

**ELECTRICITY INDUSTRY PARTICIPATION CODE
METERING EQUIPMENT PROVIDER AUDIT REPORT**

For

ARC INNOVATIONS

Prepared by: Steve Woods – Veritek Limited

Date audit commenced: 28 February 2020

Date audit report completed: 8 April 2020

Audit report due date: 19-Mar-20

TABLE OF CONTENTS

Executive summary	5
Audit summary	5
Non-compliances	5
Recommendations	9
Issues	9
1. Administrative	10
1.1. Exemptions from Obligations to Comply with Code (Section 11)	10
1.2. Structure of Organisation	11
1.3. Persons involved in this audit	12
1.4. Use of Agents (Clause 10.3)	12
1.5. Hardware and Software	13
1.6. Breaches or Breach Allegations	13
1.7. ICP Data	14
1.8. Authorisation Received	14
1.9. Scope of Audit	15
1.10. Summary of previous audit	16
Table of Non-Compliance	16
Table of Recommendations	17
2. Operational Infrastructure	18
2.1. MEP responsibility for services access interface (Clause 10.9(2))	18
2.2. Dispute Resolution (Clause 10.50(1) to (3))	18
2.3. MEP Identifier (Clause 7(1) of Schedule 10.6)	19
2.4. Communication Equipment Compatibility (Clause 40 Schedule 10.7)	19
2.5. Participants to Provide Accurate Information (Clause 11.2 and Clause 10.6)	19
3. Process for a Change of MEP	21
3.1. Payment of Costs to Losing MEP (Clause 10.22)	21
3.2. Registry Notification of Metering Records (Clause 2 of Schedule 11.4)	21
3.3. Provision of Metering Records to Gaining MEP (Clause 5 of Schedule 10.6)	22
3.4. Termination of MEP Responsibility (Clause 10.23)	22
4. Installation and Modification of Metering Installations	24
4.1. Design Reports for Metering Installations (Clause 2 of Schedule 10.7)	24
4.2. Contracting with ATH (Clause 9 of Schedule 10.6)	24
4.3. Metering Installation Design & Accuracy (Clause 4(1) of Schedule 10.7)	25
4.4. Subtractive Metering (Clause 4(2)(a) of Schedule 10.7)	29
4.5. HHR Metering (Clause 4(2)(b) of Schedule 10.7)	29
4.6. NSP Metering (Clause 4(3) of Schedule 10.7)	29
4.7. Responsibility for Metering Installations (Clause 10.26(10))	30
4.8. Suitability of Metering Installations (Clause 4(4) of Schedule 10.7)	30
4.9. Installation & Modification of Metering Installations (Clauses 10.34(2), (2A) and (3)) ..	31
4.10. Changes to Registry Records (Clause 3 of Schedule 11.4)	31
4.11. Metering Infrastructure (Clause 10.39(1))	33
4.12. Responsibility for Metering at ICP (Clause 10.23A)	33
4.13. Measuring Transformer Burden and Compensation Requirements (Clause 31(4) and (5) of Schedule 10.7)	34

4.14.	Changes to Software ROM or Firmware (Clause 39(1) and 39(2) of Schedule 10.7)	35
4.15.	Temporary Energization (Clause 10.28(6))	35
5.	Metering Records.....	37
5.1.	Accurate and Complete Records (Clause 4(1)(a) and (b) of Schedule 10.6, and Table 1, Schedule 11.4)	37
5.2.	Inspection Reports (Clause 4(2) of Schedule 10.6)	39
5.3.	Retention of Metering Records (Clause 4(3) of Schedule 10.6)	39
5.4.	Provision of Records to ATH (Clause 6 Schedule 10.6).....	40
6.	Maintenance of Registry Information.....	41
6.1.	MEP Response to Switch Notification (Clause 1(1) of Schedule 11.4)	41
6.2.	Provision of Registry Information (Clause 7 (1), (2) and (3) of Schedule 11.4)	41
6.3.	Correction of Errors in Registry (Clause 6 of Schedule 11.4)	44
6.4.	Cancellation of Certification (Clause 20 of Schedule 10.7)	44
6.5.	Registry Metering Records (Clause 11.8A)	48
7.	Certification of Metering Installations	49
7.1.	Certification and Maintenance (Clause 10.38 (a), clause 1 and clause 15 of Schedule 10.7)	49
7.2.	Certification Tests (Clause 10.38(b) and clause 9 of Schedule 10.6).....	51
7.3.	Active and Reactive Capability (Clause 10.37(1) and 10.37(2)(a))	52
7.4.	Local Service Metering (Clause 10.37(2)(b))	54
7.5.	Measuring Transformer Burden (Clause 30(1) and 31(2) of Schedule 10.7)	54
7.6.	Certification as a Lower Category (Clauses 6(1)(b) and (d), and 6(2)(b) of Schedule 10.7).....	55
7.7.	Insufficient Load for Certification Tests (Clauses 14(3) and (4) of Schedule 10.7)	55
7.8.	Insufficient Load for Certification – Cancellation of Certification (Clause 14(6) of Schedule 10.7)	56
7.9.	Alternative Certification Requirements (Clauses 32(2), (3) and (4) of Schedule 10.7) ...	56
7.10.	Timekeeping Requirements (Clause 23 of Schedule 10.7).....	57
7.11.	Control Device Bridged Out (Clause 35 of Schedule 10.7)	58
7.12.	Control Device Reliability Requirements (Clause 34(5) of Schedule 10.7).....	59
7.13.	Statistical Sampling (Clauses 16(1) and (5) of Schedule 10.7).....	59
7.14.	Compensation Factors (Clause 24(3) of Schedule 10.7).....	59
7.15.	Metering Installations Incorporating a Meter (Clause 26(1) of Schedule 10.7).....	60
7.16.	Metering Installations Incorporating a Measuring Transformer (Clause 28(1) of Schedule 10.7)	60
7.17.	Metering Installations Incorporating a Data Storage Device (Clause 36(1) of Schedule 10.7)	61
7.18.	Notification of ATH Approval (Clause 7 (3) Schedule 10.3).....	61
7.19.	Interim Certification (Clause 18 of Schedule 10.7).....	61
8.	Inspection of metering installations	63
8.1.	Category 1 Inspections (Clause 45 of Schedule 10.7).....	63
8.2.	Category 2 to 5 Inspections (Clause 46(1) of Schedule 10.7).....	64
8.3.	Inspection Reports (Clause 44(5) of Schedule 10.7)	65
8.4.	Broken or removed seals (Clause 48(4) and (5) of Schedule 10.7)	65
9.	Process for Handling Faulty Metering Installations	67
9.1.	Investigation of Faulty Metering Installations (Clause 10.43(4) and (5)).....	67
9.2.	Testing of Faulty Metering Installations (Clause 10.44).....	67
9.3.	Statement of Situation (Clause 10.46(2)).....	68

10.	Access to and Provision of Raw meter Data and Metering Installations.....	69
10.1.	Access to Raw Meter Data (Clause 1 of Schedule 10.6).....	69
10.2.	Restrictions on Use of Raw Meter Data (Clause 2 of Schedule 10.6).....	69
10.3.	Access to Metering Installations (Clause 3(1), (3) and (4) of Schedule 10.6).....	70
10.4.	Urgent Access to Metering Installations (Clause 3(5) of Schedule 10.6)	70
10.5.	Electronic Interrogation of Metering Installations (Clause 8 of Schedule 10.6)	71
10.6.	Security of Metering Data (Clause 10.15(2))	72
10.7.	Time Errors for Metering Installations (Clause 8(4) of Schedule 10.6)	73
10.8.	Event Logs (Clause 8(7) of Schedule 10.6).....	74
10.9.	Comparison of HHR Data with Register Data (Clause 8(9) of Schedule 10.6)	75
10.10.	Correction of Raw Meter Data (Clause 10.48(2),(3)).....	76
	Conclusion	77
	Participant response	78

EXECUTIVE SUMMARY

ARC Innovations Limited (ARC Innovations) is a Metering Equipment Provider (MEP) and is required to undergo an audit by 19 March 2020 in accordance with clause 1(1)(b) of schedule 10.5.

ARC Innovations is not actively expanding their metering base. There are plans in place to replace ARC Innovations metering with Vector/AMS metering. This process is carefully managed to ensure the integrity of the RF mesh is retained.

The management of registry accuracy and timeliness is generally sound; however, this audit identified a number of significant issues affecting the accuracy of data and the certification status of data storage devices. It is my conclusion that ARC Innovations data storage devices cannot be HHR certified and Generation 2 devices failed type testing so they shouldn't be certified at all. The main issues identified are as follows:

1. The HHR data files only contain one decimal place so the smallest kWh increment is 0.1 kWh. The pulse rate is 200 pulses per 0.1 kWh, so once the controller (data storage device) has received 200 pulses in its accumulator, the 0.1 kWh is transferred to the registers. If the end of an interval is reached and the accumulator has only received 190 pulses, the consumption associated with these pulses is apportioned to the next interval. There will be very few HHR intervals where the consumption is accurate to within 2.5% (the accuracy threshold for Category 1 and Category 1 installations). Approximately 100,000 installations are certified as HHR and 16,692 are settled as HHR. These installations are not designed to provide accurate HHR data and should not be certified as HHR.
2. The type test report for Generation 2 devices states that the "Data Logger retains all data pertaining to energy and events for a minimum period of the interrogation cycle plus five days". The interrogation cycle is one day. Therefore the type test has only confirmed that data will be retained for six days, but Clause 5(b)(xii) of Schedule 10.8 requires "that the data storage device has data loss protection providing a continued clock and memory operation for a continuous period of at least 15 days when the power supply to the data storage device is lost". Therefore, they have failed the type test.
3. 524 ICPs were not read during the maximum interrogation cycle.
4. 2,613 ICPs had time errors greater than the allowable threshold.

The date of the next audit is determined by the Electricity Authority and is dependent on the level of compliance during this audit. The table below provides some guidance on this matter and recommends an audit frequency of three months. Remedial actions are likely to take some time and will involve liaison with the Authority and other parties. I think three months is too soon for the next audit; I recommend the next audit is conducted by November 30th 2020.

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Participants to Provide Accurate Information	2.5	11.2	Registry not updated as soon as practicable when certification is cancelled.	Moderate	Low	2	Investigating
Design & Accuracy	4.3	4(1) of Schedule 10.7	The design of the metering installation (including data	None	High	12	Identified

			storage device and interrogation system) does not ensure the sum of the measured error and the smallest possible increment of the energy value of the raw meter data does not exceed 2.5%.				
Change to registry records	4.10	3 of Schedule 11.4	Some records updated on the registry later than 10 business days.	Moderate	Low	2	Identified
Accurate and complete records.	5.1	4(1)(b)(i)&(v) of Schedule 10.6	Missing fields in one certification report. 3 incorrect certification reports.	Moderate	Low	2	Identified
Provision of information to the registry	6.2	7(1) of Schedule 11.4	Some registry records incomplete or incorrect.	Strong	Low	1	Identified
Cancellation of Certification	6.4	20(1)(b) of Schedule 10.7	Certification cancelled and registry not updated for: 2x 3 phase installation with single phase meter and compensation factor of 3, 6x Category 2 installations not inspected at 10 years, 28x Time errors of more than 60 seconds for more than 20 days in a month, 31x Time errors more than 1,000 seconds (900 seconds is one half hour interval), 16,692 HHR settled installations where the HHR data is inaccurate per interval by more than 2.5% due to the data storage devices only having one decimal place, and	Weak	High	9	Identified

			14,633 Generation 2 installations where the data storage devices failed type testing.				
Certification and maintenance	7.1	10.38(a)	2,090 installations with expired certification. Approx. 30,000 installations with cancelled certification.	Weak	High	9	Identified
Certification tests	7.2	10.38(b)	Appropriate testing not conducted for Generation 2 data storage devices. Test results not recorded for one Category 1 installation.	Moderate	Low	2	Disputed
Active and Reactive Capability	7.3	10.37(1) and 10.37(2)(a)	Generation 1 Category 2 meters not capable of measuring and recording reactive energy.	Moderate	Low	2	Identified
Timekeeping Requirements	7.10	23 of Schedule 10.7	24 meters with timeclocks not checked every 12 months.	None	Low	5	Identified
Interim certification	7.19	18 of Schedule 10.7	1,942 ICPs with expired interim certification.	Strong	Medium	2	Identified
Category 2 to 5 inspections	8.2	46(1) of Schedule 10.7	Inspections not conducted within the allowable window for six installations.	Moderate	Low	2	Identified
Interrogation cycle	10.5	8 of Schedule 10.6	524 ICPs not read during the maximum interrogation cycle.	Moderate	Medium	4	Identified
Time Errors for Metering Installations	10.7	8(4) of Schedule 10.6	Clock errors greater than the threshold for 2,613 ICPs.	Moderate	Low	2	Identified
Future Risk Rating						56	
Indicative Audit Frequency						3 months	

Future risk rating	1-2	3-6	7-9	10-19	20-24	25+
Indicative audit frequency	36 months	24 months	18 months	12 months	6 months	3 months

RECOMMENDATIONS

Clause	Section	Recommendation	Remedial Action
4(1)(a) and (b) of Schedule 10.6, and Table 1, Schedule 11.4	5.1	Change certification reports to provide better clarity of expiry dates and validity periods.	This was done in 2018 but it related only to metering data received after the update. Previous data in our system could not be included in the new certificates.

ISSUES

Subject	Section	Recommendation	Description
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code (Section 11)

Code reference

Section 11 of Electricity Industry Act 2010.

Code related audit information

Section 11 of the Electricity Industry Act provides for the Electricity Authority to exempt any participant from compliance with all or any of the clauses.

Audit observation

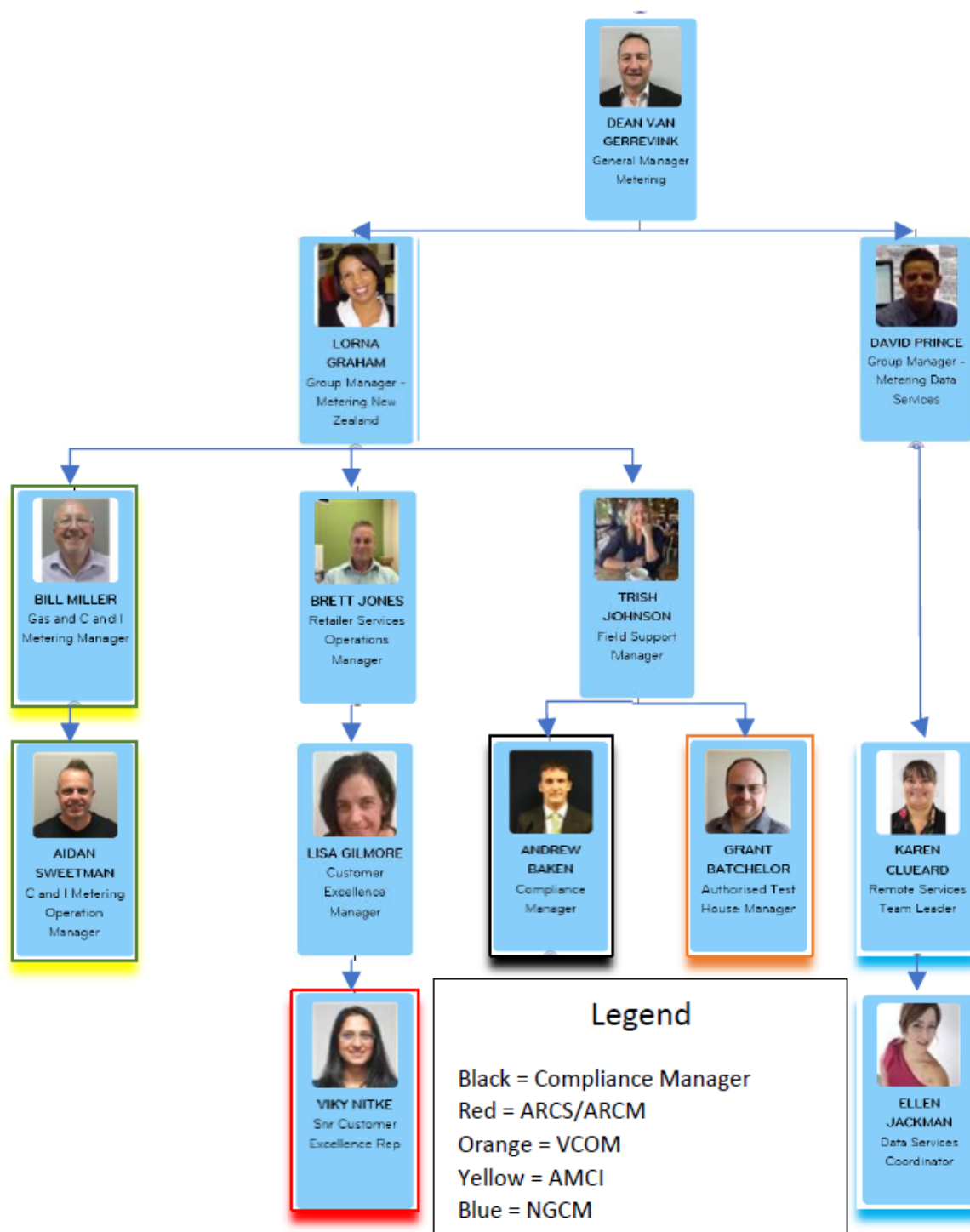
I checked the Electricity Authority website to confirm whether there were any exemptions in place.

Audit commentary

Arc Innovations was granted the exemption #168 on 20th August 2013. ARC Innovations is exempt from compliance with item 16, of Table 1 of Schedule 11.4, in respect to providing metering component serial numbers for its first-generation advanced metering infrastructure (AMI) metering installations. The exemption expires on 31 December 2025.

1.2. Structure of Organisation

ARC Innovations Metering Services Structure – Effective 28/02/20.



1.3. Persons involved in this audit

Auditor:

Steve Woods

Veritek Limited

Electricity Authority Approved Auditor

ARC Innovations personnel assisting in this audit were.

Name	Title
Andrew Baken	Compliance Manager
Viky Nitke	Senior Customer Excellence Representative

1.4. Use of Agents (Clause 10.3)

Code reference

Clause 10.3

Code related audit information

A participant who uses a contractor

- *remains responsible for the contractor's fulfillment of the participants Code obligations*
- *cannot assert that it is not responsible or liable for the obligation due to the action of a contractor*
- *must ensure that the contractor has at least the specified level of skill, expertise, experience, or qualification that the participant would be required to have if it were performing the obligation itself.*

Audit observation

ARC Innovations engages Approved Test Houses (ATHs) to conduct certification activities. These parties are not considered agents for this activity.

Audit commentary

ARC Innovations uses ATHs as agents for the storage of certification records. All records requested were supplied within the expected timeframe. Compliance is confirmed.

1.5. Hardware and Software

Software

- Jade Proprietary Arc Innovations back office software AMI 2.0
- Job Management server (to which the PDA's communicate) is Quicknet. Microsoft Windows Mobile v4.21 and .NET Compact Framework v1.0.3316.0 (PDA platform which runs Arc Innovations Field Management System and eSmart installer software, both written using Microsoft Visual Studio). MobiControl - device agents and server platform for remote management of HHP Dolphin PDA's.
- Vanilla job manager is the tool used to record jobs completed on vanilla sites and also stores vanilla asset details.

Hardware

- IBM server
- Meters are METEC, GE and Enermet, and Iskra brands.
- E-Smart controllers are from Dynamic Controls.
- HandHeld readers are Dolphin 9500 series PDA

1.6. Breaches or Breach Allegations

ARC Innovations provided details of one breach allegation, as shown in the table below.

Clause	Details	Result
4(b) of Schedule 10.7	<p>Vector Limited purchased Arc and its category 2 meter fleet and operates Arc. Vector discovered that the settings of these meters record one unit of 10 kWh which is then attributed to the trading period in which the end of the 10 kWh unit of energy is measured.</p> <p>The Committee noted the impact is negligible. Vector is in the process of replacing the 1,164 Arc category 2 meters with its own metering installations. Vector has notified all affected retailers (Contact is the main retailer) of the issue. Compliance and Market operations consider that reprogramming the meters would be less economic than replacement.</p> <p>Compliance has discussed this issue with Market Operations and will monitor Arc's progress on a regular basis</p> <p>The Committee decided to take no further action on the breaches under regulation 11(1)(c) of the Electricity Industry (Enforcement) Regulations 2010 (Regulations).</p>	No further action

This matter is discussed further in **section 4.3**. The issue is not limited to Category 2 as noted above, it affects all HHR certified metering installations where the participant is settling with an HHR profile. In any given day, very few of the HHR intervals will be accurate to within 2.5%, therefore compliance is not achieved with Clause 4(b) of Schedule 10.7. These installations cannot be considered "fit for purpose" because the design is such that accuracy will seldom be achieved on a per HHR interval basis.

1.7. ICP Data

Arc Innovations provided a list of all ICP's for **ARCS** as of the 30/01/20. The table below shows a breakdown by metering category.

Metering Category	Number of ICPs (30/01/20)	Number of ICPs (18/02/19)	Number of ICPs (07/05/18)	Number of ICPs (24/7/17)
1	99,525	110,528	113,087	115,490
2	926	1,321	1,965	2,198
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
9	0	5	15	19

Arc Innovations provided a list of all ICP's for **ARCM** as of the 30/01/20. The table below shows a breakdown by metering category.

Metering Category	Number of ICPs (30/01/20)	Number of ICPs (18/02/19)	Number of ICPs (07/05/18)	Number of ICPs (24/7/17)
1	2,567	3,211	3,579	4,125
2	13	8	15	34
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
9	0	3	1	2

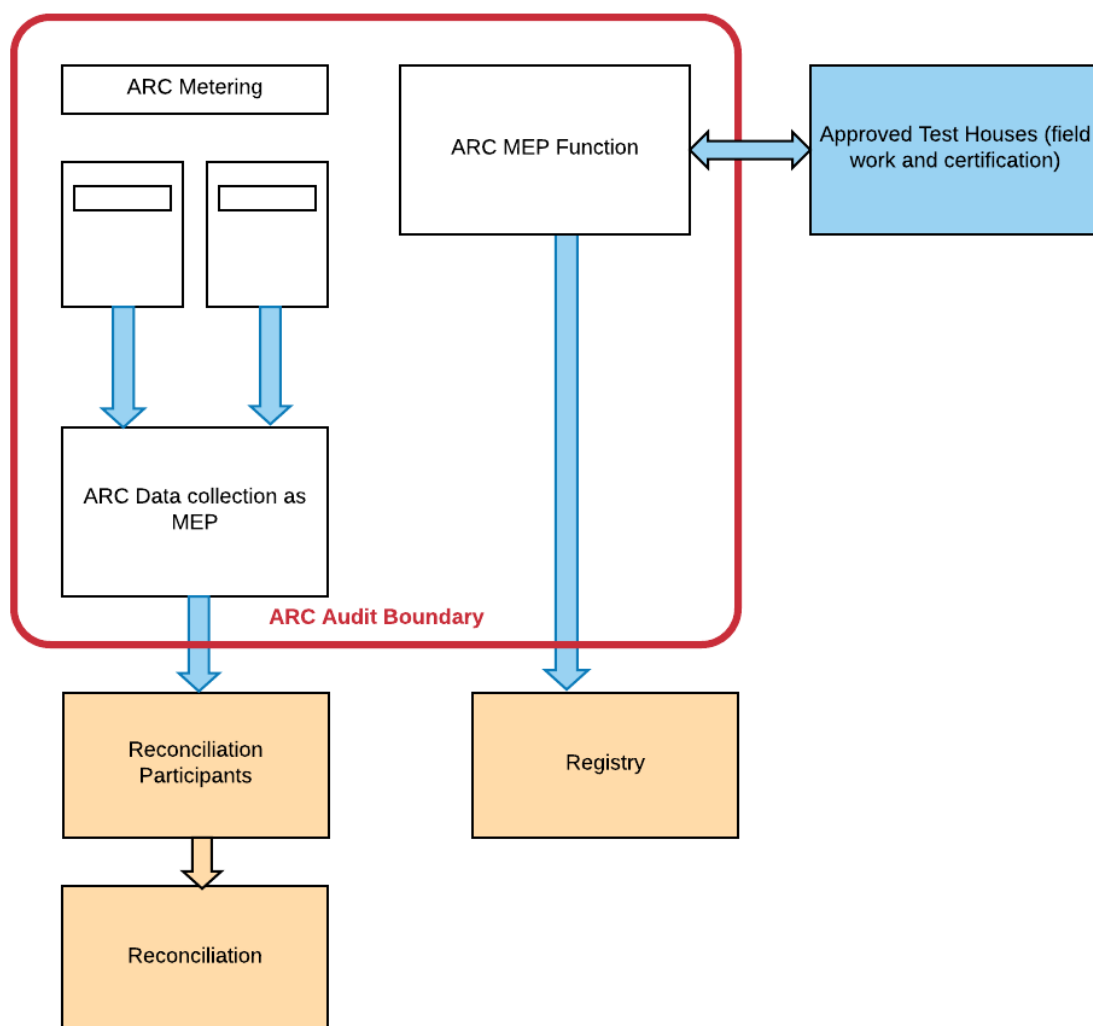
1.8. Authorisation Received

A letter of authorisation was not required or requested.

1.9. Scope of Audit

This audit was conducted in accordance with the Guideline for Metering Equipment Provider Audits V2.2, which was published by the Electricity Authority.

The boundaries of this audit are shown below for greater clarity.



1.10. Summary of previous audit

The previous audit was conducted in March 2019 by Ewa Glowacka of TEG and Associates. The table below shows that some of the issues have been cleared.

Table of Non-Compliance

Subject	Section	Clause	Non-compliance	Status
Participants to Provide Accurate Information	2.5	11.2	Information updated in the registry later than 10BD and certification of metering installation not cancelled in the registry for metering installations not fit for purpose.	Still existing
Change to registry records	4.10	3 of Schedule 11.4	Information updated in the registry later than 10BD.	Still existing
Provision of information to the registry	6.2	7(1) of Schedule 11.4	Information for 8 ICPs is missing; some information for metering installations on Scanpower's network is incorrect (control devices for 1,238 ICPs).	Still existing
Correction errors in registry	6.3	6 of Schedule 11.4	There is no process to comply with this clause.	Cleared
Cancellation of Certification	6.4	20(1)(b) of Schedule 10.7	Certification has not been cancelled for a small number of metering installations.	Still existing
Certification and maintenance	7.1	10.38(a)	Certification expired for 2,198 metering installations.	Still existing
Interim certification	7.19	18 of Schedule 10.7	2,022 ICPs with expired interim certification.	Still existing
Category 2 to 5 inspections	8.2	46(1) of Schedule 10.7	8 metering installations, category 2, were not inspected.	Still existing
Time Errors for Metering Installations	10.7	8(4) of Schedule 10.6	A small number of data storage devices exceeds the maximum time error set out in Table 1 of clause 8(5) of Schedule 10.6	Still existing

Table of Recommendations

Subject	Section	Clause	Recommendation for improvement	Status
			Nil	

2. OPERATIONAL INFRASTRUCTURE

2.1. MEP responsibility for services access interface (Clause 10.9(2))

Code reference

Clause 10.9(2)

Code related audit information

The MEP is responsible for providing and maintaining the services access interface.

Audit observation

I checked certification records for 15 metering installations, covering all relevant ATHs.

Audit commentary

ARC Innovations has an AMI system and for all installations the services access interface will be “remote”. I checked 15 certification records and found the services access interface was recorded correctly by ATHs for all installations.

Audit outcome

Compliant

2.2. Dispute Resolution (Clause 10.50(1) to (3))

Code reference

Clause 10.50(1) to (3)

Code related audit information

Participants must in good faith use its best endeavours to resolve any disputes related to Part 10 of the Code.

Disputes that are unable to be resolved may be referred to the Authority for determination.

Complaints that are not resolved by the parties or the Authority may be referred to the Rulings Panel by the Authority or participant.

Audit observation

I checked whether any disputes had been dealt with during the audit period.

Audit commentary

ARC Innovations has not been required to resolve any disputes in accordance with this clause.

Audit outcome

Compliant

2.3. MEP Identifier (Clause 7(1) of Schedule 10.6)

Code reference

Clause 7(1) of Schedule 10.6

Code related audit information

The MEP must ensure it has a unique participant identifier and must use this participant identifier (if required) to correctly identify its information.

Audit observation

I checked the registry data to ensure the correct MEP identifier was used.

Audit commentary

ARC Innovations uses the ARCS and ARCM identifier in all cases.

Audit outcome

Compliant

2.4. Communication Equipment Compatibility (Clause 40 Schedule 10.7)

Code reference

Clause 40 Schedule 10.7

Code related audit information

The MEP must ensure that the use of its communication equipment complies with the compatibility and connection requirements of any communication network operator the MEP has equipment connected to.

Audit observation

Relevant documentation was checked to ensure the compatibility of communication equipment.

Audit commentary

ARC Innovations ensures all communication equipment is appropriately certified with the relevant telecommunications standards. This is recorded in type test certificates and other approval documents.

Audit outcome

Compliant

2.5. Participants to Provide Accurate Information (Clause 11.2 and Clause 10.6)

Code reference

Clause 11.2 and Clause 10.6

Code related audit information

The MEP must take all practicable steps to ensure that information that the MEP is required to provide to any person under Parts 10 and 11 is complete and accurate, not misleading or deceptive and not likely to mislead or deceive.

If the MEP becomes aware that in providing information under Parts 10 and 11, the MEP has not complied with that obligation, the MEP must, as soon as practicable, provide such further information as is necessary to ensure that the MEP does comply.

Audit observation

The content of this audit report was reviewed to determine whether all practicable steps had been taken to provide accurate information.

Audit commentary

The content of this audit report indicates that ARC Innovations has taken all practicable steps to ensure that information is complete and accurate in most cases; however, in **sections 4.3** and **6.4** the report records that some information was not updated as soon as practicable. The main issue is that the registry is not always updated when certification is cancelled.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 2.5 With: Clause 11.2 and Clause 10.6 From: 01-Mar-19 To: 13-Mar-20	Registry not updated as soon as practicable when certification is cancelled. Potential impact: Medium Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	Controls are recorded as moderate because there is room to improve processes. The impact on other participants is minor; therefore, the audit risk rating is low. This non-compliance does not yet consider the issue of data storage devices being "not fit for purpose", because this has only been identified recently.		
Actions taken to resolve the issue		Completion date	Remedial action status
Excluding the two main issues raised in this report that we have only just learned of and are currently investigating, there was a small number of ICPs identified where registry updates were not on time. The certifications for the meters at these ICPs will be cancelled and the registry will immediately be updated accordingly.		30/04/20	Investigating
Preventative actions taken to ensure no further issues will occur		Completion date	
Vector Metering (VM) will regularly be downloading the new reports made available from the Electricity Authority's (the Authority) website. Having access to these reports will allow us to easily identify errors and correct those errors in a timely manner.		In place	

3. PROCESS FOR A CHANGE OF MEP

3.1. Payment of Costs to Losing MEP (Clause 10.22)

Code reference

Clause 10.22

Code related audit information

The MEP for a metering installation may change only if the responsible participant enters into an arrangement with another person to become the MEP for the metering installation, and if certain notification requirements are met (in relation to the registry and the reconciliation manager).

The gaining MEP must pay the losing MEP a proportion of the costs within 20 business days of assuming responsibility.

The costs are those directly and solely attributable to the certification and calibration tests of the metering installation or its components from the date of switch until the end of the current certification period.

Audit observation

I checked if ARC Innovations had sent or received any invoices.

Audit commentary

ARC Innovations has not sent or received any invoices in relation to this clause during the audit period.

Audit outcome

Compliant

3.2. Registry Notification of Metering Records (Clause 2 of Schedule 11.4)

Code reference

Clause 2 of Schedule 11.4

Code related audit information

The gaining MEP must advise the registry of the registry metering records for the metering installation within 15 days of becoming the MEP for the metering installation.

Audit observation

I checked the event detail for the period 01/03/19 to 20/01/20 for all records where ARC Innovations became the MEP to evaluate the timeliness of updates.

Audit commentary

I examined an event detail report, which showed that ARCS became the MEP for two metering installations. The registry was updated within 15 business days for both examples.

Audit outcome

Compliant

3.3. Provision of Metering Records to Gaining MEP (Clause 5 of Schedule 10.6)

Code reference

Clause 5 of Schedule 10.6

Code related audit information

During an MEP switch, a gaining MEP may request access to the losing MEP's metering records.

On receipt of a request from the gaining MEP, the losing MEP has 10 business days to provide the gaining MEP with the metering records or the facilities to enable the gaining MEP to access the metering records.

The losing MEP must ensure that the metering records are only received by the gaining MEP or its contractor, the security of the metering records is maintained, and only the specific metering records required for the purposes of the gaining MEP exercising its rights and performing its obligations are provided.

Audit observation

I checked with ARC Innovations to confirm whether there had been any requests from other MEPs.

Audit commentary

This has not occurred, and no examples are available to examine. ARC Innovations have stated that any information will be provided as necessary.

Audit outcome

Compliant

3.4. Termination of MEP Responsibility (Clause 10.23)

Code reference

Clause 10.23

Code related audit information

Even if the MEP ceases to be responsible for an installation, the MEP must either comply with its continuing obligations; or before its continuing obligations terminate, enter into an arrangement with a participant to assume those obligations.

The MEP is responsible if it:

- *is identified in the registry as the primary metering ARC Innovations or*
- *is the participant who owns the meter for the POC or to the grid or*
- *has accepted responsibility under clause 1(1)(a)(ii) of schedule 11.4 or*
- *has contracted with a participant responsible for providing the metering installation.*

MEPs obligations come into effect on the date recorded in the registry as being the date on which the metering installation equipment is installed or, for an NSP the effective date set out in the NSP table on the Authority's website.

An MEP's obligations terminate only when;

- *the ICP changes under clause 10.22(1)(a);*
- *the NSP changes under clause 10.22(1)(b), in which case the MEPs obligations terminate from the date on which the gaining MEP assumes responsibility,*
- *the metering installation is no longer required for the purposes of Part 15; or*
- *the load associated with an ICP is converted to be used solely for unmetered load.*

Audit observation

I confirmed that ARC Innovations has ceased to be responsible for some metering installations by checking the event detail report.

Audit commentary

ARC Innovations has ceased to be responsible for some metering installations and they still continue with their responsibilities, mainly in relation to the storage or records, which are kept indefinitely. I checked the records for ICPs 0005078814RN8BC and 0005534097RNCFD, which were both decommissioned. The metering details were still available.

Audit outcome

Compliant

4. INSTALLATION AND MODIFICATION OF METERING INSTALLATIONS

4.1. Design Reports for Metering Installations (Clause 2 of Schedule 10.7)

Code reference

Clause 2 of Schedule 10.7

Code related audit information

The MEP must obtain a design report for each proposed new metering installation or a modification to an existing metering installation, before it installs the new metering installation or before the modification commences.

Clause 2(2) and (3)—The design report must be prepared by a person with the appropriate level of skills, expertise, experience and qualifications and must include a schematic drawing, details of the configuration scheme that programmable metering components are to include, confirmation that the configuration scheme has been approved by an approved test laboratory, maximum interrogation cycle, any compensation factor arrangements, method of certification required, and name and signature of the person who prepared the report and the date it was signed.

Clause 2(4)—The MEP must provide the design report to the certifying ATH before the ATH installs or modifies the metering installation (or a metering component in the metering installation).

Audit observation

I checked the document containing all of the design reports.

Audit commentary

The design reports contain all of the relevant details required by the Code. Delta has signed these off. The method of certification and maximum interrogation cycle are contained in the certification records, which I consider form part of the design once certification has occurred.

Audit outcome

Compliant

4.2. Contracting with ATH (Clause 9 of Schedule 10.6)

Code reference

Clause 9 of Schedule 10.6

Code related audit information

The MEP must, when contracting with an ATH in relation to the certification of a metering installation, ensure that the ATH has the appropriate scope of approval for the required certification activities.

Audit observation

I confirmed that ARC Innovations uses the Delta, VEMS and Wells ATHs.

Audit commentary

I have checked the Authority's website and confirm that all relevant ATHs have current and appropriate scopes of approval. ARC Innovations relies on notification from the Authority to confirm if any ATH has had their approval revoked.

Audit outcome

Compliant

4.3. Metering Installation Design & Accuracy (Clause 4(1) of Schedule 10.7)

Code reference

Clause 4(1) of Schedule 10.7

Code related audit information

The MEP must ensure:

- that the sum of the measured error and uncertainty does not exceed the maximum permitted error set out in Table 1 of Schedule 10.1 for the category of the metering installation
- the design of the metering installation (including data storage device and interrogation system) will ensure the sum of the measured error and the smallest possible increment of the energy value of the raw meter data does not exceed the maximum permitted error set out in Table 1 of Schedule 10.1 for the category of installation
- the metering installation complies with the design report and the requirements of Part 10.

Audit observation

I checked the processes used by ARC Innovations to ensure compliance with the design and with the error thresholds stipulated in Table 1. I also checked the certification records for 15 metering installations.

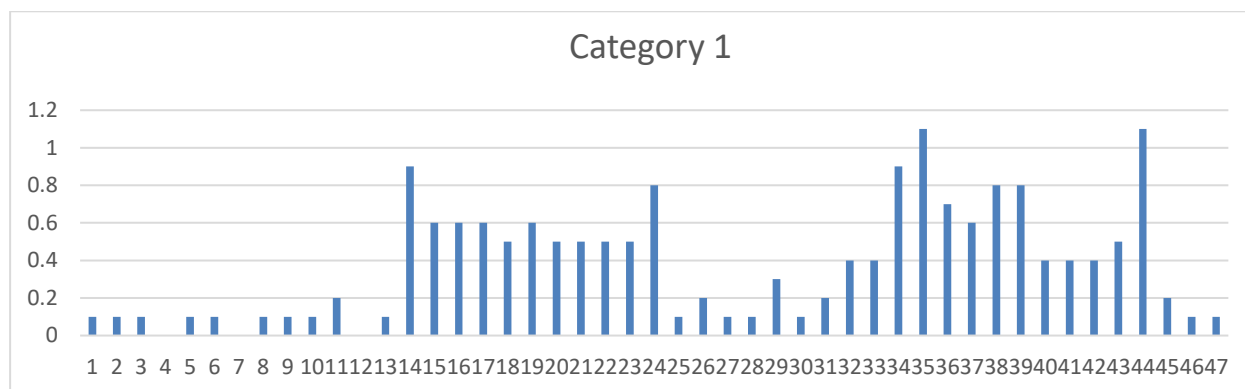
Audit commentary

The design report reference was recorded in all 15 certification reports.

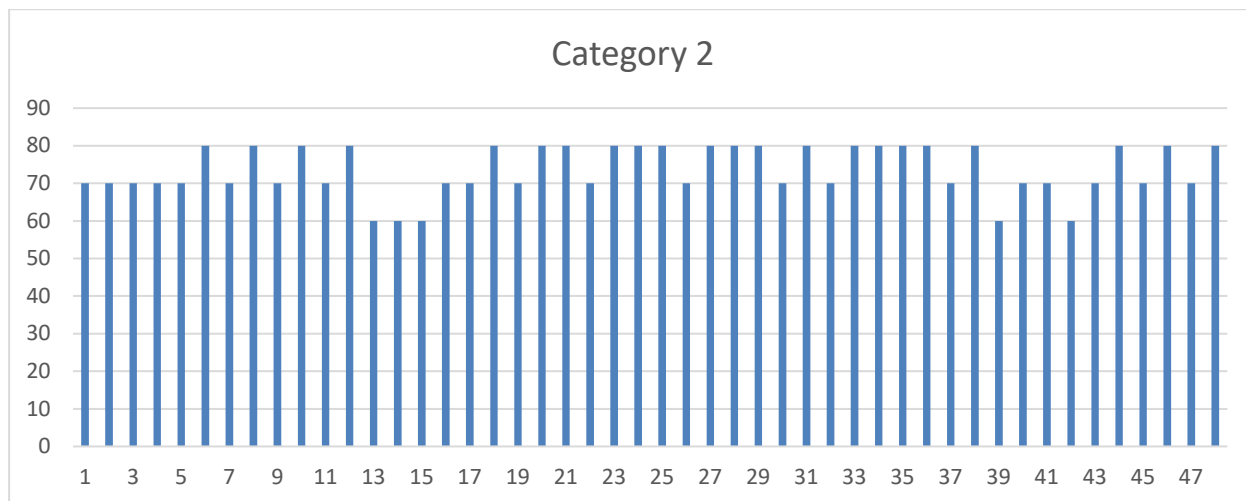
ARC Innovations has only had Category 1 metering installations certified since the last audit. All metering installations have the appropriate class of meter installed.

I checked that the interval data has the appropriate number of decimal places in the file. The HHR data files only contain one decimal place so the smallest kWh increment is 0.1 kWh. The pulse rate is 200 pulses per 0.1 kWh, so once the controller (data storage device) has received 200 pulses in its accumulator, the 0.1 kWh is transferred to the registers. If the end of an interval is reached and the accumulator has only received 190 pulses, the consumption associated with these pulses is apportioned to the next interval. There will be very few HHR intervals where the consumption is accurate to within 2.5% (the accuracy threshold for Category 1 and Category 1 installations).

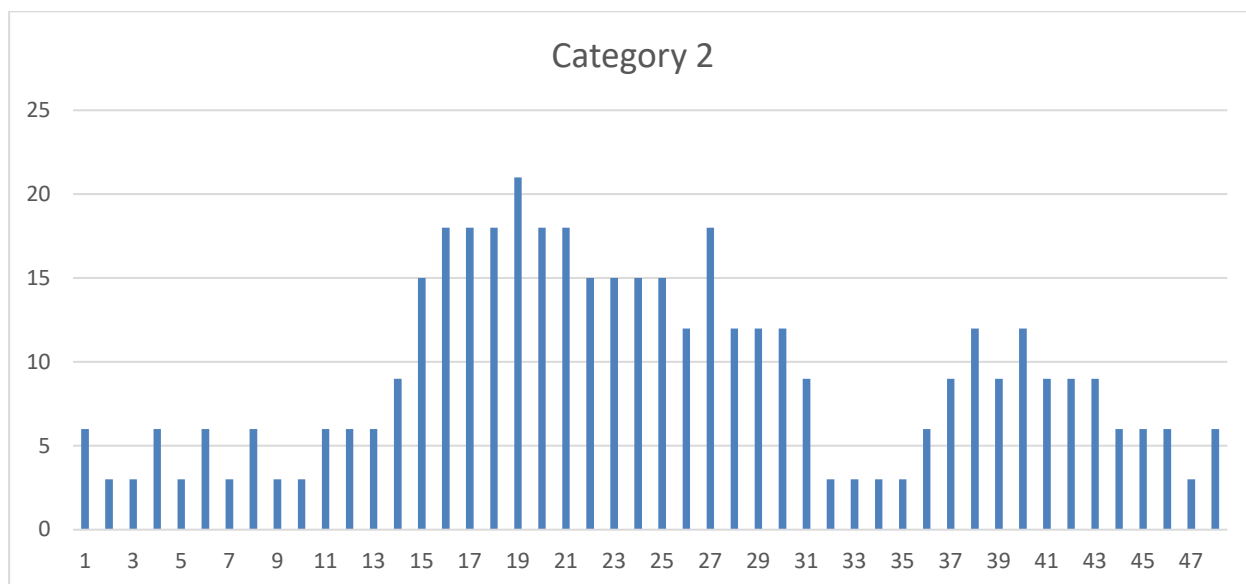
The graph below shows a Category 1 metering installation and it's likely that intervals 4, 7 and 12 have consumption below the 0.1 threshold so this is not recorded. It's unlikely that the actual consumption for the other intervals up to interval 11 are all exactly 0.1 kWh. For the lower consuming intervals, if it's assumed the consumption is flat and the average is 0.078 kWh per interval (it's reasonable to assume a flat base load between midnight and 6.30am) then some intervals are recording high by 22% and others are low by 100%.



The graph below shows a Category 2 metering installation for a pump, which appears to be running continuously and will therefore be a flat load because it's a motor. The installation has a compensation factor of 100, so each interval has multiples of 10 (100×0.1). It is likely this is a flat load of 74 kWh per interval, but many are recorded as 70 or 80, which is an error of between 5.4% and 8.0%.



The example below is also Category 2 and has a compensation factor of 30, so each interval records multiples of 3 kWh. As consumption increases, the percentage error decreases, so if it's assumed that intervals 16 to 21 should all be 18.5 kWh (the average of these intervals) then the percentage error between 2.4% and 2.8%. However, the average for intervals 1 to 11 (which appear to be base load) have an average of 4.36 kWh, therefore the error could be between 31% and 38% per interval.



Even if my assumptions are not entirely correct, there will be a large number of HHR intervals for most ICPs where error is more than 2.5%.

Approximately 100,000 installations are certified as HHR and 16,692 are settled as HHR. These installations are not designed to provide accurate HHR data and should not be certified as HHR. The information in this section leads to an inevitable conclusion, that these installations are not fit for purpose, because their purpose is to provide accurate HHR data in compliance with the Code and they do not meet this purpose. Therefore, in accordance with Clause 20, certification is cancelled.

The kWh for any given day or month will be within the 2.5% accuracy threshold, but the variance between intervals has an impact on retailers because prices differ per half hour. There are some customers of some retailers that are invoiced based on half hour spot prices; these customers will be receiving inaccurate invoices.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 4.3 With: Clause 4(1) of Schedule 10.7 From: 01-Nov-14 To: 08-Mar-20	The design of the metering installation (including data storage device and interrogation system) does not ensure the sum of the measured error and the smallest possible increment of the energy value of the raw meter data does not exceed 2.5%. Potential impact: High Actual impact: High Audit history: None Controls: None Breach risk rating: 12		
Audit risk rating	Rationale for audit risk rating		
High	The design does not comply with the Code and there does not appear to be processes in place to identify this sort of issue. There is a moderate impact on settlement accuracy because HHR intervals are not accurate. The impact on other participants is high, because cancellation of certification causes a major problem for HHR only traders. 6,650 ICPs are with HHR only traders.		
Actions taken to resolve the issue		Completion date	Remedial action status

<p>VM was surprised with the above findings, given the meters were approved for HHR certification in 2014 and have been found to be compliant in successive audits. VM have self breached to the Authority to get their understanding and decision on this matter.</p> <p>VM disputes the finding that there are no processes in place to identify this sort of issue.</p> <p>VM followed the required steps prior to certifying these meter types as HHR.</p> <ul style="list-style-type: none"> ○ The type test reports from an IANZ certified laboratory indicated we have <u>'Complied' with the requirements.</u> ○ The material change report from an Authority approved auditor has also indicated we have <u>'Complied' with the requirements.</u> ○ The Authority granted exemption to allow ATHs to change certification from NHH to HHR. This exemption was Gazetted 28/08/2014. ○ Arc has undergone annual audits by the Authority since 2014 and has complied each time on this issue (5 years). ○ Last year we raised a self-breach for this issue around our Cat 2 meters as it was identified that when the single decimal place was multiplied by 100 (500/5 CTs), errors occur. The Authority decided to close this alleged breach, citing 'negligible impact'. Any link to Cat 1 metering suffering from the same issue was not identified by VM or any other participant. <p>We believe this issue should not have a significant impact from a customer or market settlement perspective. Any inaccuracy of half hourly intervals identified in this audit would be greatest at low consumption and improve as consumption rises.</p> <p>The total energy consumption measured is not impacted. The issue only impacts which interval the energy consumption is reported in. For context, 0.1kWh of energy equates to approximately \$0.03 cents</p>	Ongoing	Identified
<p>Preventative actions taken to ensure no further issues will occur</p>	<p>Completion date</p>	
<p>VM began displacing Arc metering with EDM smart meters two years ago and will launch a full programme this year to displace all remaining Arc metering.</p>	Ongoing	

4.4. Subtractive Metering (Clause 4(2)(a) of Schedule 10.7)

Code reference

Clause 4(2)(a) of Schedule 10.7

Code related audit information

For metering installations for ICPs that are not also NSPs, the MEP must ensure that the metering installation does not use subtraction to determine submission information used for the purposes of Part 15.

Audit observation

I asked ARC Innovations to confirm whether subtraction was used for any metering installations where they were the MEP.

Audit commentary

ARC Innovations does not have any metering installations where subtractive metering is used.

Audit outcome

Compliant

4.5. HHR Metering (Clause 4(2)(b) of Schedule 10.7)

Code reference

Clause 4(2)(b) of Schedule 10.7

Code related audit information

For metering installations for ICPs that are not also NSPs, the MEP must ensure that all category 3 or higher metering installations must be half-hour metering installations.

Audit observation

I checked ARC Innovations' list file to confirm compliance with this requirement.

Audit commentary

I checked ARC Innovations' list file and I confirm that all metering installations are Category 1 or Category 2.

Audit outcome

Compliant

4.6. NSP Metering (Clause 4(3) of Schedule 10.7)

Code reference

Clause 4(3) of Schedule 10.7

Code related audit information

The MEP must ensure that the metering installation for each NSP that is not connected to the grid does not use subtraction to determine submission information used for the purposes of Part 15 and is a half-hour metering installation.

Audit observation

I checked if ARC Innovations is responsible for any NSP metering.

Audit commentary

ARC Innovations is not responsible for metering at NSPs.

Audit outcome

Compliant

4.7. Responsibility for Metering Installations (Clause 10.26(10))

Code reference

Clause 10.26(10)

Code related audit information

The MEP must ensure that each point of connection to the grid for which there is a metering installation that it is responsible for has a half hour metering installation.

Audit observation

ARC Innovations is not responsible for any grid metering.

Audit commentary

ARC Innovations is not responsible for any grid metering.

Audit outcome

Compliant

4.8. Suitability of Metering Installations (Clause 4(4) of Schedule 10.7)

Code reference

Clause 4(4) of Schedule 10.7

Code related audit information

The MEP must, for each metering installation for which it is responsible, ensure that it is appropriate having regard to the physical and electrical characteristics of the POC.

Audit observation

I asked ARC Innovations to provide details of how they ensure the suitability of metering installations.

Audit commentary

The documentation containing the design reports also has instructions to ensure the enclosures are suitable.

Audit outcome

Compliant

4.9. Installation & Modification of Metering Installations (Clauses 10.34(2), (2A) and (3))

Code reference

Clauses 10.34(2), (2A) and (3)

Code related audit information

If a metering installation is proposed to be installed or modified at a POC, other than a POC to the grid, the MEP must consult with and use its best endeavours, to agree with the distributor and the trader for that POC, before the design is finalised, on the metering installations:

- *required functionality*
- *terms of use*
- *required interface format*
- *integration of the ripple receiver and the meter*
- *functionality for controllable load.*

Each participant involved in the consultations must use its best endeavours to reach agreement and act reasonably and in good faith.

Audit observation

ARC Innovations has provided copies of the design reports to all distributors and traders in order to achieve compliance with this requirement.

Audit commentary

ARC Innovations has provided copies of the design reports to all distributors and traders in order to achieve compliance with this requirement. The documentation was checked during previous audits and no further correspondence has occurred.

Audit outcome

Compliant

4.10. Changes to Registry Records (Clause 3 of Schedule 11.4)

Code reference

Clause 3 of Schedule 11.4

Code related audit information

The MEP must advise the registry of the registry metering records or any change to the registry metering records for a metering installation for which it is responsible, no later than 10 business days following:

- a) *the electrical connection of an ICP that is not also an NSP*
- b) *any subsequent change in any matter covered by the metering records.*

Audit observation

I checked the event detail report for the period 01/03/19 to 20/01/20 to evaluate the timeliness of registry updates.

Audit commentary

ARCS

The table below shows that there were two new connections. Registry updates were late for both ICPs due to late nomination by the trader.

There were 164,071 updates to registry records. 163,698 of these occurred in August 2019. The August changes appear to be inadvertent updates to the certification expiry date, which were then corrected a few days later. I've excluded the August updates and I've identified 366 registry updates.

Event	Audit	Total ICPs	ICPs Notified Within 10 Days	ICPs Notified Greater Than 10 Days	Average Notification Days	Percentage Compliant
New Connection	Jan 2020	2	0	2	38	0%
Updates	Jan 2020	366	360	6	4	98%

ARCM

There were no new connections for ARCM. 35 registry updates occurred, and the results are shown in the table below.

Event	Audit	Total ICPs	ICPs Notified Within 10 Days	ICPs Notified Greater Than 10 Days	Average Notification Days	Percentage Compliant
New Connection	Jan 2020	0	N/A	N/A	N/A	N/A
Updates	Jan 2020	35	6	29	1,289	21%

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 4.10 With: Clause 3 of Schedule 11.4 From: 01-Mar-19 To: 20-Jan-20	Some records updated on the registry later than 10 business days. Potential impact: Low Actual impact: Low Audit history: Multiple times Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	I have recorded the controls as moderate in this area because they reduce risk most of the time but there is still room for improvement. The impact on settlement and participants is minor; therefore, the audit risk rating is low.		
Actions taken to resolve the issue		Completion date	Remedial action status
The ARCM updates shown above are backdated corrections, hence the large average notification days.		In place	Identified

Preventative actions taken to ensure no further issues will occur	Completion date	
The 10-business day delay is a factor of back dating corrections and not due to the MEP updating late. VM does not install Arc legacy metering under any circumstances and has not done so for a couple of years.	In place	

4.11. Metering Infrastructure (Clause 10.39(1))

Code reference

Clause 10.39(1)

Code related audit information

The MEP must ensure that for each metering installation:

- *an appropriately designed metering infrastructure is in place*
- *each metering component is compatible with, and will not interfere with any other component in the installation*
- *collectively, all metering components integrate to provide a functioning system*
- *each metering installation is correctly and accurately integrated within the associated metering infrastructure.*

Audit observation

ARC Innovations metering infrastructure was examined as part of this audit to confirm compliance.

Audit commentary

ARC Innovations metering infrastructure was examined and as recorded in **section 4.3**; I have concluded that the data storage devices are not compliant. This clause relates to the ability for the system to function in such a way that data collection occurs without issue. I've confirmed that this part of the operation is compliant.

Audit outcome

Compliant

4.12. Responsibility for Metering at ICP (Clause 10.23A)

Code reference

Clause 10.23A

Code related audit information

If a metering installation at an ICP is to be decommissioned, but the ICP is not being decommissioned, the metering equipment provider that is responsible for decommissioning the metering installation must—

(a) if the metering equipment provider is responsible for interrogating the metering installation—

(i) arrange for a final interrogation to take place before the metering installation is decommissioned; and

(ii) provide the raw meter data from the interrogation to the trader that is recorded in the registry as being responsible for the ICP; or

(b) if another participant is responsible for interrogating the metering installation, advise the other participant not less than three business days before the decommissioning—

(i) of the date and time of the decommissioning; and

(ii) that the participant must carry out a final interrogation.

(2) To avoid doubt, if a metering installation at an ICP is to be decommissioned because the ICP is being decommissioned—

(a) the metering equipment provider is not responsible for arranging a final interrogation of the metering installation; and

(b) the trader that is recorded in the registry as being responsible for the ICP must arrange for a final interrogation of the metering installation under clause 11.18(3).

Audit observation

I checked whether ARC Innovations was the MEP at any decommissioned metering installations and whether notification had been provided to relevant traders.

Audit commentary

There were no examples of decommissioned metering installations where the ICP was not decommissioned.

Audit outcome

Compliant

4.13. Measuring Transformer Burden and Compensation Requirements (Clause 31(4) and (5) of Schedule 10.7)

Code reference

Clause 31(4) and (5) of Schedule 10.7

Code related audit information

The MEP must, before approving the addition of, or change to, the burden or compensation factor of a measuring transformer in a metering installation, consult with the ATH who certified the metering installation.

If the MEP approves the addition of, or change to, the burden or compensation factor, it must ensure the metering installation is recertified by an ATH before the addition or change becomes effective.

Audit observation

I asked ARC Innovations whether they had approved any burden changes during the audit period.

Audit commentary

There have not been any examples of this occurring during the audit period.

Audit outcome

Compliant

4.14. Changes to Software ROM or Firmware (Clause 39(1) and 39(2) of Schedule 10.7)

Code reference

Clause 39(1) and 39(2) of Schedule 10.7

Code related audit information

The MEP must, if it proposes to change the software, ROM or firmware of a data storage device installed in a metering installation, ensure that, before the change is carried out, an approved test laboratory:

- *tests and confirms that the integrity of the measurement and logging of the data storage device would be unaffected*
- *documents the methodology and conditions necessary to implement the change*
- *advises the ATH that certified the metering installation of any change that might affect the accuracy of the data storage device.*

The MEP must, when implementing a change to the software, ROM or firmware of a data storage device installed in a metering installation:

- *carry out the change in accordance with the methodology and conditions identified by the approved test laboratory under clause 39(1)(b)*
- *keep a list of the data storage devices that were changed*
- *update the metering records for each installation affected with the details of the change and the methodology used.*

Audit observation

I checked if there any examples of changes in accordance with these clauses.

Audit commentary

ARC Innovations advised that there were no firmware or software changes during the audit period.

Audit outcome

Compliant

4.15. Temporary Energization (Clause 10.28(6))

Code reference

Clause 10.28(6)

Code related audit information

An MEP must not request the temporary energisation of a new POC unless authorised to do so by the reconciliation participant responsible for that POC and has an arrangement with that reconciliation participant to provide metering services.

Audit observation

I checked examples of insufficient load certification to determine whether there were any examples of temporary energisation for the purposes of testing.

Audit commentary

I checked examples of insufficient load certification to determine whether there were any examples of temporary energisation for the purposes of testing. None were identified.

Audit outcome

Compliant

5. METERING RECORDS

5.1. Accurate and Complete Records (Clause 4(1)(a) and (b) of Schedule 10.6, and Table 1, Schedule 11.4)

Code reference

Clause 4(1)(a) and (b) of Schedule 10.6, and Table 1, Schedule 11.4

Code related audit information

The MEP must, for each metering installation for which it is responsible, keep accurate and complete records of the attributes set out in Table 1 of Schedule 11.4. These include:

- a) the certification expiry date of each metering component in the metering installation*
- b) all equipment used in relation to the metering installation, including serial numbers and details of the equipment's manufacturer*
- c) the manufacturer's or (if different) most recent test certificate for each metering component in the metering installation*
- d) the metering installation category and any metering installations certified at a lower category*
- e) all certification reports and calibration reports showing dates tested, tests carried out, and test results for all metering components in the metering installation*
- f) the contractor who installed each metering component in the metering installation*
- g) the certification sticker, or equivalent details, for each metering component that is certified under Schedule 10.8 in the metering installation:*
- h) any variations or use of the 'alternate certification' process*
- i) seal identification information*
- j) any applicable compensation factors*
- k) the owner of each metering component within the metering installation*
- l) any applications installed within each metering component*
- m) the signed inspection report confirming that the metering installation complies with the requirements of Part 10.*

Audit observation

I checked certification records for 15 metering installations to evaluate compliance with this clause.

Audit commentary

Metering installation certification reports were provided for all 15 installations. The certification reports contained some missing fields, as follows:

ICP	ATH	Category	Data missing
0000029754CH9E8	VEMS	1	HHR/NHH, Max interrogation cycle, table 3 test results
0005079268RN555	Wells	1	HHR/NHH, Max interrogation cycle, table 3 test results
0005178851RN33A	Wells	1	HHR/NHH, Max interrogation cycle, table 3 test results
0005297060RN023	Wells	1	HHR/NHH, Max interrogation cycle, table 3 test results
All ICPs	Delta, Wells, VEMS	1 and 2	Certification validity period for components, expiry date for components, control device certification details.

ARC Innovations has a standard metering installation certification report, which is used by all ATHs. This report is missing some fields required by the Code; however, the fields are contained in the database,

which forms part of the certification record. I recommend the certification reports are changed to include the following details:

- certification validity period for components,
- expiry date for components, or clarification that this is the same as the installation expiry date, and
- clarification that the “controller” certification includes the control device certification.

Clause	Description	Audited party comment	Remedial action
Clause 4(1)(a) and (b) of Schedule 10.6, and Table 1, Schedule 11.4	Change certification reports to provide better clarity of expiry dates and validity periods.	<p>Arc Innovations work is captured on PDA and stored directly in Arc’s system. Certificates are produced as requested from this system.</p> <p>A major upgrade was completed around two years ago following a recommendation from a previous audit. The new certificates fully meet the requirements. The upgrade affects meter data entered into the system from the release forward. Certs produced from information stored earlier than the release are still on the old certs.</p>	Cleared

Of the four ICPs certified without test results being recorded, it appears that ICP 0000029754CH9E8 was required to be recertified but the other three ICPs were not required to be recertified and weren’t recertified, therefore the reports are not correct. ARC Innovations will need to change the certification dates back to the original dates.

Audit outcome

Non-compliant

Non-compliance	Description
<p>Audit Ref: 5.1</p> <p>With: Clause 4(1)(b)(i)&(v) of Schedule 10.6</p> <p>From: 01-Jul-18</p> <p>To: 31-Mar-19</p>	<p>Missing fields in one certification report.</p> <p>3 incorrect certification reports.</p> <p>Potential impact: Medium</p> <p>Actual impact: Low</p> <p>Audit history: None</p> <p>Controls: Moderate</p> <p>Breach risk rating: 2</p>
Audit risk rating	Rationale for audit risk rating
Low	<p>I have recorded the controls as moderate because there is room for improvement.</p> <p>There is a minor impact on other participants; therefore, the audit risk rating is low.</p>

Actions taken to resolve the issue	Completion date	Remedial action status
Certification of the above ICPs will be cancelled. We are investigating why these ICPs were showing as re-certified when they did not need to be and actually were not.	30/05/2020	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
Action depends on the outcome of the above investigation.	30/05/2020	

5.2. Inspection Reports (Clause 4(2) of Schedule 10.6)

Code reference

Clause 4(2) of Schedule 10.6

Code related audit information

The MEP must, within 10 business days of receiving a request from a participant for a signed inspection report prepared under clause 44 of Schedule 10.7, make a copy of the report available to the participant.

Audit observation

I asked ARC Innovations whether any requests had been made for copies of inspection reports.

Audit commentary

ARC Innovations has not been requested to supply any inspection reports, but these are available and can be supplied on request.

Audit outcome

Compliant

5.3. Retention of Metering Records (Clause 4(3) of Schedule 10.6)

Code reference

Clause 4(3) of Schedule 10.6

Code related audit information

The MEP must keep metering installation records for 48 months after any metering component is removed, or any metering installation is decommissioned.

Audit observation

I checked some metering records from 2016 to confirm compliance.

Audit commentary

ARC Innovations keeps records indefinitely and intends to keep other records for at least 48 months.

Audit outcome

Compliant

5.4. Provision of Records to ATH (Clause 6 Schedule 10.6)

Code reference

Clause 6 Schedule 10.6

Code related audit information

If the MEP contracts with an ATH to recertify a metering installation and the ATH did not previously certify the metering installation, the MEP must provide the ATH with a copy of all relevant metering records not later than 10 business days after the contract comes into effect.

Audit observation

ARC Innovations has provided information to ATH's in the past and this may occur in future. There are no current examples to examine.

Audit commentary

ARC Innovations has provided information to ATH's in the past and this may occur in future. There are no current examples to examine. ARC Innovations demonstrated that all records are retained, and these are forwarded to the ATH as required.

Audit outcome

Compliant

6. MAINTENANCE OF REGISTRY INFORMATION

6.1. MEP Response to Switch Notification (Clause 1(1) of Schedule 11.4)

Code reference

Clause 1(1) of Schedule 11.4

Code related audit information

Within 10 business days of being advised by the registry that it is the gaining MEP for the metering installation for the ICP, the MEP must enter into an arrangement with the trader and advise the registry it accepts responsibility for the ICP and of the proposed date on which it will assume responsibility.

Audit observation

I checked the switch breach history detail report to confirm whether all responses were within 10 business days.

Audit commentary

No late MN files were identified.

Audit outcome

Compliant

6.2. Provision of Registry Information (Clause 7 (1), (2) and (3) of Schedule 11.4)

Code reference

Clause 7 (1), (2) and (3) of Schedule 11.4

Code related audit information

The MEP must provide the information indicated as being 'required' in Table 1 of clause 7 of Schedule 11.4 to the registry, in the prescribed form for each metering installation for which the MEP is responsible.

From 1 April 2015, a MEP is required to ensure that all the registry metering records of its category 1 metering installations are complete, accurate, not misleading or deceptive, and not likely to mislead or deceive.

The information the MEP provides to the registry must derive from the metering equipment provider's records or the metering records contained within the current trader's system.

Audit observation

I checked the list file for 100% of records to identify discrepancies.

Audit commentary

Analysis of the list file and an event detail report for all ARC Innovations ICPs found a number of issues. The table below shows the issues found and has a comparison to the previous audit results.

Quantity of ICPs			Issue
2020	2019	2018	
1	1	1	Cat 2 with multiplier over 100
0	0	0	Cat 3 and above without HHR profile or HHR meter or HHR installation
0	0	0	Cat 1 over 15 years Cat 2 over 10 years or over 15 if cert before 29/8/2013 Cat 3 over 10 years Cat 4 over 5 years Cat 5 over 3 years
0	0	0	Invalid certification date
2	0	0	Compensation factor on Cat 1 Installation
0	7	9	CT on Cat 1 Check component type of "C" on Cat 1
0	0	0	HHR profile and submission type and meter or installation type is not HHR
1	36	1	Meter data missing
282	204	226	Any compensation factor that is not: 20,30,40,50,60,80,100,120,160,200,240,400 All are Category 1 with a compensation factor of 3. Two were certified after 29/08/13.
0	0	0	Over Cat 1 with No CTs
1,386	1,178	1,327	Control device not populated. All CN, NC, D, N should have control device unless they are AMI
4			Night without Day
193			UN only with a control device
2			IN24
14,713			Maximum interrogation cycle of 1
1,540			D17 N7 – should be D14 N10
2			D16 N8 – should be D14 N10
21			WD14 without a night

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 6.2</p> <p>With: Clause 7 (1), (2) and (3) of Schedule 11.4</p> <p>From: 01-Mar-19</p> <p>To: 20-Jan-20</p>	<p>Some registry records incomplete or incorrect.</p> <p>Potential impact: Medium</p> <p>Actual impact: Low</p> <p>Audit history: Multiple times</p> <p>Controls: Strong</p> <p>Breach risk rating: 1</p>		
Audit risk rating	Rationale for audit risk rating		
Low	<p>I have recorded the controls as strong in this area. The number of discrepancies is very small.</p> <p>Very few of the discrepancies have an impact on participants, customers or settlement. The only relevant ones in this regard are tariff related and there were only a small number. The audit risk rating is low.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>VM believes the 14,713 ICPs with maximum interrogation cycle of one day is correct and is taken directly from the type test report for the G2 meter type. These are interrogated twice daily and have sufficient memory for 40 days. VM disputes this as a non-compliance.</p> <p>The control device of 1,386 metering installations have not been populated. The majority are old legacy meters in the Scanpower Network. These were previous interim certified installations that were gifted to Arc without the control device information. We have since retrieved some LCD information from Scanpower for some sites but have no information on these ones.</p>		Ongoing	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
We continue to address these issues, and where possible will update the registry.		Ongoing	

6.3. Correction of Errors in Registry (Clause 6 of Schedule 11.4)

Code reference

Clause 6 of Schedule 11.4

Code related audit information

By 0900 hours on the 13th business day of each reconciliation period, the MEP must obtain from the registry:

- *a list of ICPs for the metering installations the MEP is responsible for*
- *the registry metering records for each ICP on that list.*

No later than five business days following collection of data from the registry, the MEP must compare the information obtained from the registry with the MEP's own records.

Within five business days of becoming aware of any discrepancy between the MEP's records and the information obtained from the registry, the MEP must correct the records that are in error and advise the registry of any necessary changes to the registry metering records.

Audit observation

I conducted a walkthrough of the validation processes to confirm compliance. I checked all records in the event detail report to confirm whether the timeliness requirements were being met.

Audit commentary

There is now a complete validation conducted monthly for both codes to compare registry data against data in both systems. The results were demonstrated during the audit. Remedial actions commence as soon as the report is run.

Audit outcome

Compliant

6.4. Cancellation of Certification (Clause 20 of Schedule 10.7)

Code reference

Clause 20 of Schedule 10.7

Code related audit information

The certification of a metering installation is automatically cancelled on the date on which one of the following events takes place:

- a) *the metering installation is modified otherwise than under sub clause 19(3) or 19(6)*
- b) *the metering installation is classed as outside the applicable accuracy tolerances set out in Table 1 of Schedule 10.1, defective or not fit for purpose under this Part or any audit*
- c) *an ATH advises the metering equipment provider responsible for the metering installation of a reference standard or working standard used to certify the metering installation not being compliant with this Part at the time it was used to certify the metering installation, or the failure of a group of meters in the statistical sampling recertification process for the metering installation, or the failure of a certification test for the metering installation*
- d) *the manufacturer of a metering component in the metering installation determines that the metering component does not comply with the standards to which the metering component was tested*
- e) *an inspection of the metering installation, that is required under this Part, is not carried out in accordance with the relevant clauses of this Part*

- f) if the metering installation has been determined to be a lower category under clause 6 and the maximum current conveyed through the metering installation at any time exceeds the current rating of its metering installation category as set out in Table 1 of Schedule 10.1
- g) the metering installation is certified under clause 14 and sufficient load is available for full certification testing and has not been retested under clause 14(4)
- h) a control device in the metering installation certification is, and remains for a period of at least 10 business days, bridged out under clause 35(1)
- i) the metering equipment provider responsible for the metering installation is advised by an ATH under clause 48(6)(b) that a seal has been removed or broken and the accuracy and continued integrity of the metering installation has been affected.

A metering equipment provider must, within 10 business days of becoming aware that one of the events above has occurred in relation to a metering installation for which it is responsible, update the metering installation's certification expiry date in the registry.

Audit observation

I checked for examples of all of the points listed above, and checked whether certification had been cancelled, and whether the registry had been updated within 10 business days.

Audit commentary

I checked all of the points mentioned above and found the following.

Quantity	Issue leading to cancellation	Registry updated?
2	3 phase installation with single phase meter and compensation factor of 3.	No
6	Category 2 installations not inspected at 10 years.	No
28	Time errors of more than 60 seconds for more than 20 days in a month.	No
31	Time errors more than 1,000 seconds (900 seconds is one half hour interval).	No
16,692	HHR settled installations where the HHR data is inaccurate per interval by more than 2.5% due to the data storage devices only having one decimal place. Note, 2,706 of these installations are also included in the 14,430 mentioned below.	No
14,430	Generation 2 data storage devices that failed type test.	No

There are a large number of time errors recorded during each interrogation. ARC Innovations has processes in place to issue service orders to resolve communications issues or to replace metering, but there are still some outstanding, where the error will affect the accuracy of settlement information sent to retailers. I've determined that where there are more than 20 time errors in a month or the time error is greater than one trading period, the installation is not fit for purpose and certification should be cancelled. The quantities above are based on the four largest retailers, there are likely to be a small number more than I've recorded.

I checked that the interval data has the appropriate number of decimal places in the file. The HHR data files only contain one decimal place so the smallest kWh increment is 0.1 kWh. The pulse rate is 200 pulses per 0.1 kWh, so once the controller (data storage device) has received 200 pulses in its

accumulator, the 0.1 kWh is transferred to the registers. If the end of an interval is reached and the accumulator has only received 190 pulses, the consumption associated with these pulses is apportioned to the next interval. There will be very few HHR intervals where the consumption is accurate to within 2.5% (the accuracy threshold for Category 1 and Category 1 installations). This means these installations are all outside the applicable accuracy tolerances of Table 1 if they are settled as HHR. Approximately 100,000 installations are certified as HHR and 16,692 are settled as HHR. The installations settled as NHH can be changed to NHH certified in accordance with Clause 8A of Schedule 10.7, and this will not affect retailers. The installations settled as HHR are inaccurate and certification will need to be cancelled.

The Generation 2 data storage devices do not appear to comply with the Code for other reasons apart from having insufficient decimal places to ensure accuracy. The type test report states that the "Data Logger retains all data pertaining to energy and events for a minimum period of the interrogation cycle plus five days". The interrogation cycle is one day. Therefore the type test has only confirmed that data will be retained for six days, but Clause 5(b)(xii) of Schedule 10.7 requires "that the data storage device has data loss protection providing a continued clock and memory operation for a continuous period of at least 15 days when the power supply to the data storage device is lost". The type test report also has the following statement regarding clock and memory operation when supply is lost:

(9)	Data logger is designed to ensure continued clock and memory operation when power supply is lost		P
	When supply is restored, time and date remain within the site design specification	Remark 1	
	Time variation	1.5 seconds per day	

It's not showing as a "pass" and "Remark 1" states:

REMARKS

Remark 1. To be determined by the approved test house certifying the installation.

These devices do not have valid certification because they failed the type test. Certification is therefore cancelled.

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 6.4</p> <p>With: Clause 20 of Schedule 10.7</p> <p>From: 01-Mar-19</p> <p>To: 09-Mar-20</p>	<p>Certification cancelled and registry not updated for:</p> <p>2x 3 phase installation with single phase meter and compensation factor of 3</p> <p>6x Category 2 installations not inspected at 10 years</p> <p>28x Time errors of more than 60 seconds for more than 20 days in a month</p> <p>31x Time errors more than 1,000 seconds (900 seconds is one half hour interval)</p> <p>16,692 HHR settled installations where the HHR data is inaccurate per interval by more than 2.5% due to the data storage devices only having one decimal place.</p> <p>14,633 Generation 2 installations where the data storage devices failed type testing.</p> <p>Potential impact: High</p> <p>Actual impact: High</p> <p>Audit history: Multiple times</p> <p>Controls: Weak</p> <p>Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
<p>High</p>	<p>I have recorded the controls as weak in this area because in most cases, the registry is not populated with the correct expiry date when certification is cancelled.</p> <p>Most of the issues found have a large impact on other participants and on settlement. The audit risk rating is high.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>The certification for two larger groups totalling over 30,000 ICPs have not been cancelled as we only learned of these issues during the audit. We have self breached on these and are awaiting response from the Authority on next steps. If the Authority informs us that cancellation is required, we will comply.</p> <p>The certification for 2x 3 phase installations with single phase meter and compensation factor of 3 have been cancelled.</p> <p>The cancellation of certification for 6x Category 2 installations that have not been inspected for 10 years is under way. The certification of four more Cat 2 ICPs certified for 15 years will be cancelled prior to year 10.</p> <p>The cancellation of certification is under way for 28x installations with time errors of more than 60 seconds for more than 20 days in a month, and 31x installations with time errors of more than 1,000 seconds (900 seconds is one half hour interval). .</p>		<p>30/05/2020 (excluding large groups which are under investigation).</p>	<p>Identified</p>
Preventative actions taken to ensure no further issues will occur		Completion date	

We recently improved our time sync process to include more robust scrutiny around meters that drift consistently. This will be reviewed by our tech team and the meters will be upgraded, as necessary.	In place	
---	----------	--

6.5. Registry Metering Records (Clause 11.8A)

Code reference

Clause 11.8A

Code related audit information

The MEP must provide the registry with the required metering information for each metering installation the MEP is responsible for and update the registry metering records in accordance with Schedule 11.4.

Audit observation

This clause refers to schedule 11.4 which is discussed in **section 6.2**, apart from the requirement to provide information in the “prescribed form”. I checked for examples of ARC Innovations not using the prescribed form.

Audit commentary

This clause refers to schedule 11.4 which is discussed in **section 6.2**, apart from the requirement to provide information in the “prescribed form”. I checked for examples of ARC Innovations not using the prescribed form and did not find any exceptions.

Audit outcome

Compliant

7. CERTIFICATION OF METERING INSTALLATIONS

7.1. Certification and Maintenance (Clause 10.38 (a), clause 1 and clause 15 of Schedule 10.7)

Code reference

Clause 10.38 (a), clause 1 and clause 15 of Schedule 10.7

Code related audit information

The MEP must obtain and maintain certification for all installations and metering components for which it is responsible. The MEP must ensure it:

- *performs regular maintenance, battery replacement, repair/replacement of components of the metering installations*
- *updates the metering records at the time of the maintenance*
- *has a recertification programme that will ensure that all installations are recertified prior to expiry.*

Audit observation

I conducted the following checks to identify metering installations with expired, cancelled or late certification:

- the registry PR255 report was checked to identify ICPs with expired certification,
- the new connections process was checked by using the event detail report, PR255 and the list file to identify ICPs where the certification was not conducted within five business days of energisation, and
- I checked ICPs where certification was cancelled to ensure the registry was updated accordingly.

Audit commentary

The registry shows 2,090 ICPs have expired certification. This is a slight improvement on the 2,198 recorded in the last audit. The table below gives a breakdown of these.

Scenario	ARCS quantity	ARCM quantity
Expired interim Category 1	0	1,942
Expired full Category 1	28	66
Expired full Category 2	54	0

As recorded in **section 6.4**, there are a large number of installations with cancelled certification.

Audit outcome

Non-compliant

Non-compliance	Description		
<p>Audit Ref: 7.1</p> <p>With: Clause 10.38 (a), clause 1 and clause 15 of Schedule 10.7</p> <p>From: 01-Mar-19</p> <p>To: 09-Mar-20</p>	<p>2,090 installations with expired certification.</p> <p>Approx. 30,000 installations with cancelled certification.</p> <p>Potential impact: High</p> <p>Actual impact: High</p> <p>Audit history: Multiple times</p> <p>Controls: Weak</p> <p>Breach risk rating: 9</p>		
Audit risk rating	Rationale for audit risk rating		
High	<p>I have recorded the controls as weak in this area because certification has been expired for a number of years for some ICPs and because some of the expired installations were fully certified at one point.</p> <p>The impact on settlement is recorded as high because of the increased likelihood of failure or inaccuracy for metering installations with expired certification, therefore the audit risk rating is high. The issues leading to cancelled certification all have an impact on settlement accuracy.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>Certifications for the larger group totalling over 30,000 ICPs have not been cancelled as we only learned of these issues during the audit. We have self breached on these and are awaiting response from the Authority on next steps. If the Authority informs us that cancellation is required, we will comply.</p> <p>We have started an investigation to identify why previously certified Cat 1 & Cat 2 metering is not re-certified prior to expiry.</p> <p>Majority of the above cases (excluding the over 30,000 ICPs) are old interim certified sites and are being managed as a separate project.</p>		30/05/2020 for investigation and corrections	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
<p>We are managing the old interim certified meters', but these are proving difficult to reach and/or upgrade.</p> <p>The above investigation will determine what steps we need to take to ensure there is no recurrence of this issue.</p>		Ongoing	

7.2. Certification Tests (Clause 10.38(b) and clause 9 of Schedule 10.6)

Code reference

Clause 10.38(b) and clause 9 of Schedule 10.6

Code related audit information

For each metering component and metering installation an MEP is responsible for, the MEP must ensure that:

- an ATH performs the appropriate certification and recertification tests
- the ATH has the appropriate scope of approval to certify and recertify the metering installation.

Audit observation

I checked the certification records for 15 metering installations to confirm compliance.

Audit commentary

All certification activities have been conducted by ARC Innovations using the Delta, VEMS and Wells ATHs. As recorded in **section 5.1**, the VEMS and Wells ATHs have not recorded test results for four metering installations. It's likely that the three Wells certification reports were produced in error and that certification has not occurred. The VEMS report is a certification report and it does not record the results of testing.

As recorded in **section 6.4**, the type test report for the Generation 2 data storage device requires the certifying ATH to confirm that when supply is restored, the time and date remain within the site design specification. The Code does not allow Class B ATHs to conduct type testing. This is a laboratory function. However, the Code does require the certifying ATH to check the type test report as part of certifying data storage devices, which can only be certified if they pass the type test. The Generation 2 data storage devices failed type testing; therefore, I have concluded that ARC Innovations has not ensured all certification tests were conducted.

(9)	Data logger is designed to ensure continued clock and memory operation when power supply is lost		P
	When supply is restored, time and date remain within the site design specification	Remark 1	
	Time variation	1.5 seconds per day	

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 7.2 With: Clause 10.38(b) From: 01-Mar-19 To: 09-Mar-20	Appropriate testing not conducted for Generation 2 data storage devices. Test results not recorded for one Category 1 installation. Potential impact: Medium Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	Rationale for audit risk rating

Low	<p>The controls are recorded as moderate. They need to be strengthened to achieve full compliance.</p> <p>The impact on settlement and participants is minor; therefore, the audit risk rating is low.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
<p>VM disputes the alleged non-compliance with this clause, given that:</p> <ul style="list-style-type: none"> Type test reports from an IANZ certified laboratory indicated we have <u>'Complied'</u>. Material change report from an Authority approved auditor indicated we have <u>'Complied'</u>. Arc has undergone annual EA audits since 2014 and has complied each time on this issue (5 years). <p>This report has identified that the initial type test report had an error, however, there was no reason at the time for Arc to question why the laboratory reported the controller as 'Compliant'. This is why we contract IANZ accredited laboratories for this work.</p> <p>On the other issue where VEMS and Wells ATHs have not recorded test results for four metering installations. We accept the finding of non-compliance and will address this issue by cancelling the certifications for, and upgrading, these meters.</p>		30/05/2020	Disputed
Preventative actions taken to ensure no further issues will occur		Completion date	
<p>VM began displacing Arc metering with EDM1 smart meters two years ago and will launch a full programme this year to displace all remaining Arc metering.</p>		Ongoing	

7.3. Active and Reactive Capability (Clause 10.37(1) and 10.37(2)(a))

Code reference

Clause 10.37(1) and 10.37(2)(a)

Code related audit information

For any category 2 or higher half-hour metering installation that is certified after 29 August 2013, the MEP must ensure that the installation has active and reactive measuring and recording capability.

Consumption only installations that is a category 3 metering installation or above must measure and separately record:

- a) import active energy*
- b) import reactive energy*
- c) export reactive energy.*

Consumption only installations that are a category 2 metering installation must measure and separately record import active energy.

All other installations must measure and separately record:

- a) import active energy
- b) export active energy
- c) import reactive energy
- d) export reactive energy.

All grid connected POCs with metering installations which are certified after 29 August 2013 should measure and separately record:

- a) import active energy
- b) export active energy
- c) import reactive energy
- d) export reactive energy

Audit observation

I checked the Generation 1 and Generation 2 meter specifications to confirm compliance.

Audit commentary

The Generation 1 Category 2 meters are not capable of measuring and recording reactive energy.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 7.3 With: Clause 10.37(1) and 10.37(2)(a) From: 01-Mar-19 To: 09-Mar-20	Generation 1 Category 2 meters not capable of measuring and recording reactive energy Potential impact: None Actual impact: None Audit history: None Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. There doesn't appear to be any impact, therefore the audit risk rating is low.		
Actions taken to resolve the issue		Completion date	Remedial action status
VM accepts this finding and is already working to displace these meters with EDML smart meters capable of complying with this clause.		30/10/2020	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	

VM began actively displacing Arc Cat 2 metering with EDMI smart meters last year and is halfway through this process. We will prioritize further upgrades this year as well as launch a full programme to displace all remaining Arc metering.	30/10/2020	
--	------------	--

7.4. Local Service Metering (Clause 10.37(2)(b))

Code reference

Clause 10.37(2)(b)

Code related audit information

The accuracy of each local service metering installation in grid substations must be within the tolerances set out in Table 1 of Schedule 10.1.

Audit observation

This clause relates to Transpower as an MEP.

Audit commentary

This clause relates to Transpower as an MEP.

Audit outcome

Not applicable

7.5. Measuring Transformer Burden (Clause 30(1) and 31(2) of Schedule 10.7)

Code reference

Clause 30(1) and 31(2) of Schedule 10.7

Code related audit information

The MEP must not permit a measuring transformer to be connected to equipment used for a purpose other than metering, unless it is not practical for the equipment to have a separate measuring transformer.

The MEP must ensure that a change to, or addition of, a measuring transformer burden or a compensation factor related to a measuring transformer is carried out only by:

- a) the ATH who most recently certified the metering installation*
- b) for a POC to the grid, by a suitably qualified person approved by both the MEP and the ATH who most recently certified the metering installation.*

Audit observation

I asked ARC Innovations if there were any examples of burden changes or the addition of non-metering equipment being connected to metering CTs.

Audit commentary

There are no examples of burden changes having occurred.

Audit outcome

Compliant

7.6. Certification as a Lower Category (Clauses 6(1)(b) and (d), and 6(2)(b) of Schedule 10.7)

Code reference

Clauses 6(1)(b) and (d), and 6(2)(b) of Schedule 10.7

Code related audit information

A category 2 or higher metering installation may be certified by an ATH at a lower category than would be indicated solely on the primary rating of the current if the MEP, based on historical metering data, reasonably believes that:

- the maximum current will at all times during the intended certification period be lower than the current setting of the protection device for the category for which the metering installation is certified, or is required to be certified by the Code; or*
- the metering installation will use less than 0.5 GWh in any 12-month period.*

If a metering installation is categorised under clause 6(1)(b), the ATH may, if it considers appropriate, and, at the MEP's request, determine the metering installation's category according to the metering installation's expected maximum current.

If a meter is certified in this manner:

- the MEP must, each month, obtain a report from the participant interrogating the metering installation, which details the maximum current from raw meter data from the metering installation by either calculation from the kVA by trading period, if available, or from a maximum current indicator if fitted in the metering installation conveyed through the point of connection for the prior month; and*
- if the MEP does not receive a report, or the report demonstrates that the maximum current conveyed through the POC was higher than permitted for the metering installation category it is certified for, then the certification for the metering installation is automatically cancelled.*

Audit observation

I checked all ICPs for examples where the CT ratio was above the threshold to confirm that protection was appropriate or that monitoring was in place.

Audit commentary

Arc Innovations has one metering installation certified to a lower category. ICP 0001104500CAB8F has 1000/5 CTs and the supply is limited by a 500A main switch, so compliance is achieved. Certification is still expired for this ICP.

Audit outcome

Compliant

7.7. Insufficient Load for Certification Tests (Clauses 14(3) and (4) of Schedule 10.7)

Code reference

Clauses 14(3) and (4) of Schedule 10.7

Code related audit information

If there is insufficient electricity conveyed through a POC to allow the ATH to complete a prevailing load test for a metering installation that is being certified as a half hour meter and the ATH certifies the metering installation the MEP must:

- *obtain and monitor raw meter data from the metering installation at least once each calendar month to determine if load during the month is sufficient for a prevailing load test to be completed:*
- *if there is sufficient load, arrange for an ATH to complete the tests (within 20 business days).*

Audit observation

I checked if there were any examples of Insufficient load certifications.

Audit commentary

There were no examples of insufficient load certification.

Audit outcome

Compliant

7.8. Insufficient Load for Certification – Cancellation of Certification (Clause 14(6) of Schedule 10.7)

Code reference

Clause 14(6) of Schedule 10.7

Code related audit information

If the tests conducted under clause 14(4) of Schedule 10.7 demonstrate that the metering installation is not within the relevant maximum permitted error:

- *the metering installation certification is automatically revoked:*
- *the certifying ATH must advise the MEP of the cancellation within one business day:*
- *the MEP must follow the procedure for handling faulty metering installations (clause 10.43 - 10.48).*

Audit observation

I checked if there were any examples of Insufficient load certifications.

Audit commentary

There were no examples of insufficient load certification.

Audit outcome

Compliant

7.9. Alternative Certification Requirements (Clauses 32(2), (3) and (4) of Schedule 10.7)

Code reference

Clauses 32(2), (3) and (4) of Schedule 10.7

Code related audit information

If an ATH cannot comply with the requirements to certify a metering installation due to measuring transformer access issues, and therefore certifies the metering installation in accordance with clause 32(1) of Schedule 10.7, the MEP must:

- *advise the market administrator, by no later than 10 business days after the date of certification of the metering installation, of the details in clause 32(2)(a) of Schedule 10.7*
- *respond, within five business days, to any requests from the market administrator for additional information*
- *ensure that all of the details are recorded in the metering installation certification report*

- take all steps to ensure that the metering installation is certified before the certification expiry date.

If the market administrator determines the ATH could have obtained access the metering installation is deemed to be defective and the MEP must follow the process of handling faults metering installations in clauses 10.43 to 10.48.

Audit observation

I checked the registry records to confirm whether alternative certification had been applied.

Audit commentary

Alternative certification has not been applied to any metering installations.

Audit outcome

Compliant

7.10. Timekeeping Requirements (Clause 23 of Schedule 10.7)

Code reference

Clause 23 of Schedule 10.7

Code related audit information

If a time keeping device that is not remotely monitored and corrected controls the switching of a meter register in a metering installation, the MEP must ensure that the time keeping device:

- has a time keeping error of not greater than an average of 2 seconds per day over a period of 12 months*
- is monitored and corrected at least once every 12 months.*

Audit observation

I checked the list files for ICPs with two or more registers (day night) and checked if the time had been checked in the last 12 months.

Audit commentary

There are 24 meters with multiple registers, that are not AMI and they have not had a time check in the last 12 months.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 7.10 With: Clause 23 of Schedule 10.7 From: 01-Mar-19 To: 09-Mar-20	24 meters with timeclocks not checked every 12 months. Potential impact: Low Actual impact: Low Audit history: None Controls: None Breach risk rating: 5
Audit risk rating	Rationale for audit risk rating

Low	<p>There isn't a process in place to check the time setting on these meters.</p> <p>The impact on settlement and participants could be minor; therefore, the audit risk rating is low.</p>		
Actions taken to resolve the issue		Completion date	Remedial action status
VM accepts this non-compliance. We are unable to correct the time clocks on these meters so will identify the 24 meters and upgrade each to AMI metering.		30/06/2020	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
VM is unable to correct the time clocks on these meters. We will upgrade the meters to AMI.		30/06/2020	

7.11. Control Device Bridged Out (Clause 35 of Schedule 10.7)

Code reference

Clause 35 of Schedule 10.7

Code related audit information

The participant must, within 10 business days of bridging out a control device or becoming aware of a control device being bridged out, notify the following parties:

- *the relevant reconciliation participant*
- *the relevant metering equipment provider.*

If the control device is used for reconciliation, the metering installation is considered defective in accordance with 10.43.

Audit observation

I checked the process for the management of bridged control devices, and I checked whether any notifications were required to other parties.

Audit commentary

There are 92 ICPs where the control device switches load for the purposes of a controlled profile.

ARC Innovations has a process for dealing with control devices which have been bridged out. If any are bridged out for more than 10 business days, they notify as required by this clause. There have not been any recent examples.

Audit outcome

Compliant

7.12. Control Device Reliability Requirements (Clause 34(5) of Schedule 10.7)

Code reference

Clause 34(5) of Schedule 10.7

Code related audit information

If the MEP is advised by an ATH that the likelihood of a control device not receiving signals would affect the accuracy or completeness of the information for the purposes of Part 15, the MEP must, within three business days inform the following parties of the ATH's determination (including all relevant details):

- a) the reconciliation participant for the POC for the metering installation*
- b) the control signal provider.*

Audit observation

I checked the steps ARC Innovations had taken to identify regions with signal propagation issues.

Audit commentary

ARC Innovations has not been advised of any areas by the ATHs.

Audit outcome

Compliant

7.13. Statistical Sampling (Clauses 16(1) and (5) of Schedule 10.7)

Code reference

Clauses 16(1) and (5) of Schedule 10.7

Code related audit information

The MEP may arrange for an ATH to recertify a group of category 1 metering installations for which the MEP is responsible using a statistical sampling process.

The MEP must update the registry in accordance with Part 11 on the advice of an ATH as to whether the group meets the recertification requirements.

Audit observation

I checked whether statistical sampling had occurred during the audit period.

Audit commentary

Statistical sampling was conducted for recertification. I checked the results and confirm compliance.

Audit outcome

Compliant

7.14. Compensation Factors (Clause 24(3) of Schedule 10.7)

Code reference

Clause 24(3) of Schedule 10.7

Code related audit information

If a compensation factor must be applied to a metering installation that is an NSP, the MEP must advise the reconciliation participant responsible for the metering installation of the compensation factor within 10 days of certification of the installation.

In all other cases the MEP must advise the registry of the compensation factor.

Audit observation

Only Category 1 metering installations were certified during the audit period.

Audit commentary

Only Category 1 metering installations were certified during the audit period.

Audit outcome

Not applicable

7.15. Metering Installations Incorporating a Meter (Clause 26(1) of Schedule 10.7)

Code reference

Clause 26(1) of Schedule 10.7

Code related audit information

The MEP must ensure that each meter in a metering installation it is responsible for is certified.

Audit observation

I checked the certification records for 15 metering installations to confirm compliance.

Audit commentary

Meters were certified for all 15 installations.

Audit outcome

Compliant

7.16. Metering Installations Incorporating a Measuring Transformer (Clause 28(1) of Schedule 10.7)

Code reference

Clause 28(1) of Schedule 10.7

Code related audit information

The MEP must ensure that each measuring transformer in a metering installation it is responsible for is certified.

Audit observation

Only Category 1 metering installations were certified during the audit period.

Audit commentary

Only Category 1 metering installations were certified during the audit period.

Audit outcome

Compliant

7.17. Metering Installations Incorporating a Data Storage Device (Clause 36(1) of Schedule 10.7)

Code reference

Clause 36(1) of Schedule 10.7

Code related audit information

The MEP must ensure that each data storage device in a metering installation it is responsible for is certified.

Audit observation

I checked the certification records for 15 metering installations to confirm compliance and I checked the type test reports for Generation 1 and Generation 2 data storage devices.

Audit commentary

All data storage devices are certified, and ARC Innovations is entitled to rely on certification reports from ATHs. As recorded in **section 4.3**, the Generation 2 devices failed type testing and should not have been certified. The ATHs are non-compliant for this and certification is cancelled, but ARC Innovations is compliant with this clause because they were supplied with certification reports by ATHs.

Audit outcome

Compliant

7.18. Notification of ATH Approval (Clause 7 (3) Schedule 10.3)

Code reference

Clause 7 (3) Schedule 10.3

Code related audit information

If the MEP is notified by the Authority that an ATH's approval has expired, been cancelled or been revised, the MEP must treat all metering installations certified by the ATH during the period where the ATH was not approved to perform the activities as being defective and follow the procedures set out in 10.43 to 10.48.

Audit observation

I checked the ATH register to confirm compliance.

Audit commentary

All relevant ATHs have appropriate approval.

Audit outcome

Compliant

7.19. Interim Certification (Clause 18 of Schedule 10.7)

Code reference

Clause 18 of Schedule 10.7

Code related audit information

The MEP must ensure that each interim certified metering installation on 28 August 2013 is certified by no later than 1 April 2015.

Audit observation

I checked the registry records (PR255) to identify any ICPs with interim certification recorded.

Audit commentary

There are 1,942 previously interim certified installations with expired certification.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 7.19 With: Clause 18 of Schedule 10.7 From: 01-Apr-15 To: 11-Apr-19	1,942 ICPs with expired interim certification. Potential impact: High Actual impact: Medium Audit history: Multiple times Controls: Moderate Breach risk rating: 4		
Audit risk rating	Rationale for audit risk rating		
Medium	I have recorded the controls as moderate in this area because certification has been expired for four years for these ICPs. The impact on settlement is recorded as moderate because of the increased likelihood of failure or inaccuracy for metering installations with expired certification, therefore the audit risk rating is medium.		
Actions taken to resolve the issue		Completion date	Remedial action status
VM has a programme to upgrade all expired interim certified metering including the ones stated above, however, we are finding many hurdles which we share with the EA on a regular basis. As we overcome these hurdles, these numbers will decline. Our aim is to eliminate all of these meters.		Ongoing	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
VM has a programme to upgrade all expired interim certified metering including the ones identified above. Once completed, this will address this non-compliance.		Ongoing	

8. INSPECTION OF METERING INSTALLATIONS

8.1. Category 1 Inspections (Clause 45 of Schedule 10.7)

Code reference

Clause 45 of Schedule 10.7

Code related audit information

The MEP must ensure that category 1 metering installations (other than interim certified metering installations):

- *have been inspected by an ATH within 120 months from the date of the metering installation's most recent certification or*
- *for each 12-month period, commencing 1 January and ending 31 December, a sample of the category 1 metering installations selected under clause 45(2) of Schedule 10.7 has been inspected by an ATH.*

Before a sample inspection process can be carried out, the MEP must submit a documented process for selecting the sample to the Electricity Authority, at least two months prior to first date on which the inspections are to be carried out, for approval (and promptly provide any other information the Authority may request).

The MEP must not inspect a sample unless the Authority has approved the documented process.

The MEP must, for each inspection conducted under clause 45(1)(b), keep records detailing:

- *any defects identified that have affected the accuracy or integrity of the raw meter data recorded by the metering installation*
- *any discrepancies identified under clause 44(5)(b)*
- *relevant characteristics, sufficient to enable reporting of correlations or relationships between inaccuracy and characteristics*
- *the procedure used, and the lists generated, to select the sample under clause 45(2).*

The MEP must, if it believes a metering installation that has been inspected is or could be inaccurate, defective or not fit for purpose:

- *comply with clause 10.43*
- *arrange for an ATH to recertify the metering installation if the metering is found to be inaccurate under Table 1 of Schedule 10.1, or defective or not fit for purpose.*

The MEP must by 1 April in each year, provide the Authority with a report that states whether the MEP has, for the previous 1 January to 31 December period, arranged for an ATH to inspect each category 1 metering installation for which it is responsible under clause 45(1)(a) or 45(1)(b).

This report must include the matters specified in clauses 45(8)(a) and (b).

If the MEP is advised by the Authority that the tests do not meet the requirements under clause 45(9) of Schedule 10.7, the MEP must select the additional sample under that clause, carry out the required inspections, and report to the Authority, within 40 business days of being advised by the Authority.

Audit observation

ARC Innovations provided a copy of the Category 1 sample inspection report.

Audit commentary

I checked the process and the reporting and confirm compliance.

Audit outcome

Compliant

8.2. Category 2 to 5 Inspections (Clause 46(1) of Schedule 10.7)

Code reference

Clause 46(1) of Schedule 10.7

Code related audit information

The MEP must ensure that each category 2 or higher metering installation is inspected by an ATH at least once within the applicable period. The applicable period begins from the date of the metering installation's most recent certification and extends to:

- 120 months for Category 2
- 60 months for Category 3
- 30 months for Category 4
- 18 months for Category 5.

Audit observation

I checked the registry information to confirm which ICPs were due for inspection.

Audit commentary

As recorded in **section 6.4**, inspections were not conducted within the allowable window for six Category 2 metering installations.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 8.2 With: Clause 46(1) of Schedule 10.7 From: 01-Jul-18 To: 31-Mar-19	Inspections not conducted within the allowable window for six installations. Potential impact: Medium Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	Rationale for audit risk rating
Low	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. The impact on settlement and participants could be minor; therefore, the audit risk rating is low.
Actions taken to resolve the issue	
Completion date	Remedial action status

Cancellation is under way for 6x Category 2 installations not inspected for 10 years. There are four more certifications for Cat 2 ICPs for 15 years that we will cancel prior to year 10. VM does not carry out cat 2 inspections for the mass market.	30/04/2020	Identified
Preventative actions taken to ensure no further issues will occur	Completion date	
All Cat 2 installations with a 15-year certification will be cancelled. Once upgraded and recertified, they will have a 10-year certification and will be upgraded. This will address this non-compliance as no further Arc Cat 2 meters will have 15-year certifications.	30/04/2020	

8.3. Inspection Reports (Clause 44(5) of Schedule 10.7)

Code reference

Clause 44(5) of Schedule 10.7

Code related audit information

The MEP must, within 20 business days of receiving an inspection report from an ATH:

- *undertake a comparison of the information received with its own records*
- *investigate and correct any discrepancies*
- *update the metering records in the registry.*

Audit observation

I checked the process for reviewing inspection reports.

Audit commentary

ARC Innovations reviews and updates records as required following inspections.

Audit outcome

Compliant

8.4. Broken or removed seals (Clause 48(4) and (5) of Schedule 10.7)

Code reference

Clause 48(4) and (5) of Schedule 10.7

Code related audit information

If the MEP is advised of a broken or removed seal it must use reasonable endeavours to determine

- a) who removed or broke the seal,*
- b) the reason for the removal or breakage*

and arrange for an ATH to carry out an inspection of the removal or breakage and determine any work required to remedy the removal or breakage.

The MEP must make the above arrangements within

- a) three business days, if the metering installation is category 3 or higher*

- b) 10 business days if the metering installation is category 2*
- c) 20 business days if the metering installation is category 1.*

Audit observation

I checked three examples of category 1 installations which had seals removed.

Audit commentary

In all three cases, the installations were checked and re-sealed. The sealing details were correctly recorded.

Audit outcome

Compliant

9. PROCESS FOR HANDLING FAULTY METERING INSTALLATIONS

9.1. Investigation of Faulty Metering Installations (Clause 10.43(4) and (5))

Code reference

Clause 10.43(4) and (5)

Code related audit information

If the MEP is advised or becomes aware that a metering installation may be inaccurate, defective, or not fit for purpose, it must investigate and report on the situation to all affected participants as soon as reasonably practicable after becoming aware of the information, but no later than;

- a) 20 business days for Category 1,*
- b) 10 business days for Category 2 and*
- c) 5 business days for Category 3 or higher.*

Audit observation

There was one recent example of a faulty metering installation at ICP 0007051204RN004. The matter was resolved within 20 business days.

Audit commentary

There was one recent example of a faulty metering installation at ICP 0007051204RN004. The matter was resolved within 20 business days.

Audit outcome

Compliant

9.2. Testing of Faulty Metering Installations (Clause 10.44)

Code reference

Clause 10.44

Code related audit information

If a report prepared under clause 10.43(4)(c) demonstrates that a metering installation is inaccurate, defective, or not fit for purpose, the MEP must arrange for an ATH to test the metering installation and provide a 'statement of situation'.

If the MEP is advised by a participant under clause 10.44(2)(a) that the participant disagrees with the report that demonstrates that the metering installation is accurate, not defective and fit for purpose, the MEP must arrange for an ATH to:

- a) test the metering installation*
- b) provide the MEP with a statement of situation within five business days of:*
- c) becoming aware that the metering installation may be inaccurate, defective or not fit for purpose; or*
- d) reaching an agreement with the participant.*

The MEP is responsible for ensuring the ATH carries out testing as soon as practicable and provides a statement of situation.

Audit observation

There was one recent example of a faulty metering installation at ICP 0007051204RN004. The matter was resolved within 20 business days. I also checked a request from a retailer to investigate whether data storage devices were fit for purpose when used on Category 2 ICPs.

Audit commentary

There was one recent example of a faulty metering installation at ICP 0007051204RN004. The matter was resolved within 20 business days. This was a simple case that didn't require a significant investigation. All notification was appropriate.

ARC Innovations investigated whether data storage devices were fit for purpose when used on Category 2 ICPs. The conclusion was that they were not fit for purpose, and a self-breach was notified to the Electricity Authority. No further action was taken following the Electricity Authority's investigation.

Audit outcome

Compliant

9.3. Statement of Situation (Clause10.46(2))

Code reference

Clause10.46(2)

Code related audit information

Within three business days of receiving the statement from the ATH, the MEP must provide copies of the statement to:

- *the relevant affected participants*
- *the market administrator (for all category 3 and above metering installations and any category 1 and category 2 metering installations) on request.*

Audit observation

The statement of situation for ICP 0007051204RN004 was provided within the appropriate timeframe.

Audit commentary

The statement of situation for ICP 0007051204RN004 was provided within the appropriate timeframe. A statement of situation was not required for the issue of data storage devices being fit for purpose.

Audit outcome

Compliant

10. ACCESS TO AND PROVISION OF RAW METER DATA AND METERING INSTALLATIONS

10.1. Access to Raw Meter Data (Clause 1 of Schedule 10.6)

Code reference

Clause 1 of Schedule 10.6

Code related audit information

The MEP must give authorised parties access to raw meter data within 10 business days of receiving the authorised party making a request.

The MEP must only give access to raw meter data to a trader or person, if that trader or person has entered into a contract to collect, obtain, and use the raw meter data with the end customer.

The MEP must provide the following when giving a party access to information:

- a) the raw meter data; or*
- b) the means (codes, keys etc.) to enable the party to access the raw meter data.*

The MEP must, when providing raw meter data or access to an authorised person use appropriate procedures to ensure that:

- the raw meter data is received only by that authorised person or a contractor to the person*
- the security of the raw meter data and the metering installation is maintained*
- access to the raw meter data is limited to only the specific raw meter data under clause 1(7)(c) of Schedule 10.6.*

Audit observation

I checked whether any parties had requested access to raw meter data.

Audit commentary

No requests have been received but ARC Innovations advised access could be granted in accordance with this clause if necessary.

Audit outcome

Compliant

10.2. Restrictions on Use of Raw Meter Data (Clause 2 of Schedule 10.6)

Code reference

Clause 2 of Schedule 10.6

Code related audit information

The MEP must not give an authorised person access to raw meter data if to do so would breach clause 2(1) of Schedule 10.6.

Audit observation

I checked whether any parties had requested access to raw meter data.

Audit commentary

No requests have been received but ARC Innovations advised access could be granted in accordance with this clause if necessary.

Audit outcome

Compliant

10.3. Access to Metering Installations (Clause 3(1), (3) and (4) of Schedule 10.6)

Code reference

Clause 3(1), (3) and (4) of Schedule 10.6

Code related audit information

The MEP must within 10 business days of receiving a request from one of the following parties, arrange physical access to each component in a metering installation:

- *a relevant reconciliation participant with whom it has an arrangement (other than a trader)*
- *the Authority*
- *an ATH*
- *an auditor*
- *a gaining MEP.*

This access must include all necessary means to enable the party to access the metering components

When providing access, the MEP must ensure that the security of the metering installation is maintained and physical access is limited to only the access required for the purposes of the Code, regulations in connection with the party's administration, audit and testing functions.

Audit observation

I checked whether any parties had requested access to metering installations.

Audit commentary

No requests have been received but ARC Innovations advised access could be granted in accordance with this clause if necessary.

Audit outcome

Compliant

10.4. Urgent Access to Metering Installations (Clause 3(5) of Schedule 10.6)

Code reference

Clause 3(5) of Schedule 10.6

Code related audit information

If the party requires urgent physical access to a metering installation, the MEP must use its best endeavours to arrange physical access.

Audit observation

I checked whether any parties had requested access to metering installations.

Audit commentary

No requests have been received, but ARC Innovations advised access could be granted in accordance with this clause if necessary.

Audit outcome

Compliant

10.5. Electronic Interrogation of Metering Installations (Clause 8 of Schedule 10.6)

Code reference

Clause 8 of Schedule 10.6

Code related audit information

When raw meter data can only be obtained from an MEP's back office, the MEP must

- *ensure that the interrogation cycle does not exceed the maximum interrogation cycle shown in the registry*
- *interrogate the metering installation at least once within each maximum interrogation cycle.*

When raw meter data can only be obtained from an MEP's back office, the MEP must ensure that the internal clock is accurate, to within ± 5 seconds of:

- *New Zealand standard time; or*
- *New Zealand daylight time.*

When raw meter data can only be obtained from an MEP's back office, the MEP must record in the interrogation and processing system logs, the time, the date, and the extent of any change in the internal clock setting in the metering installation.

When raw meter data can only be obtained from an MEP's back office, the MEP must ensure that a data storage device in a metering installation does not exceed the maximum time error set out in Table 1 of clause 8(5) of Schedule 10.6.

The MEP must compare the time on the internal clock of the data storage device with the time on the interrogation and processing system clock, calculate and correct (if required by this provision) any time error, and advise the affected reconciliation participant.

When raw meter data can only be obtained from an MEP's back office, the MEP must, when interrogating a metering installation, download the event log, check the event log for evidence of malfunctioning or tampering, and if this is detected, carry out the appropriate requirements of Part 10.

The MEP must ensure that all raw meter data that can only be obtained from the MEPs back office, that is downloaded as part of an interrogation, and that is used for submitting information for the purpose of Part 15 is archived:

- *for no less than 48 months after the interrogation date*
- *in a form that cannot be modified without creating an audit trail*
- *in a form that is secure and prevents access by any unauthorised person*

in a form that is accessible to authorised personnel.

Audit observation

I requested reporting on interrogation cycle to confirm compliance.

I checked the security and storage of data by looking at examples of data more than 48 months old.

Audit commentary

Reporting is in place and this was demonstrated. I checked the most recent report for a large retailer and two medium retailers and found that 524 ICPs were not read within the maximum interrogation cycle of 30 days.

Data is stored indefinitely, and this was confirmed by checking some historic data from 2016.

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 10.5 With: Clause 8 of Schedule 10.6 From: 01-Mar-19 To: 09-Mar-20	524 ICPs not read during the maximum interrogation cycle. Potential impact: High Actual impact: Medium Audit history: None Controls: Moderate Breach risk rating: 4		
Audit risk rating	Rationale for audit risk rating		
Medium	The controls are recorded as moderate because they mitigate risk most of the time but there is room for improvement. The impact on settlement and participants is moderate, particularly the AMI only retailers, where estimates need to be performed if data is not provided. The audit risk rating is medium.		
Actions taken to resolve the issue		Completion date	Remedial action status
VM accepts this non-compliance and has recently automated its manual AMI flag process. The AMI flag should now be more accurate and reflect the actual communications status of the installation. We will recheck the 524 ICPs and ensure the AMI flag is set to 'N' if the installations are not communicating.		30/05/2020	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
We have a new automated system in place.		In place	

10.6. Security of Metering Data (Clause 10.15(2))

Code reference

Clause 10.15(2)

Code related audit information

The MEP must take reasonable security measures to prevent loss or unauthorised access, use, modification or disclosure of the metering data.

Audit observation

I checked the security and storage of data by looking at examples of data more than 48 months old.

Audit commentary

All data is secure, and any transmission is via SFTP or password protected email.

Audit outcome

Compliant

10.7. Time Errors for Metering Installations (Clause 8(4) of Schedule 10.6)

Code reference

Clause 8(4) of Schedule 10.6

Code related audit information

When raw meter data can only be obtained from the MEPs back office, the MEP must ensure that the data storage device it interrogates does not exceed the maximum time error set out in Table 1 of clause 8(5) of Schedule 10.6.

Audit observation

I conducted a walkthrough of the management of time errors and I checked the relevant reports.

Audit commentary

The MEP must ensure that a data storage device in a metering installation does not exceed the maximum time error set out in Table 1 of clause 8(5) of Schedule 10.6. The MEP must compare the time on the internal clock of the data storage device with the time on the interrogation and processing system clock, calculate and correct (if required by this provision) any time error, and advise the affected reconciliation participant. The relevant part of this table is shown below:

Metering Installation Category	HHR Metering Installations (seconds)	NHH Metering Installations (seconds)
1	±30	±60
2	±10	±60

Data storage device time synchronisation occurs as follows:

1. GPRS - time synchronisation occurs for each daily interrogation,
2. Satellite – interrogation occurs three times per month, time synchronisation is carried out during each interrogation, and
3. RF mesh – interrogation occurs twice per day, time synchronisation is a separate exercise, conducted weekly by sending a time adjustment message to relevant data storage devices.

I checked the most recent reports for time errors greater than 30 seconds. The report contained 2,613 for all retailers for January 2020. 48 were more than 1,000 seconds.

This clause is clear that when errors are outside the threshold, compliance is not achieved. The exact text is as follows:

“A metering equipment provider must ensure that a data storage device in a metering installation for which it is responsible for interrogating does not exceed the maximum time error set out in Table 1 of subclause (5).”

Audit outcome

Non-compliant

Non-compliance	Description		
Audit Ref: 10.7 With: Clause 8(4) of Schedule 10.6 From: 01-Jan-20 To: 31-Jan-20	Clock errors greater than the threshold for 2,613 ICPs. Potential impact: Low Actual impact: Low Audit history: Once Controls: Moderate Breach risk rating: 2		
Audit risk rating	Rationale for audit risk rating		
Low	The controls are recorded as moderate because sound reporting is in place and resolution processes are in place. 48 of the errors were great than a trading period but this is a small percentage of the overall quantity. The audit risk rating is low.		
Actions taken to resolve the issue		Completion date	Remedial action status
Clock errors outside the 'Code' limits are corrected during the interrogation and reported to the Retailer. VM acknowledges this technical non-compliance. Our internal thresh-holds are set lower than the limits stated in the Code. i.e. +/- 5 Secs Cat 2 & +/- 15 Secs Cat 1. When they do exceed repeatedly or excessively, they are investigated by our technical team and are either manually corrected or replaced. We will change our follow up process to shorten the time before an investigation is launched for those repeatedly exceeding time drift limits.		30/05/2020	Identified
Preventative actions taken to ensure no further issues will occur		Completion date	
Our time correction is predominantly automated. We will update our manual process to capture those repeatedly exceeding time limits. We are also about to embark on a full fleet replacement programme which will address this non-compliance.		Ongoing	

10.8. Event Logs (Clause 8(7) of Schedule 10.6)

Code reference

Clause 8(7) of Schedule 10.6

Code related audit information

When raw meter data can only be obtained from the MEP's back office, the MEP must, when interrogating a metering installation:

- a) ensure an interrogation log is generated*
- b) review the event log and:*

- i. take appropriate action
- ii. pass the relevant entries to the reconciliation participant.
- c) ensure the log forms part of an audit trail which includes:
 - i. the date and
 - ii. time of the interrogation
 - iii. operator (where available)
 - iv. unique ID of the data storage device
 - v. any clock errors outside specified limits
 - vi. method of interrogation
 - vii. identifier of the reading device used (if applicable).

Audit observation

I conducted a walkthrough of the event management process and I checked the most recent report sent to all relevant retailers.

Audit commentary

Event logs are downloaded and evaluated following each interrogation. ARC Innovations provide a list of 14 relevant events.

There is also a “no consumption” report and a “no reads” report sent to retailers. If the evaluation of the other events results in field work being required to fix comms or replace a meter, the retailer is advised, and a service request is sent.

Audit outcome

Compliant

10.9. Comparison of HHR Data with Register Data (Clause 8(9) of Schedule 10.6)

Code reference

Clause 8(9) of Schedule 10.6

Code related audit information

When raw meter data can only be obtained from the MEP’s back office, the MEP must ensure that each electronic interrogation that retrieves half-hour metering information compares the information against the increment of the metering installations accumulating meter registers.

Audit observation

I conducted a walkthrough of the sum-check process, and I checked the most recent reporting.

Audit commentary

Sum-check validation occurs. The pass/fail threshold is 0.1 kWh. The table below shows the error messages related to sum-check validation.

ID	Check / Rule	Description
107	Interval readings do not match previously recorded intervals	<p>Interval read data received from a meter which covers a complete interval period for which data has previously been received, must be equal to the consumption already recorded for those interval periods.</p> <p>Exception: Initialised meters will default all interval registers up to the time of initialisation to ZERO. A zero value should be overwritten with newly received values if these values are non-zero. A zero value must not overwrite a non-zero value.</p>

108	Negative Interval readings encountered	Interval consumption data received from a meter must contain positive values only.
114	Invalid TOU Register	The Smart Meter has provided a read against a General Accumulation (GA) register that should not be in use (the smart meter is known but the GA register was not in use according to the tariff assigned to the smart meter as at the date/time of the read).
115	Sum of TOU registers does not = Total KWH	The sum of the GA registers must match the Master Accumulator (MA) register (+/- a configurable threshold [default = 1KWh]) Note: this check applies to smart meters operating in Post-pay mode only.

Any issues identified are investigated and resolved.

Audit outcome

Compliant

10.10. Correction of Raw Meter Data (Clause 10.48(2),(3))

Code reference

Clause 10.48(2),(3)

Code related audit information

If the MEP is notified of a question or request for clarification in accordance with clause 10.48(1), the MEP must, within 10 business days:

- *respond in detail to the questions or requests for clarification*
- *advise the reconciliation participant responsible for providing submission information for the POC of the correction factors to apply and period the factors should apply to.*

Audit observation

ARC Innovations has not received any requests in relation to this clause.

Audit commentary

ARC Innovations has not received any requests in relation to this clause.

Audit outcome

Not applicable

CONCLUSION

ARC Innovations is not actively expanding their metering base. There are plans in place to replace ARC Innovations metering with Vector/AMS metering. This process is carefully managed to ensure the integrity of the RF mesh is retained.

The management of registry accuracy and timeliness is generally sound; however, this audit identified a number of significant issues affecting the accuracy of data and the certification status of data storage devices. It is my conclusion that ARC Innovations data storage devices cannot be HHR certified and Generation 2 devices failed type testing so they shouldn't be certified at all. The main issues identified are as follows:

1. The HHR data files only contain one decimal place so the smallest kWh increment is 0.1 kWh. The pulse rate is 200 pulses per 0.1 kWh, so once the controller (data storage device) has received 200 pulses in its accumulator, the 0.1 kWh is transferred to the registers. If the end of an interval is reached and the accumulator has only received 190 pulses, the consumption associated with these pulses is apportioned to the next interval. There will be very few HHR intervals where the consumption is accurate to within 2.5% (the accuracy threshold for Category 1 and Category 1 installations). Approximately 100,000 installations are certified as HHR and 16,692 are settled as HHR. These installations are not designed to provide accurate HHR data and should not be certified as HHR.
2. The type test report for Generation 2 devices states that the "Data Logger retains all data pertaining to energy and events for a minimum period of the interrogation cycle plus five days". The interrogation cycle is one day. Therefore the type test has only confirmed that data will be retained for six days, but Clause 5(b)(xii) of Schedule 10.7 requires "that the data storage device has data loss protection providing a continued clock and memory operation for a continuous period of at least 15 days when the power supply to the data storage device is lost". Therefore, they have failed the type test.
3. 524 ICPs were not read during the maximum interrogation cycle.
4. 2,613 ICPs had time errors greater than the allowable threshold.

The date of the next audit is determined by the Electricity Authority and is dependent on the level of compliance during this audit. The table below provides some guidance on this matter and recommends an audit frequency of three months. Remedial actions are likely to take some time and will involve liaison with the Authority and other parties. I think three months is too soon for the next audit; I recommend the next audit is conducted by November 30th 2020.

PARTICIPANT RESPONSE

Vector Metering acknowledges the issues affecting the accuracy of data and the certification status of data storage devices highlighted in this report.

These non-compliances are the subject of alleged self-breaches by VM, which are currently sitting with the Electricity Authority for review and/or further investigation. VM cannot comment further on this until the Authority has made its determination.