water companies in this area, the Water UK Leakage Network requested that Artesia:

- Itemise and review the leakage reporting guidance, both in the main text and RAG checklist
- Circulate these requirements and collect feedback in any areas respondents felt were appropriate.
- Produce a summary report of the response from Water Companies

This document will help to provide context and background for Water companies in responding to proposed guidance and provide the regulator with a clear view of current thoughts and issues. It highlights the key areas of responses, including both where there is a consensus and where there are different views.

Available to download on the ‘Projects’ tab of the Artesia website

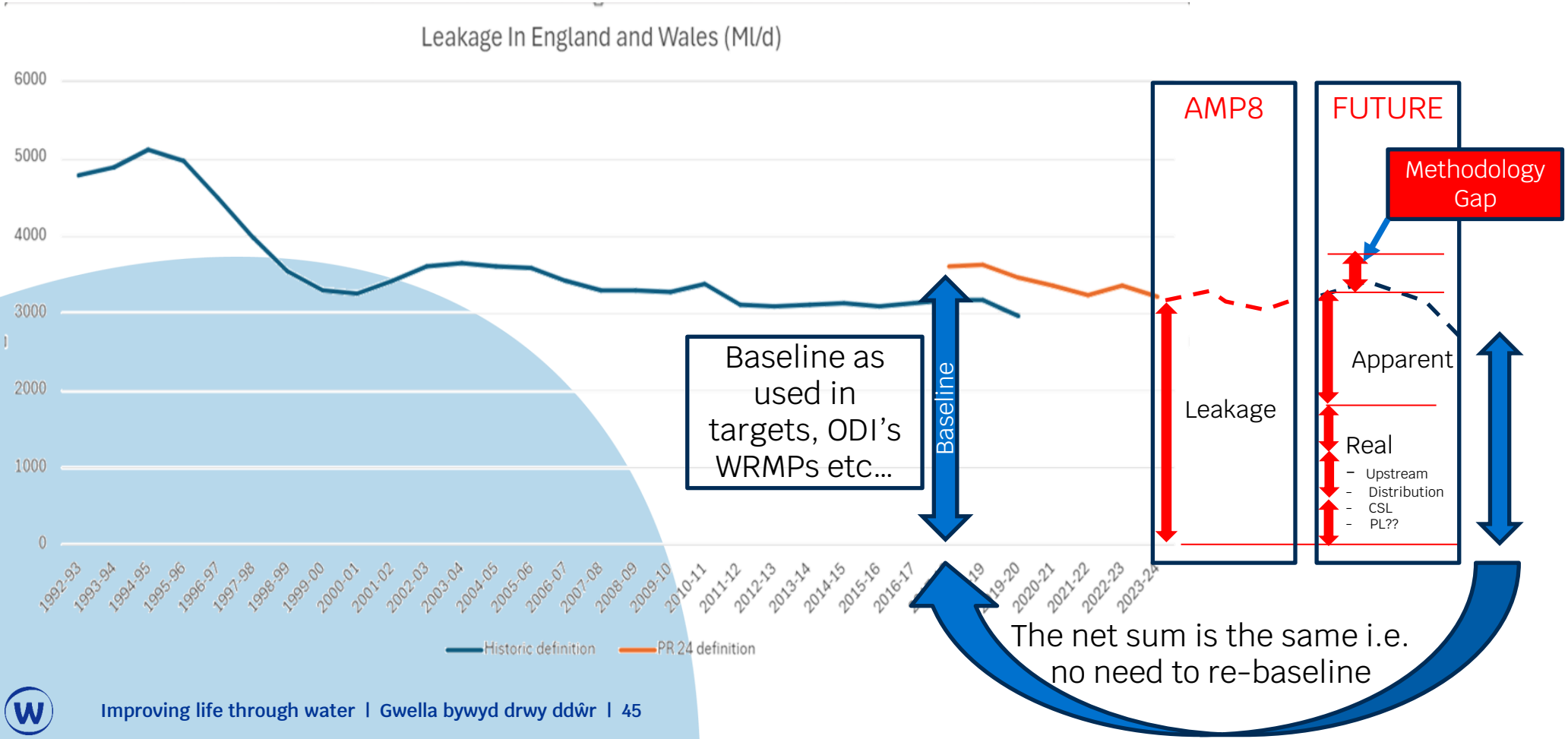
Summary of Feedback from Water UK Leakage Managers

1. "strong support overall [for] top-down and bottom-up method"
2. "very strong support from all respondents for the MLE process"
3. "guidance contains a range of arbitrary thresholds and figures"
4. "The most important threshold highlighted is the Water Balance Gap"
5. "The current guidance is …not suitable for the inclusion of smart metering"
6. "guidance refers to "Billed" properties, notably removing "void" properties"
7. "coverage, availability and operability are poorly defined"
8. "Third party assurance is highly inconsistent"
9. "leakage, PCC and business demand PCs… interlinked… risk [of] inconsistency and changes elsewhere"

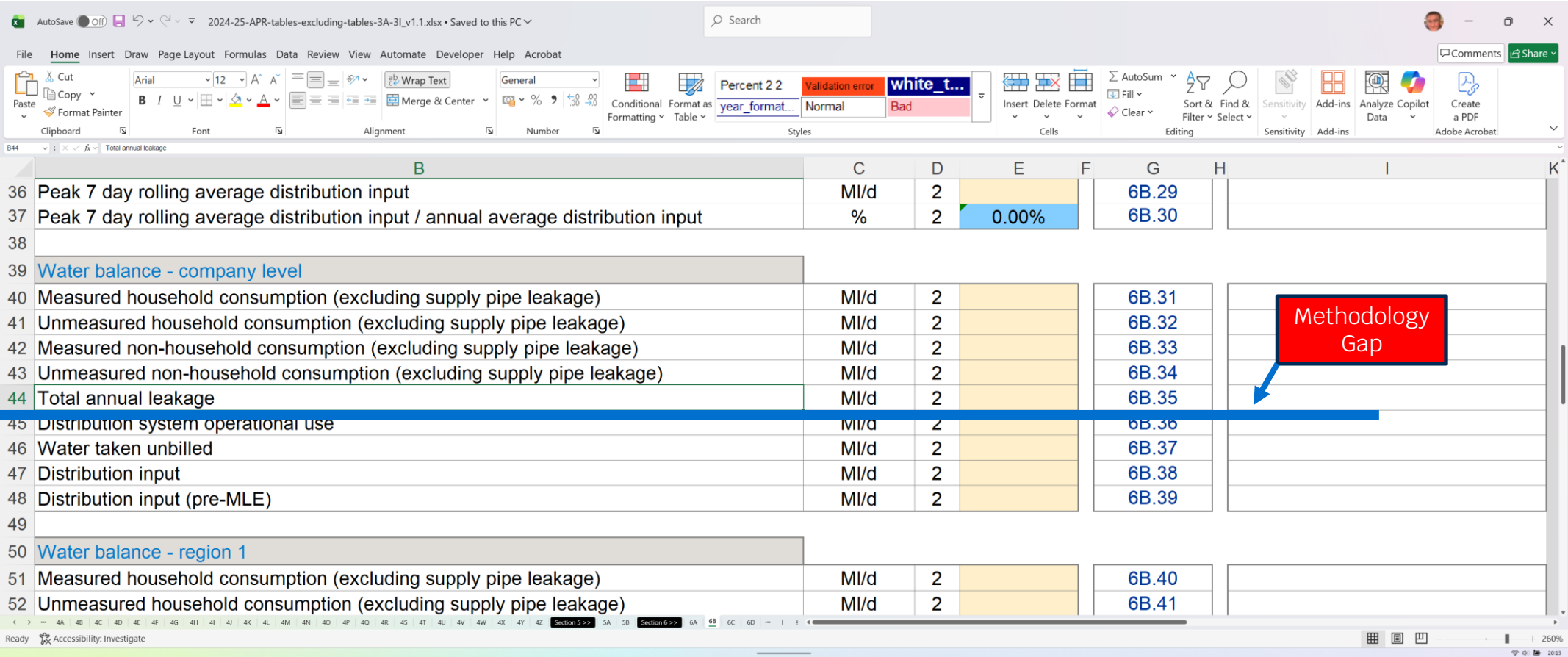
Emerging Thinking

Possible ‘Methodology Gap’# to prevent need for re-statement and re-baselining

Working title



How to account for Methodology Gap



	B	C	D	E	G
36	Peak 7 day rolling average distribution input	Ml/d	2		6B.29
37	Peak 7 day rolling average distribution input / annual average distribution input	%	2	0.00%	6B.30
38					
39	Water balance - company level				
40	Measured household consumption (excluding supply pipe leakage)	Ml/d	2		6B.31
41	Unmeasured household consumption (excluding supply pipe leakage)	Ml/d	2		6B.32
42	Measured non-household consumption (excluding supply pipe leakage)	Ml/d	2		6B.33
43	Unmeasured non-household consumption (excluding supply pipe leakage)	Ml/d	2		6B.34
44	Total annual leakage	Ml/d	2		6B.35
45	Distribution system operational use	Ml/d	2		6B.36
46	Water taken unbilled	Ml/d	2		6B.37
47	Distribution input	Ml/d	2		6B.38
48	Distribution input (pre-MLE)	Ml/d	2		6B.39
49					
50	Water balance - region 1				
51	Measured household consumption (excluding supply pipe leakage)	Ml/d	2		6B.40
52	Unmeasured household consumption (excluding supply pipe leakage)	Ml/d	2		6B.41

The ninth area

Supply pipe leakage, plumbing losses and Voids



The ninth area – Supply Pipe Leakage, plumbing losses and voids

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Conditional Formatting Format as Table

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Insert Delete Format Cells

AutoSum Fill Clear Sort & Filter Editing

B81 Customer supply pipe losses – void measured non-households

	B	C	D	E	F	G
69	Distribution input	Ml/d	2			6B.56
70	Distribution input (pre-MLE)	Ml/d	2			6B.57
71						
72	Components of total leakage (post MLE) - company level					
73	Leakage upstream of DMA	Ml/day	2			6B.58
74	Distribution main losses	Ml/day	2			6B.59
75	Customer supply pipe losses – measured households excluding void properties	Ml/day	2			6B.60
76	Customer supply pipe losses – unmeasured households excluding void properties	Ml/day	2			6B.61
77	Customer supply pipe losses – measured non-households excluding void properties	Ml/day	2			6B.62
78	Customer supply pipe losses – unmeasured non-households excluding void properties	Ml/day	2			6B.63
79	Customer supply pipe losses – void measured households	Ml/day	2			6B.64
80	Customer supply pipe losses – void unmeasured households	Ml/day	2			6B.65
81	Customer supply pipe losses – void measured non-households	Ml/day	2			6B.66
82	Customer supply pipe losses – void unmeasured non-households	Ml/day	2			6B.67

RAG guidance on plumbing losses

January 2025

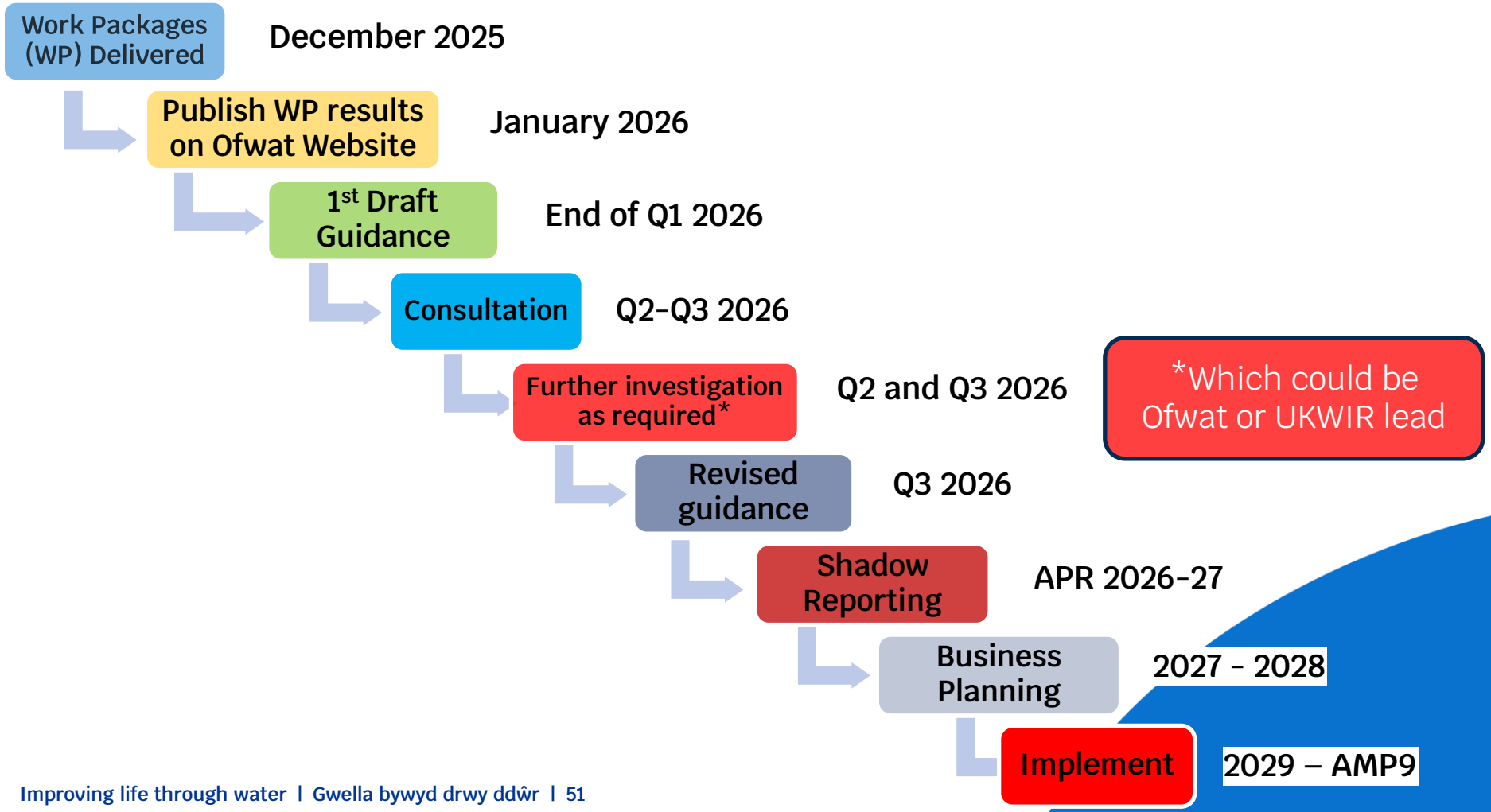
RAG 4.13 – Guideline for the table definitions in the annual performance report: Draft for consultation

Component analysis as a proportion of distribution input – not to scale

<table>
<tr><td colspan="8">Distribution Input</td></tr>
<tr><td colspan="2">Distribution system ◄-------</td><td colspan="6">Customers' installations -------►</td></tr>
<tr><td colspan="2" rowspan="3"></td><td>Water Delivered – billed measured residential</td><td>Water Delivered – billed measured business</td><td>Water Delivered – billed unmeasured residential</td><td>Water Delivered – billed unmeasured business</td><td>Water taken legally unbilled</td><td>Water taken illegally unbilled</td></tr>
<tr><td colspan="2">Water Delivered – billed measured</td><td colspan="2">Water Delivered – billed unmeasured</td><td colspan="2">Water taken unbilled</td></tr>
<tr><td colspan="4">Water Delivered – billed</td><td colspan="2"></td></tr>
<tr><td colspan="2">Water not delivered</td><td colspan="6">Water delivered to customers</td></tr>
<tr><td rowspan="3">Distribution system operational use</td><td rowspan="3">Distribution Losses</td><td rowspan="3">Underground supply pipe losses</td><td colspan="2">Total plumbing losses</td><td rowspan="3">Customer use</td></tr>
<tr><td>Underground supply pipe losses</td><td>Internal plumbing losses</td></tr>
<tr><td colspan="2">Total leakage</td><td colspan="2">Consumption</td></tr>
</table>

Current view of the Timeline

Current view of the timeline



Thank you and Questions



Leakage routemap: Next steps for AMP8



Glen Mountfort

Director of Technical Consulting

WRc

creating a better tomorrow

Leakage 2050

Glen Mountfort

24th November 2025



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Update on routemap commitments & notable progress to date

Decision making	• Workshop Sept 2025 • Paper to publish but will needs regulatory consideration in terms of PR29/WRMP29
Information and knowledge	• Routemap follow on work e.g. calm networks templates, further research • Spring & Generation & publication of the 2nd Leakage Innovation Heatmap
Background leakage	• Ofwat innovation competition • Deep dive using smart meter data - UKWIR
Customer Side Leakage	• Croydon Group
Supply Chain	• *Area lacking in focus - people, sensors?* • *What about fixing all the small leaks and plumbing losses the smart metering programmes find?*
Asset renewal selection	• Optimising the Selection of Pipes for Renewal to Reduce Leakage (UKWIR)
Leak free new networks	• Assessing the levels of leakage on new polyethylene networks. (UKWIR)
Supply pipe ownership	• Croydon Group work expected to lead towards policy discussion (Water UK)
Adaptive pathways	• *Area lacking in focus – regulatory approach is key here*

Better decision making – and being on the same page with regulators

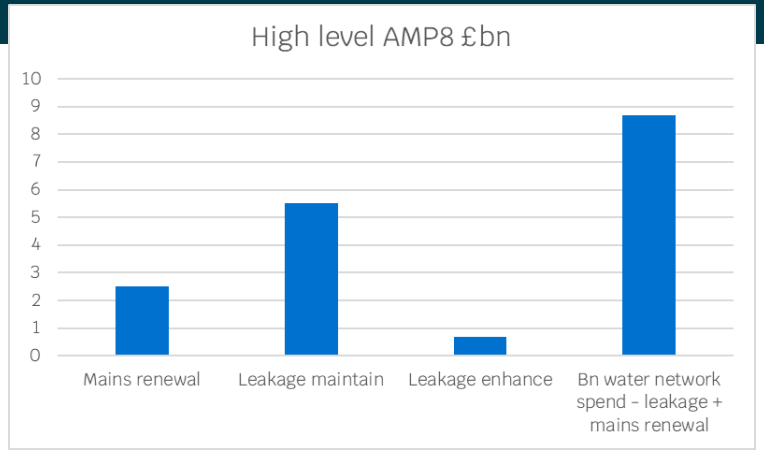
- A more holistic view and systems-focused view is needed to appraise what truly represents “best-value” in achieving the 2050 ambitions and EIP targets
- September 2025 workshop, and working on thought leadership publication – watch this space
- Leakage scenarios would avoid some of the pitfalls of the WRMP process in terms of optimism bias around demand side options
- Can’t assume “leading” and “lagging” performers can all operate in the same way – steeper cost curves
- We need to consider how to influence the evolution of the regulators approaches to ensure the right outcome for all – deliverable plans for companies, the environment, society
- Ultimately there’s a lot more to consider around assets, people, health and safety, physical network considerations, geography…it can’t all come down to a simple econometric model to decide what’s needed

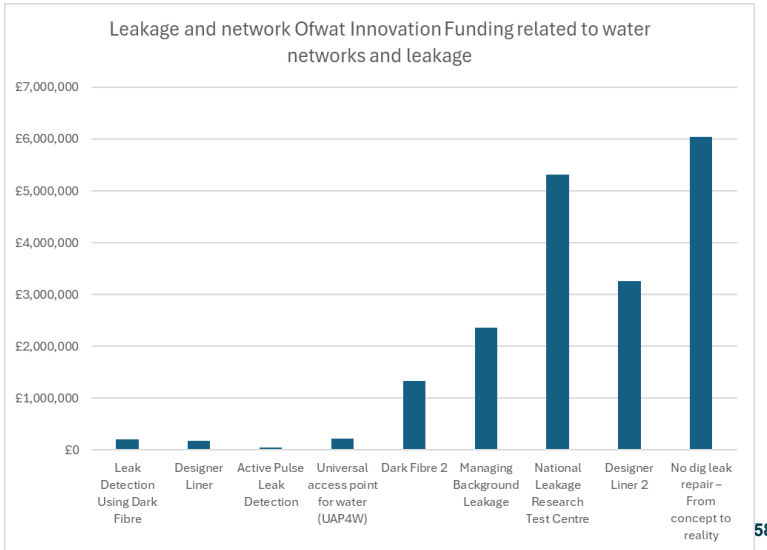
	Reduce expenditure							Reduction in leakage							Reduction in leakage / Reduce expenditure			
Year	1	2	3	4	5	6	7	1	2	3	4	5	6	7	7 years	6 years	5 years	4 years
	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2018-24	2019-24	2020-24	2021-24
	£m	£m	£m	£m	£m	£m	£m	Ml/d	Ml/d	Ml/d	Ml/d	Ml/d	Ml/d	Ml/d	Ml/d Leakage Reduction per £m	Ml/d Leakage Reduction per £m	Ml/d Leakage Reduction per £m	Ml/d Leakage Reduction per £m
ANH	12.439	12.283	9.181	14.238	34.629	24.103	24.690	2.056	-8.580	8.850	0.010	8.970	17.120	7.140	0.270	0.281	0.394	0.3
HDD	0.000	0.247	0.000	0.268	0.090	0.255	0.153	0.000	-0.652	2.513	-1.932	0.784	0.700	0.435	1.825	1.825	3.265	0.0
NES	0.000	0.000	0.000	0.000	4.815	2.873	2.154	-1.310	2.770	2.390	-7.970	16.260	7.690	6.350	2.660	2.793	2.512	2.2
NWT	1.359	2.442	25.810	13.922	16.157	9.398	6.490	-14.300	-2.454	9.870	21.415	10.800	-16.410	13.450	0.296	0.494	0.545	0.6
SRN	1.972	2.370	2.750	2.109	2.189	2.144	2.410	-14.530	0.810	7.790	-4.380	1.602	0.918	3.200	-0.288	0.711	0.787	0.1
SVE	0.000	0.000	20.144	19.705	4.532	10.325	3.642	0.000	14.853	19.832	-6.926	-29.984	56.597	24.870	1.358	1.358	1.104	1.1
SWB	6.571	7.487	4.198	8.198	10.203	0.000	0.000	1.050	-1.179	-2.681	-29.670	45.430	-16.670	3.530	-0.005	-0.041	-0.003	0.1
TMS	24.096	57.477	80.047	39.606	72.303	63.148	63.168	-17.498	4.260	95.560	5.230	-4.230	12.975	22.640	0.297	0.363	0.415	0.1
WSH	1.961	2.909	2.805	3.346	3.399	1.554	7.039	2.580	3.310	1.590	4.330	6.207	4.013	5.200	1.183	1.171	1.176	1.2
WSX	15.065	19.091	14.249	13.449	11.681	1.556	3.598	-11.310	13.270	5.040	-3.700	1.736	-7.810	2.345	-0.005	0.171	-0.054	-0.2
YKY	5.222	23.214	53.984	6.084	10.157	8.982	8.827	-5.120	10.510	19.020	-19.050	6.720	54.430	13.450	0.687	0.765	0.847	1.6
AFW	0.000	3.766	24.307	19.498	34.112	11.016	0.000	0.317	-23.406	33.955	-9.318	17.190	12.360	6.510	0.406	0.402	0.682	0.4
BRL	0.406	1.855	1.857	1.422	1.940	0.000	0.000	-0.220	4.930	4.500	1.680	-0.120	-3.850	1.500	1.125	1.221	0.711	-0.2
PRT	0.222	2.637	0.913	0.931	0.771	0.301	0.258	-6.630	8.880	4.540	0.030	-3.380	-4.710	1.040	-0.038	1.101	-0.781	-3.1
SES	0.000	0.000	0.000	5.112	4.027	4.344	3.256	0.180	0.010	0.200	-1.060	3.870	-0.660	0.700	0.194	0.183	0.182	0.1
SEW	2.047	1.420	0.626	3.022	2.606	9.128	9.183	0.933	0.812	0.480	-6.273	4.021	5.451	4.119	0.340	0.331	0.317	0.3
SSC	0.157	0.476	1.097	1.736	3.959	0.964	0.987	-2.630	3.060	2.050	3.720	-1.980	7.650	3.900	1.682	1.996	1.755	1.7
Average	4.207	8.098	14.233	8.979	12.798	8.829	7.992	-3.908	1.836	12.676	-3.168	4.935	7.635	7.081	0.948	0.948	1.049	0.8
Median	1.359	2.442	2.805	5.112	4.532	2.873	3.256	-0.220	2.770	4.540	-1.932	3.870	4.013	4.119	0.340	0.711	0.682	0.3
Inverse average															1.055	1.055	0.953	1.2
Inverse median															2.937	1.406	1.465	3.2

"Other Leakage" Unit Rate	1.406

I had a feeling…

- £104bn AMP8 programme (CMA appeals ongoing)
- Based on AMP7 data – circa £1.1bn/year on maintaining leakage
- Enhancement £0.8bn
- £2.5bn mains renewal
- All taken on face value (i.e. as per Ofwat PR24 models i.e. not corrected for time value of money)
- Circa 9% of the total is investment in the network and leakage
- Ofwat innovation funding £200m in AMP7 and £400m in AMP8, £600m in total
- Simplistically, if we take a proportionate view of innovation how are we doing? By my reckoning around £19m of projects that are “closely related” to water networks and leakage.
- ***9% of the total innovation pot would be ~£50m, we currently have around £19m “on the go” through Ofwat innovation funding***





The ongoing challenge



Breakout rate	Number of leaks	Leak flow rates
Leak awareness and location time	Leak repair time	Background leakage

- Ensuring research and innovation improves the way we **manage** leakage
- **Change** management is going to be key – is this an area we need to think more about?
- PALM and the **levers** that water companies can pull on are the only controllable aspects that ultimately can manage leakage performance:
  - Rehabilitation (replace, reline)
  - Pressure and calming
  - ALC
  - Repairs
  - Metering (operational and revenue)
  - Smart networks

Some big questions ahead of AMP9?

Supply chains and **People** – the forgotten assets?

State of current and future **networks** - asset condition & performance

Are there novel ways to help **finance** customer supply pipe and plumbing loss repairs?

Artificial intelligence – how to revolutionise the way we work and drive greater **efficiency**

Calmer networks – how to take **systems** focused approach and drive change

Ensuring deliverable and affordable **plans that work for companies, regulators, society and the environment** - leakage 2050

Are we prepared in terms of change management – companies and regulators?

Collaborative approach – leakage 2050





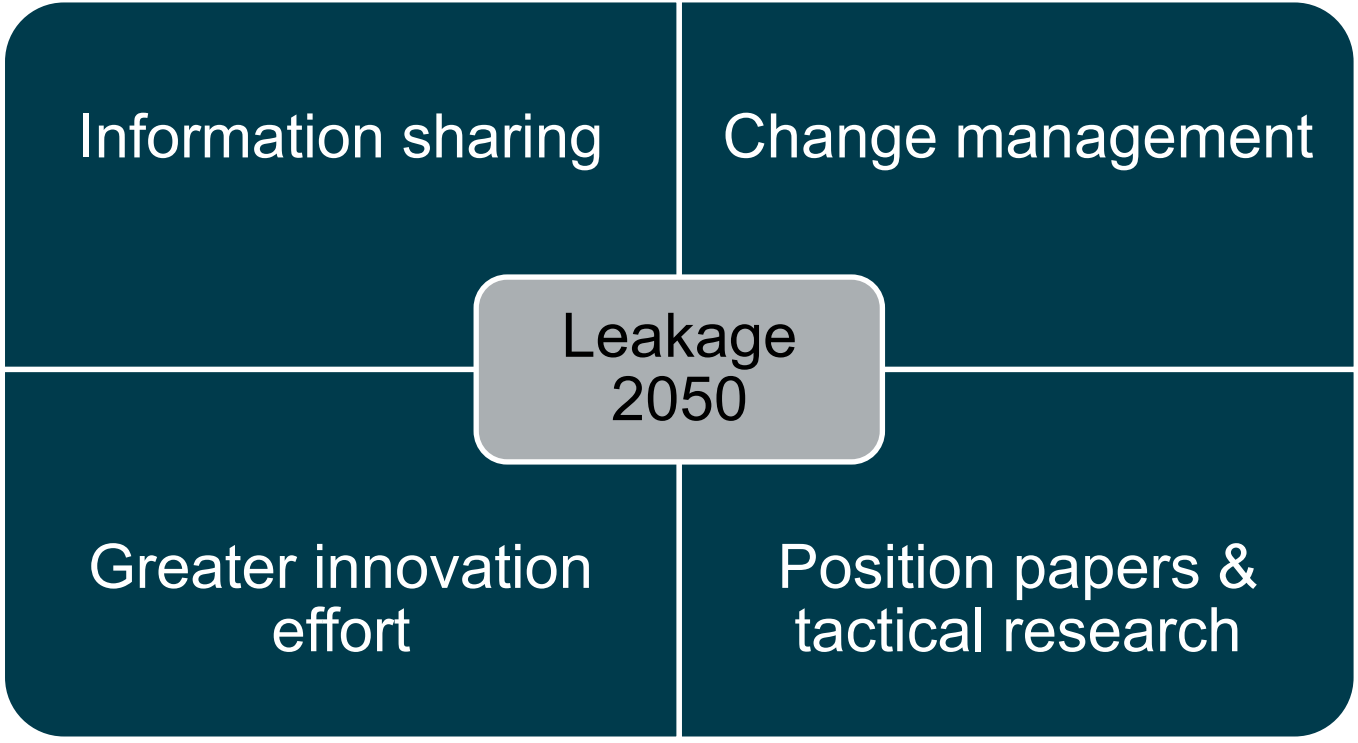








How this supports the long-term leakage 2050 goals





Q & A

Ofwat Innovation Fund: Five years on, what next? Growing the fund and supporting implementation



Marc Hannis

Principle

Ofwat (Innovation Fund)

Ofwat Innovation Fund

Ofwat Innovation Fund: Five years on – what next? Growing the Fund and supporting implementation

24 November 2025

Marc Hannis

The Ofwat Innovation Fund

The Ofwat Innovation Fund is a £600m initiative across 2020-2030 to transform the sector through innovation so that the sector can better meet the needs of, and create long-term value for, customers, society and the environment.

The fund aims to achieve this objective by driving impact in three key areas:

Aim 1

Accelerating the creation and roll-out of innovative products, services and concepts

Aim 2

Growing the capacity and capability of the sector to innovate

Aim 3

Embedding a culture that values, encourages and supports innovation

As of June 2025, we have awarded over £200m to 109 projects

We see innovation as key to meeting the challenges of the future and we are working to create the conditions in which innovation can thrive. This includes:

- Making ££ available to develop innovative solutions/approaches.
- Identifying the regulatory barriers to innovation and engaging colleagues (internal and external) to reduce those barriers.
- Looking across the whole innovation ecosystem in water – how can we support innovation?

2025-2030 – doubling of the Fund to £400m

The Ofwat Innovation Fund has doubled and so has the scope and ambition of the programme.

Water Breakthrough Challenge	Annual competitions between 2025-2030, ~£250m funding
Water Discovery Challenge	At least two competitions between 2025-2030, ~£15m funding

NEW	Water Innovation Missions	Water companies coming together to collaborate on solutions to specific sector-wide 'strategic challenges' (£40m over 5 years)
NEW	Implementation Fund	Accelerating the scaling of projects to deliver impact and addressing barriers to this scaling (£40m over 5 years)
NEW	Cross-sector Programme	Exploring joint working/funding approaches with other sectors for solutions requiring cross-sector effort (£40m over 5 years)

Evaluation: Impact and VfM study of 2020-2025 Fund that will inform approach at PR29

Leakage related projects funded so far

The Innovation Fund has supported **five Projects directly addressing leakage:**

1) **Dark Fibre** (part 1: £206,385 / part 2: £1,332,205) – **see talk tomorrow by Ed Austin and Darius Bristow**
2) **No Dig Leak Repair** (£6,039,069) – **see talk tomorrow by Tim Evans**

3) **National Leakage Research and Test Centre** (£5,319,913)
4) **Designer Liner** (part 1: £173,880 / part 2: £3,251,283)
5) **Managing Background Leakage** (£2,363,132)

Total spend: £18,685,866 – out of ~£200m this is **9.3% of funding.**

Note that other projects will indirectly address leakage matters:

- **Universal Access Point 4 Water**
- **Pipebots for Rising Mains**
- **Using science and nature to end sewer misery**



NLRTC
Designer Liner
Managing Background Leakage

National Leakage Research and Test Centre (NLRTC)

A 5km buried water pipe network dedicated to **developing and testing leakage innovations without disrupting customer supplies** or water quality:

- Enables controlled testing of new leakage solutions, such as repair robots/sealants/liners
- Provides a safe, realistic environment for accelerating innovation development

The facility **replicates a live water network** with a mix of old and new pipes of different materials and diameters:

- Allows researchers to insert deliberately leaky sections to test detection and repair methods
- Collects and recycles leaked water and can simulate customer demand during trials
- Will issue performance certifications for tested technologies
- Offers training and research opportunities for water companies and innovators

Led by: Northumbrian Water

Partners: Water Research Centre, HR Wallingford, The University of Sheffield, Southampton University, Anglian Water, Thames Water, Severn Trent, Portsmouth Water, SES Water, United Utilities, Irish Water, Dŵr Cymru Welsh Water, Northern Ireland Water, South East Water, Southern Water, Wessex Water, Yorkshire Water, British Water, Isle Utilities

Designer Liner

Yorkshire Water estimates that the cost to replace just 1% of the pipe network is at least £600 million, but that much more than that needs replacing each year to prevent leaks.

Pipe lining is **50% cheaper** than digging up and replacing broken pipes. It also **generates less carbon** and is **less disruptive** for customers.

Phase 1

Scoped out products from around the world to identify existing liner solutions with potential for adaptation or implementation in the UK. Finding no suitable solution in existence, the team set out to **design a specification for a liner** fit to meet the challenges of a 21st century water network

Phase 2

Will develop this specification into a product – overcome the current technical, regulatory, financial and market confidence barriers and **deliver a liner solution** which is ready to be taken forward by the supply chain for UK water industry

Led by: Yorkshire Water

Partners: Affinity Water, Thames Water Utilities, Northumbrian Water, Scottish Water, Cymru Welsh Water, SES Water

Managing Background Leakage

Aims to test the hypothesis that some background leakage comes from a small number of long-running, hidden leaks not detected by current methods

- Challenges industry assumptions about the “irreducible” nature of background leakage and seeks to **set new achievable minima for leakage reduction**
- The project explores emerging methods using high-resolution flow, pressure, and temperature data to improve detection

Will **conduct intensive surveys across 25 DMAs to assess background leakage** using business-as-usual (BAU) techniques and then apply forensic, high-density monitoring approaches.

- Seeks to localise and pinpoint hidden leaks on both company assets and customer supply pipes
- Aims to redefine the Minimum Achievable Level (MAL) of leakage by identifying leaks previously undetectable

Combines smarter use of existing tools with emerging technologies to make advanced leak detection practicable, sustainable, and cost-effective

Ultimate target: a **50% reduction in background leakage** within sample DMAs

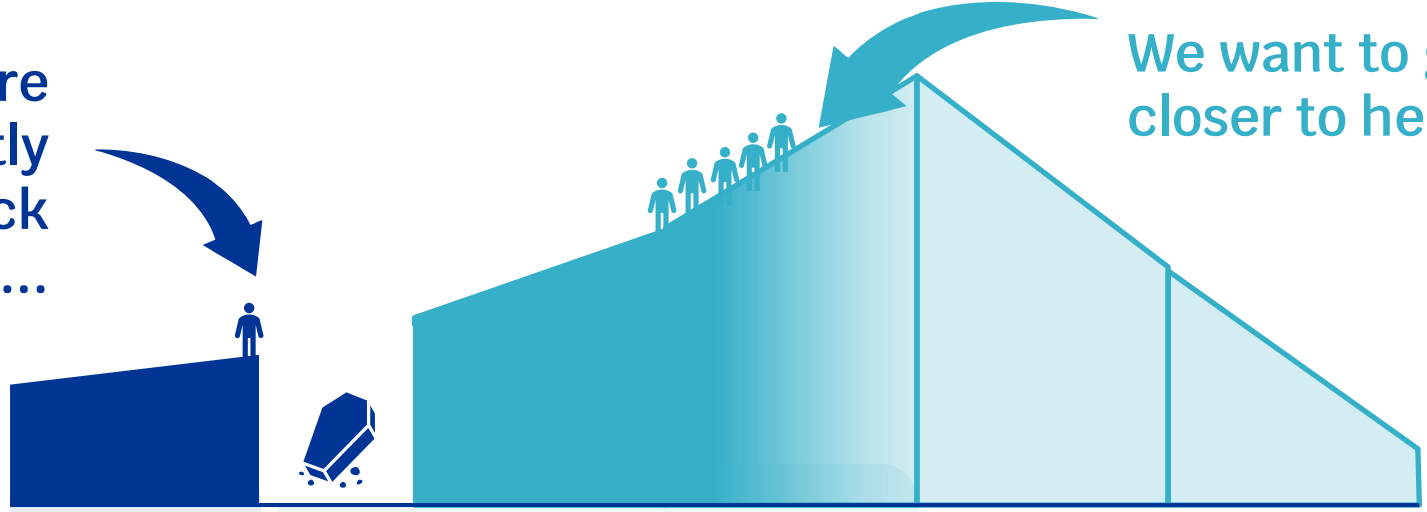
Led by: Dŵr Cymru
Partners: Affinity Water, Anglian Water, Severn Trent Water, Portsmouth Water, University of Sheffield, HWM, Invenio Systems

How the Ofwat Innovation Fund is supporting innovation investment and implementation

Adoption Journey – why do we need implementation support?

We are currently stuck here...

We want to get closer to here...



INNOVATORS
Risk-takers and early users of new solutions

CHASM

EARLY ADOPTERS
Hold more social influence than innovators and are often the first ones to validate value of adoption

EARLY MAJORITY
Favour adoption after an innovation has been adopted by others so they can leverage learning

LATE MAJORITY
More risk averse, they adopt innovation based on social pressure rather than enthusiasm

LAGGARDS
Will only adopt solutions that are close to what they already know

Innovation Fund

Implementation Programme

Overview of implementation programme

Water Innovation Implementation Programme

To accelerate the speed and scale by which successful innovations are implemented by the water sector in England and Wales

Implementation in action

Early-Adopter & Fast-Follower

We will provide partial funding for the implementation of innovations from other Ofwat Innovation Fund projects.

Directly supports the increased scale and speed by which fund innovations are adopted by de-risking early implementation activity through partial funding

Easing the journey

Implementation Enablers

Projects that enable the sector to better implement innovation

Directly Drives systemic and lasting change by funding activities that address known barriers to implementation

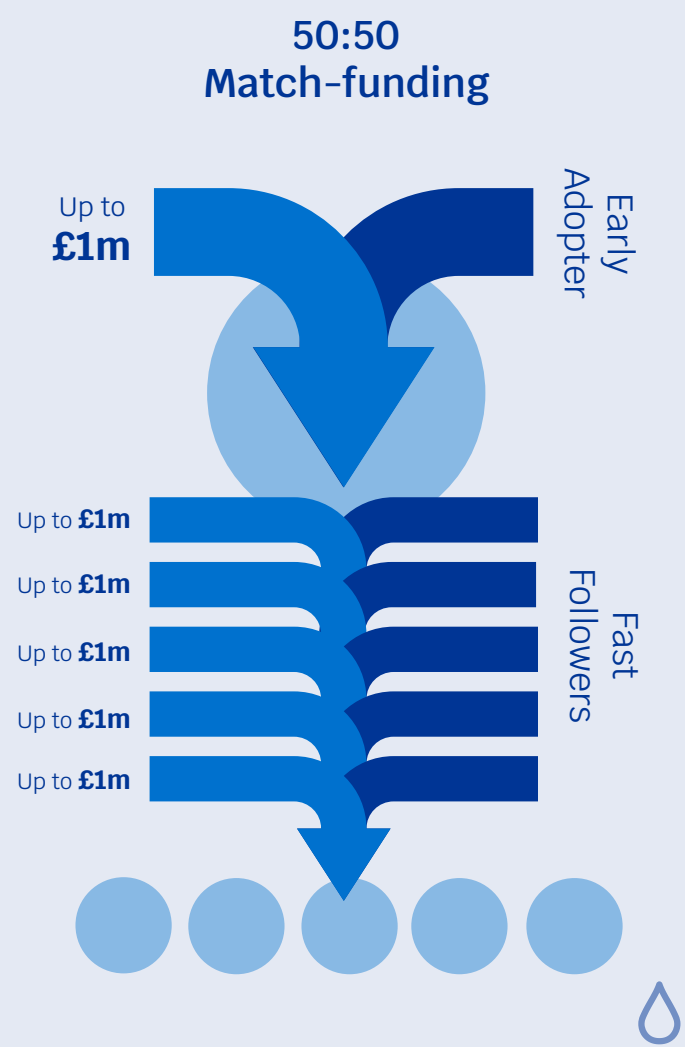
How it will work

Projects will be structured around an **Early Adopter** (the lead entrant) and a group of **up to five Fast Followers** who will implement the same solution after the initial deployment.

To progress to award, at least **two Fast Followers** must opt-in to also implement the solution. This ensures that every project is relevant across multiple companies and that the plan for implementation is genuinely replicable across the sector. **Up to five Fast Followers are eligible to receive their own match-funding.**

The Early Adopter will complete the first implementation, sharing knowledge, lessons learned and practical support with the Fast Follower cohort, who will then implement the same solution in their own organisations.

This collaborative structure is designed to demonstrate repeatability, accelerate adoption and ensure value for customers, communities and the environment.



How it will work

A new **Sector Implementation Committee** will meet quarterly to identify and prioritise barriers to implementation.

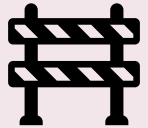
Each year, the Committee will select one priority barrier to address through a focused sprint, with a cross-sector consortium developing practical solutions.

Insights from the Early Adopter and Fast Follower Stream will help inform the selection of these barriers to ensure the most pressing, systemic issues are tackled first.

Sprints will be open to a broad range of organisations, including: water companies, consultancies and delivery partners, universities and research organisations, third-party technology providers, not-for-profit and third-sector organisations.

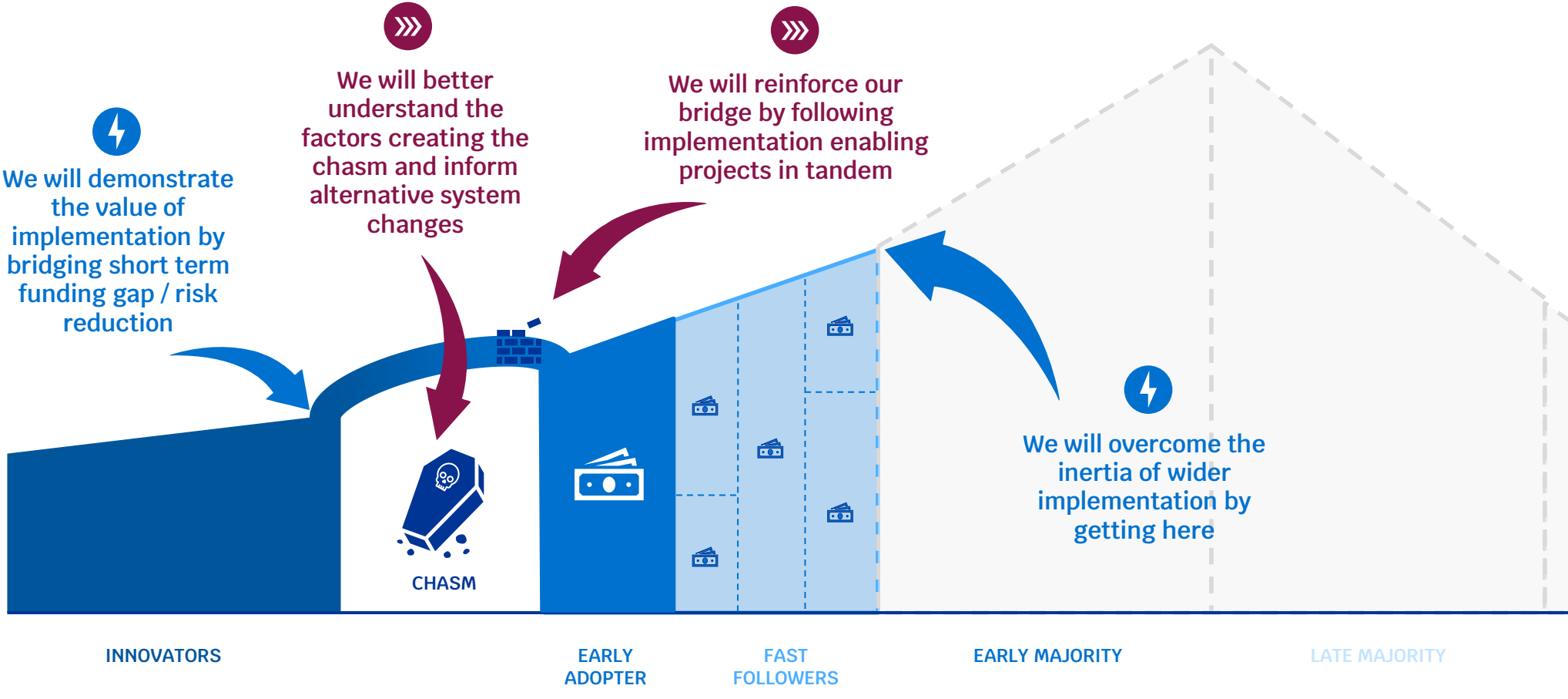
The total available funding for this stream will be **up to £10 million**, though funds may not be allocated directly to those involved in the solution generation.

The Implementation Enablers Stream will tackle the broader barriers that hold back innovation adoption across the sector.



These could include data-sharing challenges, capability gaps or cultural blockers that make it harder for new ideas to move from demonstration to business-as-usual. The stream will operate through a series of end-to-end sprints, each designed to address a single key barrier.

Adoption Journey – where we can get to



Any questions?



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UKWIR update



Jeremy Heath

Innovation Manager

SES Water

26th Annual Leakage conference

UKWIR update and research projects

Jez Heath – Pennon clean water Innovation Manager

UKWIR Programme Lead on Leakage

The current and future UKWIR Leakage Programme.

Outcomes	Prevent We can prevent new leaks from forming and minimise the effect of existing ones	Aware We can correctly measure and quantify the various components and areas that leakage occurs in and prioritise interventions	Locate We can accurately locate leakage on all materials and under all surface conditions	Mend We can repair leaks quickly and economically with minimum disruption
Key Benefits	We understand how leaks form and develop and can minimise their growth We can effectively justify and target mains replacement programmes to reduce leakage	We understand the various components that make up leakage and can accurately quantify them We can monitor the changes in leakage in components and geographical areas in order to effectively target resources	We understand the use and limitations of current leakage location methods We can assist with the development and trials of new leak location methods	We can reduce the run time of leaks due to more effective repairs We can assist in the development of new repair technologies
	39 Leakage impact of high-pressure variance within DMAs	31 Understanding what factors contribute to and affect overall DMA leakage	40 Update on trunk main leakage location technologies	35 Temporary flow reduction and repair technologies
	28 Optimising the selection of pipes for renewal to reduce leakage	32 Defining a consistent approach to calculating MAL and MAbL	33 Use of models to determine the size and most likely location of CSL	34 Contract management to incentivise efficient leak location and repair
	29 Calculating whole life costings and total value of mains renewal methodologies	WM/08/A/220 Update on non-acoustic leak detection and location	WM/08/A/217 Optical fibre sensing for acoustic leak detection	36 Assisting the development and adoption of in pipe repair methods
	23/WM/08/77 Assessing the levels of leakage on new polyethylene networks.	24/WM/08/78 A deep dive into leakage using smart meter data	WM/08/A/218 Pipe wave modelling for acoustic leak detection	37 Development of testing methodologies for mains repair techniques
	27 A review of the success of previous mains renewal methods and an overview of new techniques	30 Quantifying leakage levels on difficult to meter properties	WM/08/S/211 Combination of transient and steady state leak detection methods	22/WM/12/01 Transferring minimal excavation methods into the water industry
	WM/04/C/204 The Impact of Pressure Transients on Leakage	20/WM/08/72 Understand The Balance Between Use, Supply Pipe Leakage, Plumbing Losses And Meter Under-Registration	WM/08/A/216 The use of acoustic sensing rods for leak detection on trunk mains	38 Factors affecting leak repair times
	WM/08/A/215 Understanding how the deterioration of cast iron evolves into leakage	20/WM/08/74 Best Practice For Trunk Main Flow Monitoring Areas	17/WM/08/61 Leakage Detection By Acoustic Methods	WM/08/S/210 Hydrant dynamics for acoustic leakage detection
	WM/08/S/218 Tracking pipeline fault progression using acoustic signature detection	19/WM/08/68 The impact of reductions in leakage levels on reported and detected leak repair frequencies	17/WM/08/63 Leak Repair Techniques	20/WM/08/73 Impact of customer-side leakage approaches
	22/WM/04/14 The Occurrence and causes of pressure transients in distribution networks	22/WM/03/25 Use Of Smart Meters And Smart Networks For Leakage Management		
	22/WM/03/25 Improving the testing approach to novel lining materials for potable water networks - Phase I	17/WM/08/65 Water Accounting And Quantification Methods		
	17/WM/08/60 Basic Mechanisms Of Bursts And Leakage	17/WM/08/62 Leakage Detection and Location - Non Acoustic Methods		
	17/WM/08/64 Laying Leak Free New Networks			
	19/WM/08/71 Incidence And Causes Of Repeat Bursts At Old Repairs			

Notes

Project Status

- Idea
- Planned
- Live
- Completed

Project Priority

- # High
- # Medium
- # Low
- # Not prioritised

For Information

Report reference *(on Completed projects)*

21/DW/13/10 1 Project title

Version 16
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The UKWIR programme.

- We have now completed 20 projects under the big question.
- Either myself or Doug Spencer (co-programme lead) attend every meeting of the leakage managers to ensure that their concerns are addressed and the programme aligns with their needs.
- Following a suggestion from Tim Evans, we have arranged for our PhD's to be paired with an industry expert to meet with them on a regular basis and discuss the research.
- We are working carefully to ensure that the programme not only meets the needs of the leakage managers, but also is sufficiently evidenced to attract widespread support.
- We are welcoming a new co-programme lead into fold.

Introducing Euan Hampton

The UKWIR programme – recently completed projects.

Project title or activity	Benefits/ Outcomes
Use of models to determine the size and most likely location of CSL	Identified that whilst service pipes share some physical characteristics with mains, the availability of data is a challenge in adapting these techniques to service pipes. Material was highlighted as the most important factor for service pipe failure, with lead, black alkathene and galvanised steel being most problematic.

The UKWIR programme – current projects (excluding PhD projects)

Project title or activity	Benefits/ Outcomes
Optimising the Selection of Pipes for Renewal to Reduce Leakage	Devise an effective method for the optimum selection of mains for renewal at sub-DMA level, where the principle driver for investment is reduction of leakage.
Calculating whole life costings and value of mains renewal methodologies	Evaluate the whole life cost of the various methodologies available (open cut, directional drilling, slip lining, semi-structural lining and other methods).
Understanding factors contributing to and affecting overall DMA leakage	The aim of this project is to explore how the known influences (pressure, transients, material & condition, substrate, temperature, active leakage control (ALC) approach) relate to DMA characteristics.
A review of the success of previous mains renewal methods and an overview of new techniques	Analyse the impact of previous renewal programmes and provide an appraisal of any change in leakage performance.

The UKWIR programme – current PhD projects

Project title or activity	Student	Mentor
Using acoustics to monitor how small cracks develop into bursts in pipelines	Shahab Khodayari	Jez Heath
Understanding and predicting the evolution from first leak to final failure in cast iron water mains	Luke Ronayne	Jez Heath
Optical Fibre Sensing for Acoustic Leak Detection	Wenhao Xu	Tim Evans
Hydrant dynamics for acoustic leak detection	Musab Hajalfadul	Edward Woodruff
The use of vertically inserted acoustic sensing rods for leak detection on trunk mains	Yi Hu	Andrew Hunt

The Leakage Innovation Heatmap.

- Published and available for download of the UKWIR website.
- Brings together over 400 Water Company projects, UKWIR reports, Ofwat funded projects and Spring Knowledge shares
- We have been asked to carry out a review and also meet with all the leakage manager in the near future. We intend to carry this out next spring/summer.
- This is likely to be the last time I will be involved, as I am now extremely old and looking to semi-retire in the next couple of years.



The challenge of the Chinese

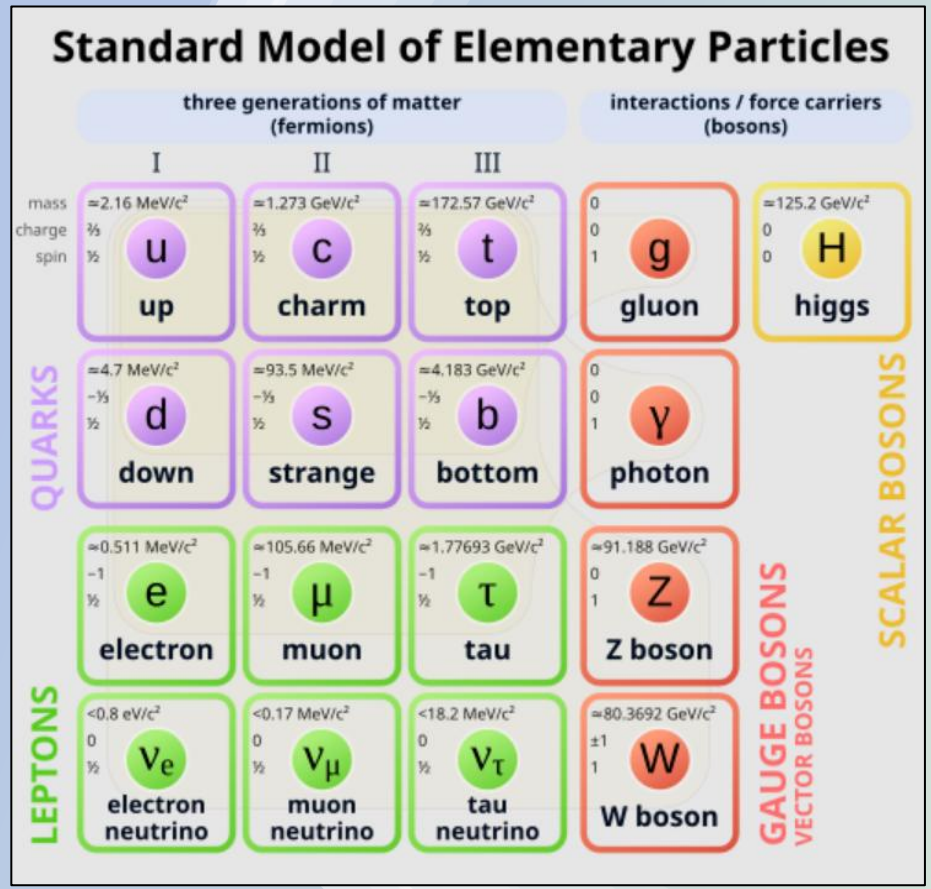
- I recently visited China to take speak and take part in the IWA China water loss conference.
- Chinese water companies have been challenged to reduce their water leakage to 9%
  Note: Their average daily HH consumption is 190 litres/person/day.
- The conference had about 250 delegates, but the demographic was very different with far more academia presentations and far less supply chain. The average age of the audience was far lower, with many students attending.
- The Chinese water companies are still building their networks with DMA's, however the level of analysis they bring to their data was extraordinary. Much of their knowledge is in-house rather than consultants.
- The entire 2nd day of the conference was devoted to AI and water leakage, with highly technical talks and demonstrations from the stage.
- Joby Boxall (who also attended) and I are in discussions about how we can better bring together academia & leakage. I intend to expand the upcoming heatmap to include academia, consultants and supply chain.

Quantum Leakage

- With a wide number of solutions now available, leakage managers are finding it increasingly difficult to adequately choose between leakage reduction strategies.
- With mains replacement as a long-term solution and most companies Prevent approaches well developed, we will need to concentrate on Aware, Locate & Mend
- However, most of our understanding on the impact of measures in these areas is empirically derived. Faster location certainly reduces leakage, but by how much?
- For example, if I was able to reduce leak location times for slowly developing leaks by one day, what measurable actual impact would that have on leakage?
- We need to develop an approach that allows us to link our empirical approaches with the actual characteristics of leaks.
- A successful model would allow us to better develop leakage strategies and understand the costs and potential benefits of interventions

Quantum Leakage

Quantum mechanics attempts to define the fundamental particles of matter.



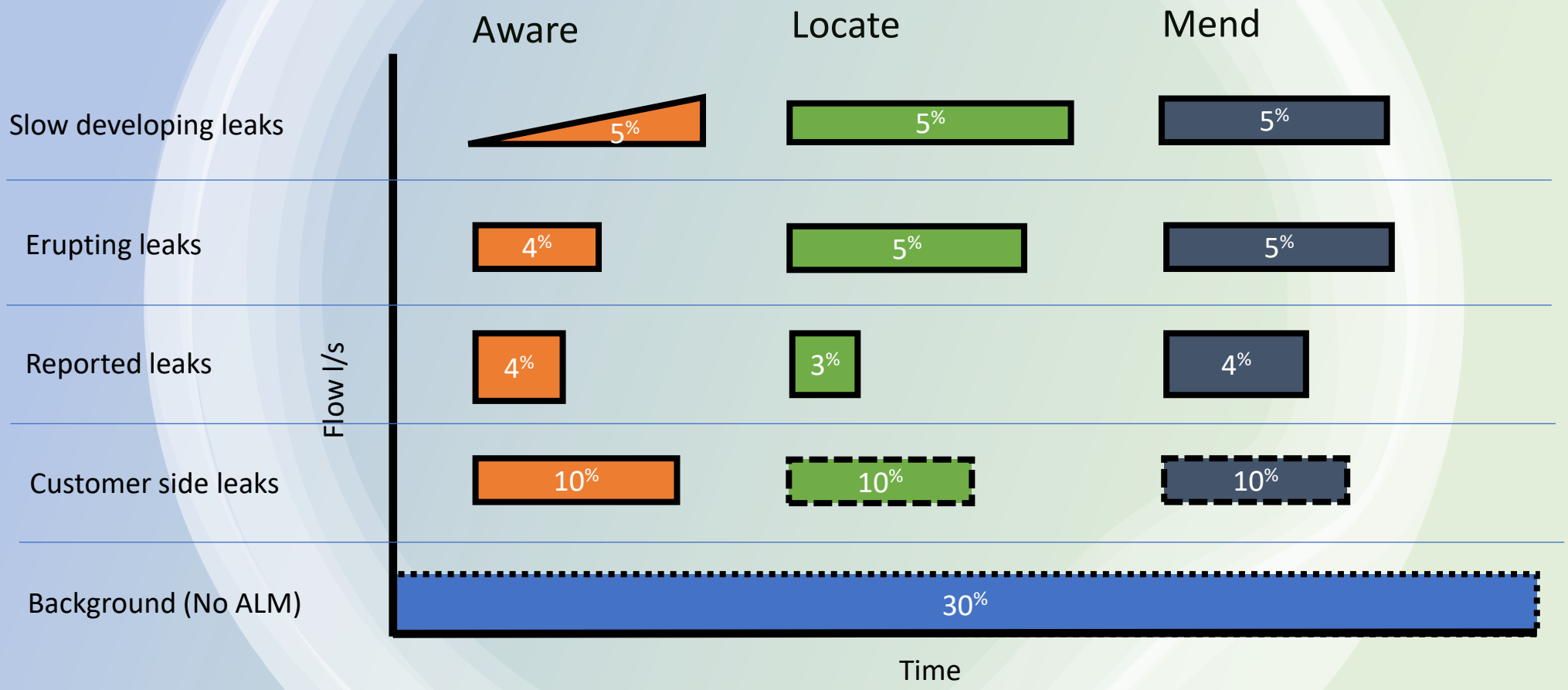
- Quantum simply means something that can be counted or measured in discrete units
- Physicist are attempting to unify the forces we understand empirically (like gravity) with the elementary particles
- Maybe this approach could also be applied to our understanding of leakage.

How would this work

- The fundamental property of every leak is the volume lost, which is a function of the flow rate and the time for which it runs.
- As our ability to change the flow rate is limited, our main impact on the volume lost is the time taken to repair it, once a leak has occurred.
- Rather than consider the leak runtime as a whole, this can be broken down into awareness, locate and mend times, which will have different characteristics and intervention methods.
- In addition, the type of leak (background, customer side, reported, erupting or slow developing) will have different characteristics and intervention methods.
- This approach allows us to start building an initial model of quantum leakage.
- QL could potentially be applied over varying timescales (years or months) and areas.
- Key concept is that the sum of the model components should equal our real losses

Quantum Leakage

The model is based on real losses, leak volumes and structured around ALM



Quantum Leakage

- Important to understand that this is not a leakage calculation approach but instead assists our development and implementation of leakage strategy and benefits.
- All of the QL allocations will be based on estimated numbers and averaged flows. As our knowledge increases, we will be able to better quantify these areas.
- It is entirely possible that we are missing significant areas in the model. We may need to identify the gaps and then find the “Higgs Bosons” of leakage.
- It is likely that QL models for varying timescales and areas will look different.
- Pennon Group have agreed to take this forward with me and are looking to develop an industry standard model, hopefully based around a number of metrics that we already collect, although there will undoubtedly be knowledge gaps.

Any questions?



Networking & Refreshments
See you back at 4.05pm



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