

AffinityWater

AFW154 Smart metering PCD working group report



Price Control Deliverable *Pack for Circulation*

16th August 2024



from
**Southern
Water** 

Executive Summary: Key challenges to the Metering Price Control Deliverable (New Meter Installs & Meter Upgrades).

- 1 PCDs should measure outcomes, not performance.
- 2 The PCD is overly punitive (non-delivery + time penalties based on performance, plus ODIs).
- 3 Evidence from the Water & Energy Sectors prove the measures & thresholds are incorrect.
- 4 Incorrectly set performance standards drive unintended consequences on costs to consumers, stifle innovation, and prevent benefits.
- 5 An alternative PCD design should ensure customers receive funded “connected upgrades”. ODI penalties govern “read performance”.

1

Ofwat has set a Price Control Deliverable values KPIs over outcomes...



Completeness Threshold – >95%

Measure and record water consumption data **at least once an hour with a 95%** or higher success rate



Connectivity Threshold – >95%

Transmit the recorded consumption data to the smart infrastructural network at least once **every 24 hours with a 95%** or higher success rate*



Non-Delivery Payments

Will apply to funded meters which are **not delivered nor meeting the active thresholds by the end of the control period.**
Applies to PR19 funded Accelerated Infrastructure Delivery.



Time Under / Over Performance

Payments will apply for any given year for New Installs, Meter Replacements, or Meter Upgrades where performance falls short of PCD target



Independent 3rd Party Annual Assurance

Shall be provided every year on level of reported installs, upgrades, and replacements, and the level of data capture & transmission.



Agreed Interoperability Standards by 31st Dec 2025

Water companies must engage and collaborate with other water companies, meter suppliers and other stakeholders across the sector to agree on common data collection standards to ensure data interoperability across the sector. No later than 31st Dec 2025, and reported from 1st Apr 2026.

The success rate should be based on the number of data points recorded or transmitted since the meter was installed, upgraded or replaced (post-31 March 2005) and the time of reporting. The minimum acceptable period of time to report a successful installation of an active meter is one month of data from installation. It is expected that once installed a meter should achieve these success rates on average until the end of the reporting period 31 March 2030.

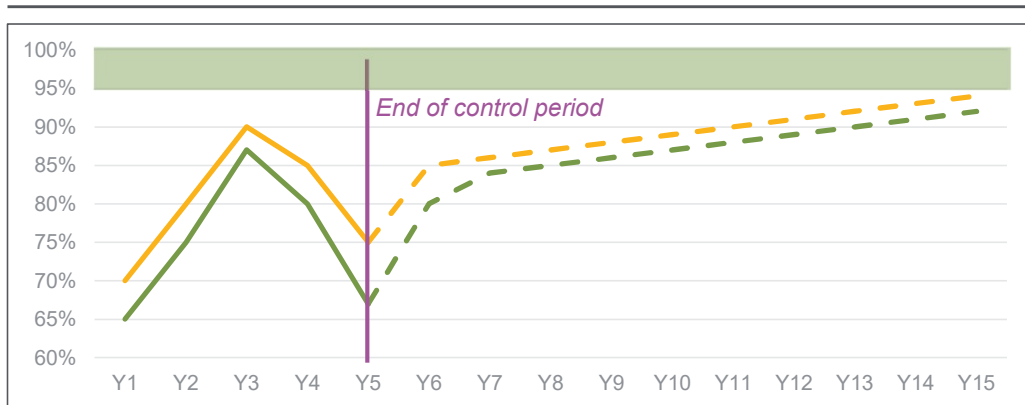
- PR24 draft determinations – Price control deliverables appendix



2

The PCD is overly punitive. A meter could receive penalties >140% of the allowed revenue over its lifetime.

Scenario 1: One Meter Upgrade never meets 95% thresholds

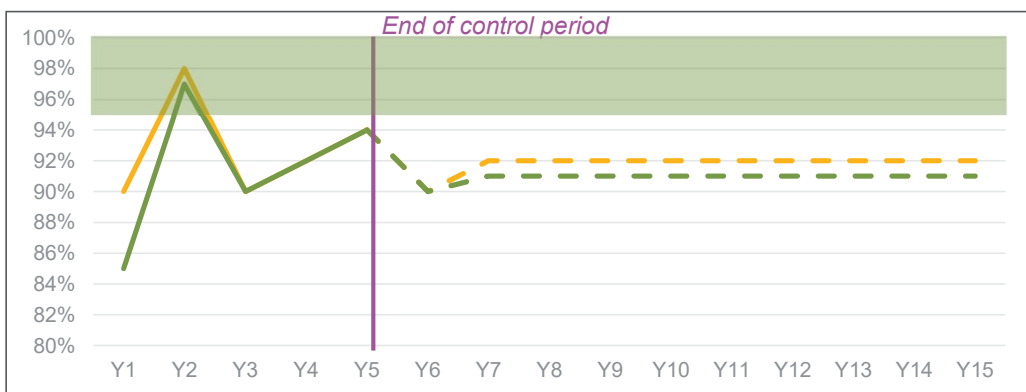


Total Meter Upgrade Penalties over 15 years



- Upfront allowed revenue: £76.84
- £73.93 Non-Delivery
- £37.94 Time penalties

Scenario 2: One New Meter Install meets thresholds for one year, achieves 92% on average



Total New Meter Install Penalties over 15 years



- Upfront allowed revenue: £428.35
- £409.36 Non-Delivery
- £14.98 Time penalties

- % achieving completeness threshold (hypothetical scenario)
- % achieving connectivity threshold (hypothetical scenario)



3

Smart metering devices require “All things to be true” to perform well at scale...



Environment

- External below ground boundary boxes
- Variable boundary box materials
- Terrain (hilly, flat etc), plus urban / rural
- Internal materials & plumbing



Installation

- Fitted successfully
- Connected successfully
- Registered successfully
- Confirmed “upgraded”



Comms Networks

- Multiple technologies
- Signal attenuation
- Hardware issues
- Urban environments changes affecting signal

Many factors can influence the successful outcome of securing meter readings

Hourly meter readings

Meters



- Compatible meter type with technology choice
- Type of meter to record accurately at all flows
- 15 year mechanical life & battery life
- Inconsistent standards (incl. Configuration & one or two-way comms)

Comms Devices



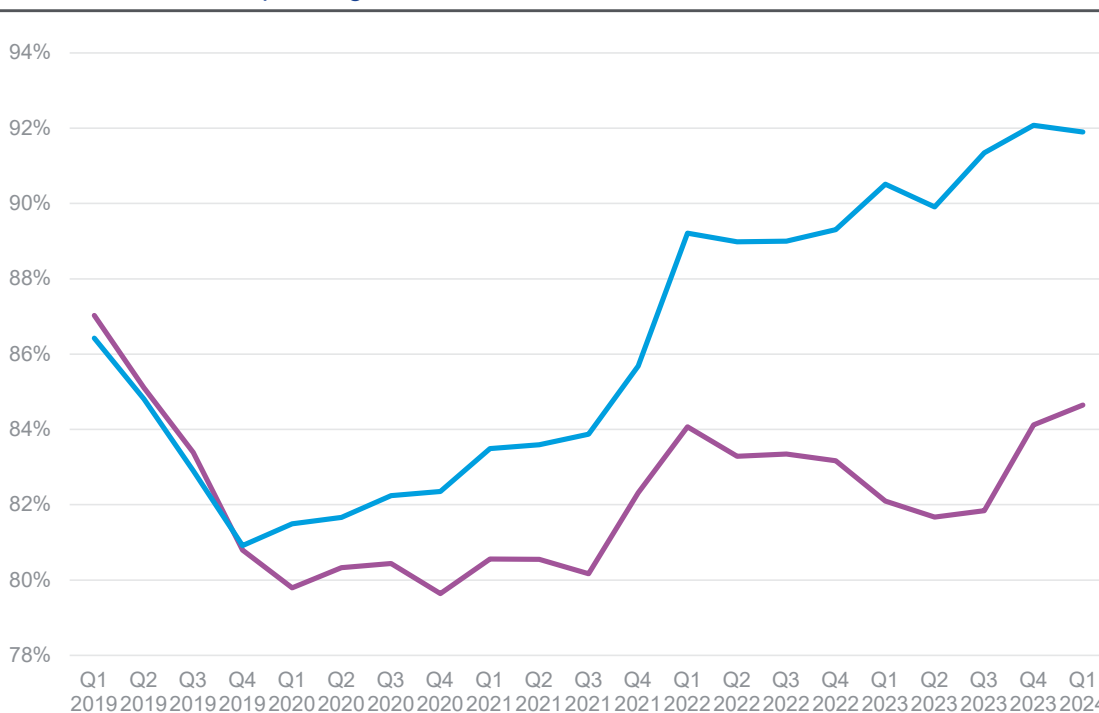
- Fitted successfully
- Connected successfully
- Signal issues
- Transient comms issues (e.g. parked cars)

3

Energy Smart Metering has achieved between ~80-92% of meters in “Smart Mode” since 2019 (DESNZ annual reports).

DESNZ report a meter operating in Smart Mode “can send readings via a remote connection to energy suppliers”.

% of smart meters operating in smart mode¹ since 2019



■ % of electricity smart meters in smart mode
 ■ % of gas smart meters in smart mode

*“The below are the consistent themes and a ranges of issues since 2012 from time spent at 3 of the largest energy suppliers”
 George Donoghue*

Typical scenarios across Foundation and Enduring SMETs:

Reason	Indicative Range	Applicable to Water? (✓/X)
1. Install & Leave	5-10%	✓
2. SMETs1 Dormant	2.5-5%	X
3. SMETs 1 enrolled not operational	1-5%	X
4. Intermittent	1-5%	X
5. Dark Sites (No Comms)	2.5-5%	✓
6. No Readings	2.5-5%	✓
7. Estimated bill	2.5-5%	✓

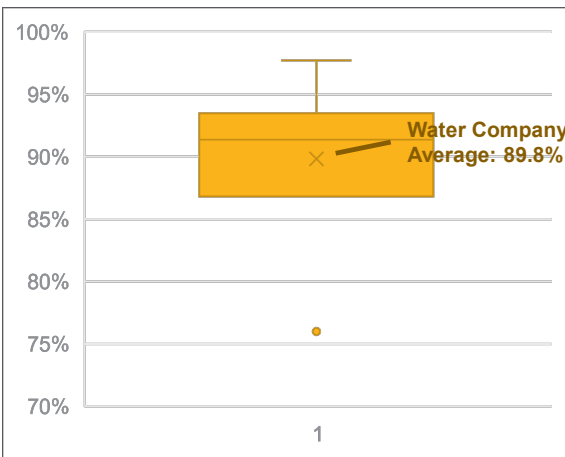


6 1. Both Ofgem and the DCC use Citizens Advice’s definition of smart mode; “Smart mode means your meter should automatically send readings to your supplier.”

3

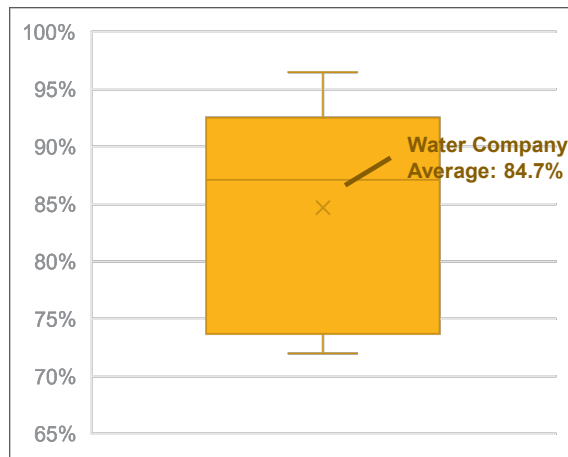
Water Smart Metering was first pursued in 2015. With 20% of AMI Meters deployed, 89.8% on average connect to a network, achieving 84.7% read performance.

% Meters connected to network (i.e. registered as connected)*



*Measure includes where suppliers do not report on stale meters >3 days

% Read Performance (average of hourly data, available daily)



Anecdotes from water companies installing meters at scale suggest these performances are achieved in favourable areas for communications coverage and via a proactive rollout programme. These rates will be even more challenging at greater volumes, across a whole region, and with a mix of reactive & proactive work.

Typical root causes cited by water companies:

Reasons

1. Installed outside or ahead of network setup
2. Lost connectivity (materials e.g. deep boundary boxes or metal lids)
3. Lost connectivity (masts / incorrect mappings)
4. Signal issues (new buildings erected)
5. KPI misalignment (e.g. supplier reporting does not include meters that are not connected to the network)
6. Smart meter portfolio densification

Water Company	Volume of AMI	First Install	Meter Manufacturer	Comms Technology
UK Portfolio Position	2.45m			
Anglian Water	0.94m	2016	Sensus	Flexnet (Arqiva)
Northumbrian Water	0.20m	2021	Sensus + Itron	Flexnet (Arqiva) + LoRAWAN (Connexin)
Severn Trent Water	0.14m	2022	Itron	LoRAWAN (Connexin)
Thames Water	1.07m	2015	Sensus	Flexnet (Arqiva)
United Utilities	(trial – 1k)	2023	Itron	LoRAWAN (Connexin)
Yorkshire Water	0.10m	2021	Itron	LoRAWAN (Connexin + Netmore)



3

There are various reasons cited by participants why completeness or connectivity issues emerge

1. Installed before network setup



“Network rollout doesn’t always match up to meter rollout. Proactive installs / replacements are planned where network coverage has gone live first. However, **reactive installs / replacements may not be connected to the network from date of installation as we have no control over these.**”

2. Lost Connectivity (materials)



“In my experience with the boundary box being underground, **variable box materials**; metals or plastics, **can be one of many causes for attenuation.** Or if there is any concrete that can get in the way.”

“If the reason for non-communication is due to a metal lid, we would not raise a job to rectify this due to the costs involved in replacing the chamber.”

3. Lost Connectivity (masts / mappings)



“In April 2023, **only 64% of meters were communicating due to an issue with the network provider not having mapped the area correctly.** There was a new high rise building they had not mapped, creating a communications shadow. To combat this issue, **a further three masts were installed and now 92% of meters are communicating,** which have stayed static for the last few months and will not be picked up by the current masts installed.”

4. Signal Issues



“Half of the meters that cannot join the network due to lost coverage **from ‘skyline changes’** i.e. new building construction, and / or hard-to-reach meter point locations and **installation quality issues where the smart point is not ideally situated for best communication** with the fixed network.”

5. KPI Misalignments



“**Providers remove figures for meters that have gone stale for three days,** if we include those meters then it should be 92% connectivity, with those data points removed, performance significantly improves, which is not how the real-world works. Three days of no communication would mean failing the PCD.”

“Our **supplier KPIs are based on meters being installed within network coverage.** Ofwat’s PCDs are based on every funded meter installed.”

6. Smart Meter Portfolio Densification



“On reads returned over a longer period, we have compliant performance, **but with returns within 24 hours we are still significantly in pain, doubly so at a ‘fast’ rollout,** which I guess all of us will be in for significant periods on the AMP either due to sheer volume or the issues of ‘densification’ on rollouts and where we are driving the network programme.”

3

Achieved performance levels have enabled benefits, which are the basis of forecasts submitted in WRMPs

Water Co	Necessary Data	Insights	Realised Benefits
1	<ul style="list-style-type: none"> • C. 50% of daily reads, 75% of the time, during times of low/no use to detect continuous flow (CSLs and /or plumbing loss)". 	9% properties with smart meter identified as having continuous flow (CSL & wastage - plumbing losses)	<ul style="list-style-type: none"> • CSL: 9% properties @ 700 l/prop/d • Usage:13%, equivalent to 40-50 l/prop/d* <p>*not specified if new install vs replacement</p>
2	<ul style="list-style-type: none"> • “No more than 3 missing reads per day to detect a leak” • “Under 50lph we want 7 days of consecutive reads before action. For leaks > 50lph action within 24 hours” 	<p>“The data we do have available shows that 26% of meters connected to the network have had a leak at some point.</p> <ul style="list-style-type: none"> • 74% of leaks are 1-4 lph • 9% of leaks are 5-9lph • 5% of leaks are 10-19lph • 12% of leaks are >20 lph 	Reporting under development
3	<i>Not stated</i>	<i>Not stated</i>	<ul style="list-style-type: none"> • CSL (incl. Plumbing Loss and Customer Supply Pipe Leaks): 12.6l/hh/d** • Usage: 6l/hh/d** <p>** Difficulties agreeing methodology due to lack of control group between the two categories</p>
4	<ul style="list-style-type: none"> • “Hourly read granularity with new data received at a frequency of once per day or higher. This data does not need to be 95% complete to extract benefit.” 	<i>Not stated</i>	<ul style="list-style-type: none"> • CSL: 7.6litres per meter installed • Usage: 22.1litres per meter installed

Initial view only and gives an indication of the nature of data needed to drive benefits.



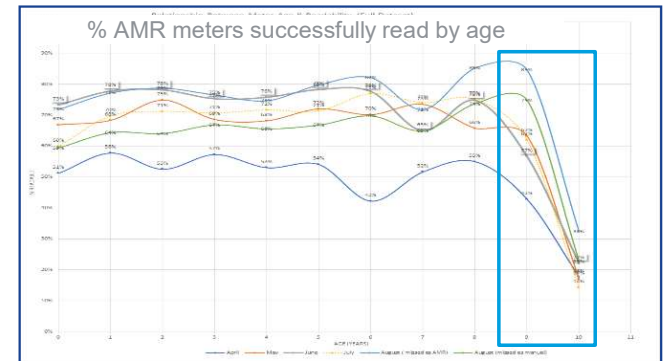
4 Costs to customers may increase 2-3x if unrealistic targets cause meter battery life to fail early.

Case	Mechanical Life (warranted)	Battery Life (warranted)	Install Phase					Operate Phase															Cost		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
Assumed	15 years	15 years	1																						£204
Likely	15 years	10 years	1										2												£408
Worst	15 years	8 years	1									2													£612

* All figures are rounded to the nearest unit place, actual total cost of replacement, plus meter upgrade on average is £204.33.




Reasons unrealistic PCD performance thresholds cause early life failure:

- ▶ Battery life is already unproven. AMR meter batteries have been proven to fail early (Southern Water experience has been those batteries have failed at ~9-10 years).
- ▶ To hit 95% on average will lead to more rapid battery failure. Communications technologies are likely to consume more battery power in order to improve connectivity success (higher radio power, longer transmit time/more repeats, or more regular “pings” to the meter etc). Configuring meters to meet success criteria will reduce asset life due to faster battery depletion.



4

Costs to customers will increase as new measures and thresholds drive new terms from supply chain partners and/or stifles innovation.

Risks	Impacts	Severity	Likelihood
<p>1. PCD causes water companies to exit contracts early</p> 	<ul style="list-style-type: none"> Water companies need to absorb further costs by exiting contracts, to either re-negotiate, or move to other suppliers who are willing to achieve the stated performance levels. 	Medium	Medium
<p>2. Increased supply chain costs and / or stifles innovation limiting best value for customers</p> 	<ul style="list-style-type: none"> Costs of meter devices and communications network infrastructure increase in order to meet the stated performance levels. The market is skewed toward the highest cost provider(s) and/or to networks that are already in place, limiting innovation as it imposes a barrier to new solutions emerging into the market with time to prove performance at scale 	High	High
<p>3. PCD penalty measurement and timings do not align with commercial terms</p> 	<ul style="list-style-type: none"> Increased risk exposure on water companies limited performance outcomes by vendors. 	Low	High

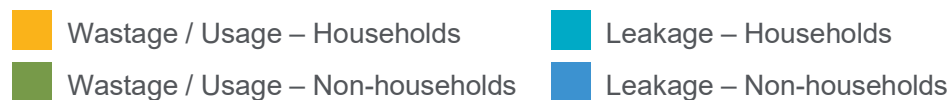
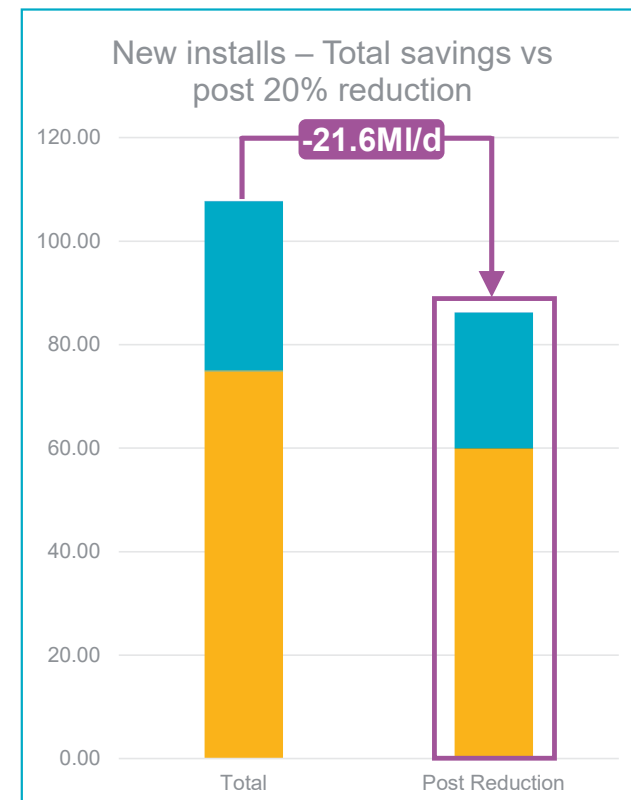
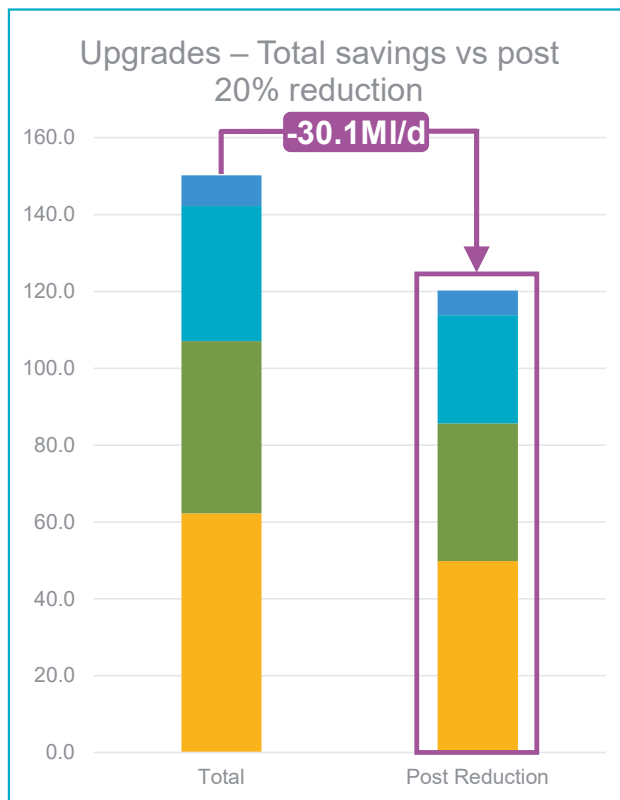
4 Installs & upgrades reduce by 20% causing a 51.7MI/d* WRMP shortfall (as those meters are uneconomical to upgrade).

Many meters will not meet the performance thresholds stated at an economical cost. If these are not delivered, then it puts government set targets at risk:

- ▶ Wastage (HH) – Risks PCC long-term goal of target 110l/p/d by 2050.
- ▶ Wastage (NHH) – Risks Business Demand long-term goal of target 15% reduction in consumption by 2050.
- ▶ Leakage (HH / NHH) – Risks Leakage long-term goal of target 50% reduction by 2050.

A 20% reduction in installations would be 1.88m less smart meters in AMP8*

*Likely an underestimate, as submissions in Oct 2023 were inconsistently populated. See appendix.



5

PCD penalties must ensure customers receive funded enhancements. ODIs govern time and read performance.



Outcome Delivery Incentives



Non-Delivered Penalty linked to “% Meters Connected”



No non-delivery payment based on “read performance”



No time incentives

- ▶ New install PCD is split into two parts, in-line with the approach for replacements
 - ▶ (1) New Installations of Meters
 - ▶ (2) Upgrade of new meters to Smart AMI Meters
- ▶ The Price Control Deliverable (PCD) for upgraded meters only applies penalties on a % of non-connected meters (see slide 14)
- ▶ Outcome Delivery Incentives (ODI) govern “read performance” as this is necessary for demand reductions.
- ▶ No time penalties associated with meter upgrades, as these are necessary for delivering upon ODIs
- ▶ Annual reporting of consistent “read performance” metrics, not linked to a PCD penalty.



5

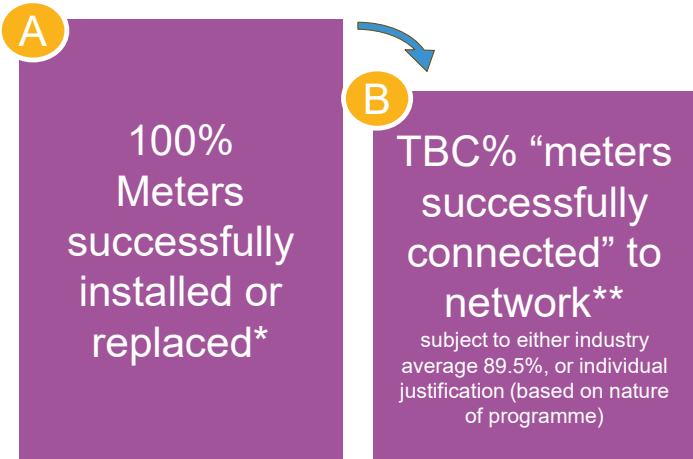
The PCD alternative ensures delivery of “connected upgrades”. Sector reports upon “read performance”.

WAN Availability (communications network)

>95%

Purpose: Separate out this measure to ensure consistency between Ofwat / Vendors / Water Companies

PCD applies to % connected meters across portfolio, measured at the end of the control period.



AMI “Read Performance” Reporting (not subject to PCD)

Average meter read communication performance for connected meters***

* Measured as: the number of AMI-capable meters installed by the Company

** Measured as: the number of meters which have successfully registered with the Company’s meter data management system and been connected to the communication network for 7 consecutive days following installation or replacement, divided by the total number of installed / replaced meters, multiplied by 100.

- We note that some companies may need to consider reactive demand as part of this metric (e.g. via optants or fix on fail replacements and upgrades, that are not expected to be in coverage)

*** Measures to be refined in-line with sector-wide reporting and interoperability standards

Appendix



PCD penalties and incentives by Water Company

New Installs

Company	Allowed revenue per meter upgrade	Non-delivery PCD payment (£ / meter)	Under-performance rate (£ / meter)	Out-performance rate (£ / meter)
ANH	380.05	366.70	13.42	3.36
WSH	324.01	312.02	11.42	2.85
HDD	408.17	212.08	7.76	1.94
NES	368.54	354.27	12.97	3.24
SVE	360.63	347.72	12.73	3.18
SWB	377.86	364.90	13.36	3.34
SRN	-	-	-	-
TMS	366.05	352.19	12.89	3.22
NWT	360.52	347.55	12.72	3.18
WSX	379.36	364.91	13.36	3.34
YKY	371.89	358.86	13.13	3.28
AFW	377.71	364.94	13.36	3.34
BRL	383.43	368.70	13.49	3.37
PRT	371.78	357.72	13.81	3.45
SEW	428.35	409.36	14.98	3.75
SSC	369.90	294.93	11.38	2.85
SES	401.37	386.17	14.13	3.53

Meter Upgrades

Company	Allowed revenue per meter upgrade	Non-delivery PCD payment (£ / meter)	Under-performance rate (£ / meter)	Out-performance rate (£ / meter)
ANH	76.95	74.25	2.72	0.68
WSH	39.05	-	-	-
HDD	83.07	43.16	1.58	0.39
NES	77.78	74.77	2.74	0.68
SVE	78.67	75.85	2.78	0.69
SWB	78.32	75.63	2.77	0.69
SRN	76.84	73.93	2.71	0.68
TMS	77.28	-	-	-
NWT	78.13	75.31	2.76	0.69
WSX	79.33	76.30	2.79	0.70
YKY	76.34	73.66	2.70	0.67
AFW	78.67	76.01	2.78	0.70
BRL	80.03	76.96	2.82	0.70
PRT	80.48	77.43	2.99	0.75
SEW	78.22	74.75	2.74	0.68
SSC	82.43	65.72	2.54	0.63
SES	79.19	76.19	2.79	0.70

- Highest allowed expenditure
- Lowest allowed expenditure (non-zero figure)



Water Company submitted wastage and leakage benefits for new installations (as at October 2023)

Company	Households		
	Wastage / Usage	Leakage	Total HH Benefit Per Meter
ANH	73.28	35.88	109.16
WSH	-	-	-
HDD	-	25.00	25.00
NES	45.90	5.30	51.20
SVE	23.30	24.90	48.20
SWW	53.80	11.90	65.70
SRN	48.07	-	48.07
TMS	44.80	-	44.80
UUW	23.10	19.60	42.70
WSX	73.30	36.66	109.96
YKY	57.71	21.96	79.67
AFW	40.60	-	40.60
BRL	81.00	8.10	89.10
PRT	82.10	13.70	95.80
SEW	65.17	15.82	80.98
SSC	-	-	-
SES	-	-	-

Non-households		
Wastage / Usage	Leakage	Total NHH Benefit Per Meter
240.00	9.00	249.00
-	-	-
-	-	-
-	-	5.30
-	-	-
-	-	-
-	-	-
9.10	-	9.10
72.69	15.13	87.83
49.60	21.96	71.56
-	-	-
-	-	-
-	-	-
-	-	-
-	51.28	337.62
-	-	-
-	-	-

- Highest figure
- Lowest non-zero figure



Water Company submitted wastage and leakage benefits for meter upgrades to AMI (as at October 2023)

Company	Households		
	Wastage / Usage	Leakage	Total HH Benefit Per Meter
ANH	14.10	4.70	18.80
WSH	-	-	-
HDD	-	4.40	4.40
NES	17.70	5.30	23.00
SVE	-	4.40	4.40
SWW	7.40	5.10	12.50
SRN	10.15	7.03	17.18
TMS	-	19.00	19.00
UUW	20.80	-	20.80
WSX	-	-	-
YKY	7.40	3.90	11.30
AFW	28.30	-	28.30
BRL	-	-	-
PRT	46.20	13.70	59.90
SEW	9.97	2.19	12.16
SSC	-	-	-
SES	-	-	-

Non-households		
Wastage / Usage	Leakage	Total NHH Benefit Per Meter
240.00	9.00	249.00
-	-	-
-	-	-
-	5.30	5.30
187.40	-	187.40
-	-	-
50.82	7.03	57.85
27.30	23.00	50.30
43.60	19.10	62.70
-	-	-
49.60	3.90	53.50
-	-	-
-	-	-
408.00	-	408.00
76.36	34.01	110.36
-	-	-
-	-	-

■ Highest figure
■ Lowest non-zero figure

