ELECTRICITY INDUSTRY PARTICIPATION CODE
DISTRIBUTED UNMETERED LOAD AUDIT REPORT

VERITEK

For

CHRISTCHURCH CITY COUNCIL UNMETERED TRAFFIC LIGHTS AND GENESIS ENERGY LIMITED

Prepared by: Tara Gannon

Date audit commenced: 10 April 2019

Date audit report completed: 19 May 2020

Audit report due date: 31 May 2019

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This audit of the **Christchurch City Council's Christchurch Transport Operation Centre (CTOC)** Unmetered Traffic Light DUML database and processes was conducted at the request of **Genesis Energy Limited** (**Genesis**), in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied.

The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

Traffic light data is maintained in RTOAD (Real Time Operations Asset Database) by CTOC. RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

A monthly report from the database is provided to Genesis, and used to calculate submissions. Genesis submits the DUML load as NHH using the UNM profile, and multiplies the daily unmetered kWh by the number of days in the month.

Seven non-compliances were identified, and one recommendation was raised. The future risk rating of 19 indicates that the next audit be completed in three months.

Following completion of the field audit, the ICPs switched to Contact Energy, and there was a delay in receiving comments so that the report could be finalised.

The majority of the non-compliances related to an error in the calculation of daily unmetered kWh for some traffic safety cameras and speed zone signs, which were corrected during the audit. The non-compliances which were not confirmed to be cleared relate to audit trails and recording of the ICP number. These non-compliances have little to no impact but contribute nine points because controls are weak.

I recommend that the next audit is completed in a minimum of 15 months.

The matters raised are detailed below:

AUDIT SUMMARY

NON-COMPLIANCES

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Deriving submission information	2.1	11(1) of Schedule 15.3	The database contained some missing and incorrect daily kWh information. The errors were corrected during the audit.	Weak	Low	3	Cleared
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	ICP number is not recorded in RTOAD. All items of load have a GXP recorded, and this GXP information is used to map to the correct ICP.	Weak	Low	3	Unknown
Description and capacity of load	2.4	11(2)(c) and (d) of Schedule 15.3	Two sites had no database kWh per day recorded.	Moderate	Low	2	Cleared
All load recorded in database	2.5	11(2A) of Schedule 15.3	One traffic safety camera was missing from the database for site 129.	Moderate	Low	2	Cleared
Audit trails	2.7	11(4) of Schedule 15.3	No audit trail of changes made in the access database.	Weak	Low	3	Unknown
Database accuracy	3.1	15.2 and 15.37B(b)	The database contained some missing and incorrect daily kWh information. The errors were corrected during the audit. ICP number is not recorded in the database.	Weak	Low	3	Unknown

Subject	Section	Clause	Non-Compliance	Controls	Audit Risk Rating	Breach Risk Rating	Remedial Action
Volume information accuracy	3.2	15.2 and 15.37B(c)	The database contained some missing and incorrect daily kWh information. The errors were corrected during the audit.	Weak	Low	3	Cleared
					Future Risk Rating		**19**

Future risk rating	0	1-4	5-8	9-15	16-18	19+
Indicative audit frequency	36 months	24 months	18 months	12 months	6 months	3 months

RECOMMENDATIONS

Subject	Section	Description	Recommendation
Database accuracy	3.1	0000298513MPF38 metering	Confirm whether the metering record for this ICP is correct, and which connected load is metered.

ISSUES

Subject	Section	Description	Issue
		Nil	

1. ADMINISTRATIVE

1.1. Exemptions from Obligations to Comply with Code

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.

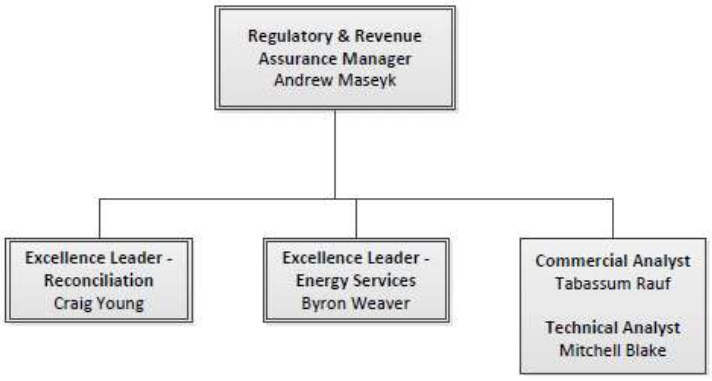
Audit observation

The Electricity Authority's website was reviewed to identify any exemptions relevant to the scope of this audit. No exemptions are in place.

Audit commentary

Compliance is confirmed.

1.2. Structure of Organisation



1.3. Persons involved in this audit

Auditor:

Tara Gannon

Veritek Limited

Electricity Authority Approved Auditor

Other personnel assisting in this audit were:

Name	Title	Company
Bruce Kelly	SCATS Engineer	Christchurch Transport Operation Centre – Christchurch City Council

Name	Title	Company
Toni Dakers	CTOC Real-Time Operations	Christchurch Transport Operation Centre – Christchurch City Council
Craig Young	Excellence Leader - Reconciliation	Genesis Energy
Grace Hawken	Technical Specialist - Reconciliation Team	Genesis Energy

1.4. Hardware and Software

Traffic light data is maintained in RTOAD Access database by CTOC. Backup and restoration procedures are in accordance with normal industry protocols.

A copy of the traffic light asset information is also maintained within RAMM. RAMM is periodically reconciled for RTOAD to ensure that it holds all traffic light information.

1.5. Breaches or Breach Allegations

There are no breach allegations relevant to the scope of this audit.

1.6. ICP Data

The following ICPs are relevant to the scope of this audit. The database expresses the wattage as kWh per day.

ICP Number	Description	NSP	Profile	Number of sites	Database kWh per day
0007102602RN872	Ref Orion_Bromley 66kV GXP Traffic Lights	BRY0661	UNM	63	397.81
0007102603RN437	Ref Orion_Islington 33kV GXP Traffic Lights	ISL0331	UNM	14	99.25
0007102604RN9FD	Ref Orion_Islington 66kV GXP Traffic Lights	ISL0661	UNM	297	2167.94
0000298513MPF38	TRAFFIC LIGHTS OFF RAMP	KAI0111	UNM	5	5.93
			Total	**379**	**2670.93**

1.7. Authorisation Received

All information was provided directly by Genesis or the CTOC.

1.8. Scope of Audit

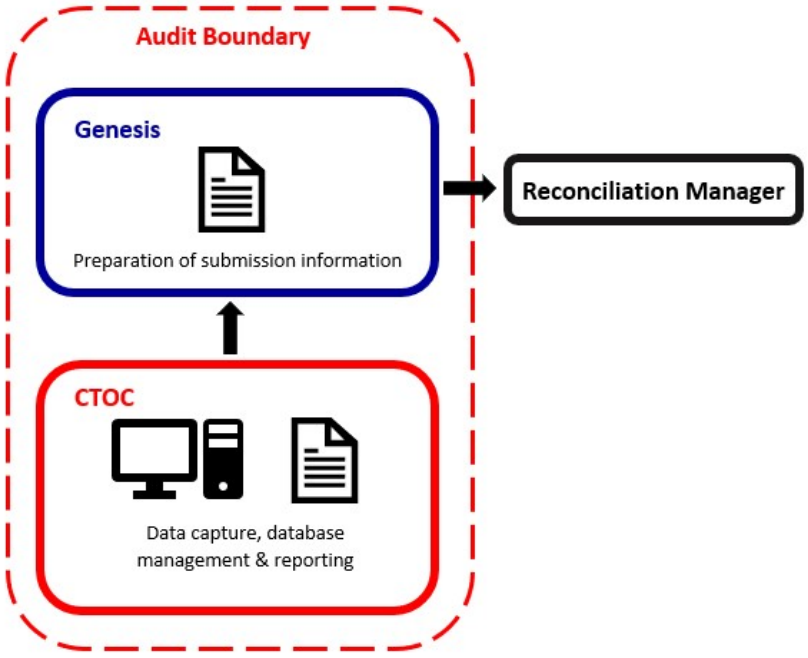
This audit of the CTOC DUML database and processes was conducted at the request of Genesis in accordance with clause 15.37B. The purpose of this audit is to verify that the volume information is being calculated accurately, and that profiles have been correctly applied. The audit was conducted in accordance with the audit guidelines for DUML audits version 1.1.

Traffic light data is maintained in RTOAD (Real Time Operations Asset Database) database by CTOC. RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

A monthly report from the database is provided to Genesis, and used to calculate submissions. Genesis submits the DUML load as NHH using the UNM profile.

The scope of the audit encompasses the collection, security and accuracy of the data, including the preparation of submission information based on the database reporting.

The diagram below shows the audit boundary for clarity:



The field audit was undertaken of a statistical sample of 100 sites on 10-11 April 2019.

1.9. Summary of previous audit

Genesis provided a copy of the last audit report undertaken by Steve Woods of Veritek Limited, completed in May 2018. The table below records the findings.

Subject	Section	Clause	Non compliance	Status
Deriving submission information	2.1	11(1) of Schedule 15.3	Over submission occurring due to disconnected lights being included in the monthly report.	Some non-compliance still exists
ICP identifier and items of load	2.2	11(2)(a) and (aa) of Schedule 15.3	No ICP identifier recorded against each item of load in the traffic light access database. Five items of load with no GXP recorded.	Still existing Cleared
Tracking of load changes	2.6	11(3) of Schedule 15.3	Disconnected traffic lights not tracked in the database.	Cleared
Audit trail	2.7	11(4) of Schedule 15.3	No audit trail of changes made in the access database.	Still existing
Volume information accuracy	3.2	15.2 and 15.37B (c)	Under submission for the March 2018 period due to the incorrect monthly report being used to calculate the submission.	Some non-compliance still exists

1.10. Distributed unmetered load audits (Clause 16A.26 and 17.295F)

Code reference

Clause 16A.26 and 17.295F

Code related audit information

Retailers must ensure that DUML database audits are completed:

1. *by 1 June 2018 (for DUML that existed prior to 1 June 2017)*
2. *within three months of submission to the reconciliation manager (for new DUML)*
3. *within the timeframe specified by the Authority for DUML that has been audited since 1 June 2017.*

Audit observation

Genesis have requested Veritek to undertake this streetlight audit.

Audit commentary

This audit report confirms that the requirement to conduct an audit has been met for this database within the required timeframe. Compliance is confirmed.

2. DUML DATABASE REQUIREMENTS

2.1. Deriving submission information (Clause 11(1) of Schedule 15.3)

Code reference

Clause 11(1) of Schedule 15.3

Code related audit information

The retailer must ensure the:

- *DUML database is up to date*
- *methodology for deriving submission information complies with Schedule 15.5.*

Audit observation

The process for calculation of consumption was examined and the application of profiles was checked. The database was checked for accuracy.

Audit commentary

RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

A monthly report from the database is provided to Genesis, and used to calculate submissions. Genesis submits the DUML load as NHH using the UNM profile, and multiplies the daily kWh by the number of days in the month to calculate the submission data.

I checked the February 2019 submission data for ICPs 0007102602RN872, 0007102603RN437, 0007102604RN9FD and 0000298513MPF38, and compliance is confirmed.

The 2018 audit found that some existing traffic lights were turned off as part of the city rebuild, but remained active in the database. CTOC confirmed that this issue has been resolved, and the unused lights have been decommissioned and are excluded from the database.

Volume inaccuracy is present as follows:

Issue	Estimated volume information impact (annual kWh)
Some incorrect wattages are recorded for traffic safety cameras and speed zone signs	12.57 kWh per day or 4,588 kWh per annum
Missing wattages for two sites with speed zone signs	0.12 kWh per day or 43.8 kWh per annum

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: unknown To: 12-Apr-19	The database contained some missing and incorrect daily kWh information. The errors were corrected during the audit. Potential impact: Low Actual impact: Low Audit history: Twice Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls were rated as weak, because they were not sufficient to ensure that correct daily kWh values were recorded for all speed signs and traffic safety cameras. The impact is assessed to be low based on the wattage differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
The council had implemented controls to mitigate the risk, Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	
n/a	n/a	

2.2. ICP identifier and items of load (Clause 11(2)(a) and (aa) of Schedule 15.3)

Code reference

Clause 11(2)(a) and (aa) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *each ICP identifier for which the retailer is responsible for the DUML*
- *the items of load associated with the ICP identifier.*

Audit observation

The database was checked to confirm the correct ICP was recorded against each item of load.

Audit commentary

ICP number is not recorded in RTOAD. All items of load have a GXP recorded against them, which corresponds to the ICP number. GXPs are confirmed as part of the new connection process. If a new traffic light is surrounded closely by existing lights which all have the same GXP, CTOC assigns that GXP. In all other cases, the GXP is checked with Orion before being recorded in the database.

CTOC advised that Orion provided notification of GXP changes.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.2 With: Clause 11(2)(a) and (aa) of Schedule 15.3 From: unknown To: 11-Apr-19	ICP number is not recorded in RTOAD. All items of load have a GXP recorded, and this GXP information is used to map to the correct ICP. Potential impact: None Actual impact: None Audit history: Three times Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls were rated as weak. An ICP number field is available in RTOAD but is not used. The impact is assessed to be low. ICP numbers can be determined from the GXP information because there is a 1:1 relationship between GXP and ICP, and the GXP is populated for every item of load. There is no impact on submission.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Unknown
Preventative actions taken to ensure no further issues will occur	**Completion date**	

2.3. Location of each item of load (Clause 11(2)(b) of Schedule 15.3)

Code reference

Clause 11(2)(b) of Schedule 15.3

Code related audit information

The DUML database must contain the location of each DUML item.

Audit observation

The database was checked to confirm the location is recorded for all items of load.

Audit commentary

All items of load have a site name recorded which includes the location. 336 of the 379 power sites also have GPS coordinates.

The sites without GPS coordinates are speed signs. Typically there are between two and ten speed signs around a school at different locations, which are recorded as one site. RTOAD only allows one GPS location and location description to be recorded for each site, and the description indicates speed signs and the school name. CTOT will investigate whether to record one of these GPS locations for each site with speed signs.

Audit outcome

Compliant

2.4. Description and capacity of load (Clause 11(2)(c) and (d) of Schedule 15.3)

Code reference

Clause 11(2)(c) and (d) of Schedule 15.3

Code related audit information

The DUML database must contain:

- *a description of load type for each item of load and any assumptions regarding the capacity*
- *the capacity of each item in watts.*

Audit observation

The database was checked to confirm that it contains load types and capacities.

Audit commentary

RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

The capacity in watts is recorded in the back end of the database as part of the daily kWh calculation, and is also set out in the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

All items of load have site units per day recorded except the two sites with speed zone signs listed below. The individual quantities of each equipment type had not been loaded due to an oversight, resulting in zero units per day being calculated.

SiteID	SiteName	Database kWh per day	Correct kWh per day
737	SZ Russley School (Cutts)	0	0.06
738	SZ St Albans Catholic School (Rutland)	0	0.06

The accuracy of the recorded wattages is discussed in **section 3.1**.

The 2018 audit recorded that the calculation had not changed since 2016, and did not include communication units. The calculation has now been updated to include these.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.4 With: Clause 11(2)(c) and (d) of Schedule 15.3 From: unknown To: 11-Apr-19	Two sites had no database kWh per day recorded. The errors were corrected during the audit. Potential impact: None Actual impact: None Audit history: Three times Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls were rated as moderate because almost all items of load have kWh information recorded. The impact is assessed to be low. The missing kWh values are 0.12 kWh per day.

Actions taken to resolve the issue	Completion date	Remedial action status
The council had implemented controls to mitigate the risk, Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	

2.5. All load recorded in database (Clause 11(2A) of Schedule 15.3)

Code reference

Clause 11(2A) of Schedule 15.3

Code related audit information

The retailer must ensure that each item of DUML for which it is responsible is recorded in this database.

Audit observation

The field audit was undertaken of a statistical sample of 100 sites on 10-11 April 2019.

Audit commentary

The following differences were identified during the field audit:

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Other					
Aldwins Rd	2	2	-	1	The TS camera for site 198 was excluded from the calculation.

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Avonhead Rd	1	1	-	1	Site 727 had speed zone sign controller details incorrectly recorded, resulting in an incorrect wattage.
Greers Rd	2	2	-	2	Site 719 had speed zone sign controller details incorrectly recorded, resulting in an incorrect wattage. The TS camera for site 309 was excluded from the calculation.
Main North Rd	6	6	-	4	Site 700 had speed zone sign controller details incorrectly recorded, resulting in an incorrect wattage. The TS cameras for sites 267, 281, and 282 were excluded from the calculation.
Papanui Rd	3	3	-	3	The TS cameras for sites 249, 283 and 317 were excluded from the calculation.
Traffic lights					
Aldwins Rd	3	3	-	2	The TS cameras for sites 117 and 201 were excluded from the calculation.
Avonhead Rd	1	1	-	1	The TS camera for site 411 was excluded from the calculation.
Barbadoes St	14	14	-	5	The TS cameras for sites 21, 29, 31, 34 and 65 were excluded from the calculation.
Brougham St	10	10	-	10	The TS cameras for sites 97, 98, 99, 105, 106, 107, 108, 109, 120 and 148 were excluded from the calculation.
Carmen Rd	3	3	-	3	The TS cameras for sites 501, 504 and 506 were excluded from the calculation.

Address	Database Count	Field Count	Count differences	Wattage differences	Comments
Cranford St	4	4	-	3	The TS cameras for sites 211, 212 and 214 were excluded from the calculation.
Greers Rd	3	3	-	3	The TS cameras for sites 305, 310 and 354 were excluded from the calculation.
Hereford St	8	8	-	4	The TS cameras for sites 36, 50, 59 and 91 were excluded from the calculation.
Kilmarnock St	2	2	-	2	The TS cameras for sites 399 and 405 were excluded from the calculation.
Main North Rd	12	12	-	9	The TS cameras for sites 256, 259, 260, 261, 262, 263, 265, 266 and 268 were excluded from the calculation.
Moorhouse Ave	11	11	-	9	The TS cameras for sites 69, 80, 81, 83, 100, 135, 200 and 419 were excluded from the calculation.
Papanui Rd	5	5	-	4	The TS cameras for sites 62, 252, 253 and 255 were excluded from the calculation.
Sawyers Arms Rd	2	2	-	2	The TS cameras for sites 279 and 313 were excluded from the calculation.
Stanmore Rd	4	4	1	3	No TS camera was recorded in the database for site 129. The TS cameras for sites 121 and 130 were excluded from the calculation.
Wairakei Rd	2	2	-	2	The TS cameras for sites 303 and 306 were excluded from the calculation.
Total	100	100	1	73	

One TS camera was found to be missing from the database at site 129 (North Avon/Stanmore) and is recorded as non-compliance below. The lamp wattage differences are recorded as non-compliance in **section 3.1**.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.5 With: Clauses 11(2A) of Schedule 15.3 From: 10-Apr-19 To: 10-Apr-19	One traffic safety camera was missing from the database for site 129. The database was updated during the audit. Potential impact: Low Actual impact: Low Audit history: None Controls: Moderate Breach risk rating: 2
Audit risk rating	**Rationale for audit risk rating**
Low	The controls are rated as moderate, because only one difference was identified. The impact is low because the wattage of the missing camera is 0.048 kWh per day.

Actions taken to resolve the issue	Completion date	Remedial action status
The council had implemented controls to mitigate the risk, Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	

2.6. Tracking of load changes (Clause 11(3) of Schedule 15.3)

Code reference

Clause 11(3) of Schedule 15.3

Code related audit information

The DUML database must track additions and removals in a manner that allows the total load (in kW) to be retrospectively derived for any given day.

Audit observation

The process for tracking of changes in the database was examined.

Audit commentary

On 20th September 2012 the Authority sent a memo to Retailers and auditors advising that tracking of load changes at a daily level was not required as long as the database contained an audit trail. I have interpreted this to mean that the production of a "snapshot" report is sufficient to achieve compliance. The database tracks additions and removals as required by this clause.

Processes to track changes to the database were reviewed.

The process for new connections is well defined. The Christchurch City Council (CCC) capital programme team manage the new connection process, and the CTOC are responsible for programming the lights and ensuring that both RTOAD and RAMM are updated. CTOC is well aware of any new lights to be commissioned and ensures that database information is updated as required.

The GXP, and types and quantities of equipment installed are determined from the signal plan and "as built" information. If a new traffic light is surrounded closely by existing lights which all have the same GXP, CTOC assigns that GXP. In all other cases, the GXP is checked with Orion before being recorded in the database.

Additions, changes and decommissions are also managed by CCC and CTOC, and the database is updated from the effective date of the change.

The 2018 audit found that some existing traffic lights were turned off as part of the city rebuild, but remained active in the database. CTOC confirmed that this issue has been resolved, and the unused lights have been decommissioned and are excluded from the database.

Audit outcome

Compliant

2.7. Audit trail (Clause 11(4) of Schedule 15.3)

Code reference

Clause 11(4) of Schedule 15.3

Code related audit information

The DUML database must incorporate an audit trail of all additions and changes that identify:

- *the before and after values for changes*
- *the date and time of the change or addition*
- *the person who made the addition or change to the database.*

Audit observation

The database was checked for audit trails.

Audit commentary

CTOC RTOAD Access database has no audit trail of additions and changes to the database information. Historic reports are able to be compared to identify any changes made from one month to the next.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.7 With: Clause 11(4) of Schedule 15.3 From: unknown To: 12-Apr-19	No audit trail of changes made in the access database. Potential impact: Low Actual impact: Low Audit history: Three times Controls: Weak Breach risk rating: 3

Audit risk rating	Rationale for audit risk rating
Low	The controls are rated as weak because audit trails do not exist. The impact is rated as low, because it does not affect submission.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Unknown
Preventative actions taken to ensure no further issues will occur	**Completion date**	

3. ACCURACY OF DUML DATABASE

3.1. Database accuracy (Clause 15.2 and 15.37B(b))

Code reference

Clause 15.2 and 15.37B(b)

Code related audit information

Audit must verify that the information recorded in the retailer's DUML database is complete and accurate.

Audit observation

The DUML Statistical Sampling Guideline was used to determine the database accuracy. The table below shows the survey plan.

Plan Item	Comments
Area of interest	CCC unmetered traffic lights
Strata	The database contains 379 sites in the CCC area. All lights in the database have the same owner, and the management process is the same. The database was divided into two strata: • traffic lights; and • other equipment including CCTV, pedestrian crossing lights, and speed zone signs.
Area units	I used a random number generator to select a total of 22 sub-units across the two strata.
Total items of load	100 items of load were checked.

The calculation of daily kWh in the database was checked, by reperforming the calculation based on the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

Audit commentary

Database accuracy based on the field audit

As described in **section 2.5**, the database was found to contain some inaccurate and missing data. The field audit of 100 sites found:

- one traffic safety camera was missing from the database at site 129; and
- 73 sites with wattage calculation differences relating to speed zone signs and traffic safety cameras.

The unmetered load does not operate only during night hours, and is recorded as a daily kWh value. To account for this when assessing database accuracy, I adjusted the data entered into the Authority's DUML database auditing tool as follows:

- I entered the daily kWh for each sub-unit instead of watts, and
- I modified the on hours per annum to 365,000 to reflect (1) that the values entered were kWh not watts, and (2) that the daily average kWh needs to be multiplied by 365 to give annual consumption, instead of 4,271 night burn hours.

The field data was 100.6% of the database data for the sample checked. The statistical sampling tool reported with 95% confidence the precision of the sample was 0.5%, and the true load in the field will be between 100.4% to 100.9% of the load recorded in the database. The sample is sufficiently precise to indicate that the database is accurate within ±5%.

The tool indicated that there is potentially 5,700 kWh per annum (based on annual burn hours of 4,271 as detailed in the DUML database auditing tool) of under submission. The statistical sampling tool reported with 95% confidence that there is a potential estimated over submission variance range of between 3,900 and 8,400 kWh per annum but as the accuracy is within the 5% threshold compliance is recorded.

Wattage accuracy

The accuracy of the wattages recorded in the database was confirmed by reperforming the wattage calculation for each type of equipment and summing the result by site. The recalculation was according to the CTOC Traffic Signal Database Traffic Signal Power Calculation Formula document.

I found some errors in the database daily kWh information:

1. Where traffic safety cameras were present at a site and other equipment was also installed, the traffic safety cameras were excluded from the daily kWh calculation. Traffic safety cameras consume 0.048 kWh per day.
2. Speed zone signs were originally loaded with the controller listed as N/A because the controller used the power supply of the school they were associated with. Later, CTOC swapped to a cloud based remote control system for these controllers and some staff loaded the speed zone controllers with the controller make, instead of N/A. This resulted in some speed signs having invalid wattage information added.

The total impact of these differences was 12.57 kWh per day or 4,588 kWh per annum. Upon becoming aware of these errors during the audit, CTOC immediately updated the data. I viewed before and after reports for March 2019 to confirm that the errors had been resolved.

As discussed in **section 2.4**, all items of load had site units per day recorded except two sites with speed zone signs listed below. The impact of the missing values is included in the 12.57 kWh per day recorded above.

SiteID	SiteName	Database kWh per day	Correct kWh per day
737	SZ Russley School (Cutts)	0	0.06
738	SZ St Albans Catholic School (Rutland)	0	0.06

One site had zero values for all equipment types, but database kWh of 0.12. I confirmed that two speed signs are installed, and the correct kWh is 0.06. The impact of the incorrect value is included in the 12.57 kWh per day recorded above.

SiteID	SiteName	Database kWh per day	Correct kWh per day
747	SZ Christchurch South I School (Selwyn)	0.12	0.06

ICP number accuracy

As discussed in **section 2.2**, ICP number is not recorded in the database but can be mapped using the GXP.

ICP 0000298513MPF38

The electricity registry records metering for ICP 0000298513MPF38, and the distributor has not recorded any unmetered load details. Genesis treats the load attached to this ICP as DUML, and CTOC also believes it is unmetered.

I recommend that this is followed up with the MEP to confirm whether metering is installed, and which connected load is metered.

Description	Recommendation	Audited party comment	Remedial action
0000298513MPF38 metering	Confirm whether the metering record for this ICP is correct, and which connected load is metered.	Genesis were unable to assess as the customer switched to another energy provider.	Unknown

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 3.1 With: Clause 15.2 and 15.37B(b) From: unknown To: 12-Apr-19	The database contained some missing and incorrect daily kWh information. The errors were corrected during the audit. ICP number is not recorded in the database. Potential impact: Low Actual impact: Low Audit history: None Controls: Weak Breach risk rating: 3
Audit risk rating	**Rationale for audit risk rating**
Low	The controls were rated as weak, because they were not sufficient to ensure that correct daily kWh values were recorded for all speed signs and traffic safety cameras. The impact is assessed to be low based on the wattage differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Unknown
Preventative actions taken to ensure no further issues will occur	**Completion date**	

3.2. Volume information accuracy (Clause 15.2 and 15.37B(c))

Code reference

Clause 15.2 and 15.37B(c)

Code related audit information

The audit must verify that:

- *volume information for the DUML is being calculated accurately*
- *profiles for DUML have been correctly applied.*

Audit observation

The submission was checked for accuracy for the month the database extract was supplied. This included:

- checking the registry to confirm that the ICP has the correct profile and submission flag; and
- checking the database extract combined with the burn hours against the submitted figure to confirm accuracy.

Audit commentary

RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

A monthly report from the database is provided to Genesis, and used to calculate submissions. Genesis submits the DUML load as NHH using the UNM profile, and multiplies the daily kWh by the number of days in the month to calculate the submission data. The correct profile and submission type is recorded on the registry for all four ICPs.

I checked the February 2019 submission data for ICPs 0007102602RN872, 0007102603RN437, 0007102604RN9FD and 0000298513MPF38, and compliance is confirmed.

Volume inaccuracy is present as follows:

Issue	Estimated volume information impact (annual kWh)
Some incorrect wattages recorded for traffic safety cameras and speed zone signs	12.57 kWh per day, or 4,588 kWh per annum
Missing wattages for two sites with speed zone signs	0.12 kWh per day, or 43.8 kWh per annum

The 2018 audit found that some existing traffic lights were turned off as part of the city rebuild, but remained active in the database. CTOC confirmed that this issue has been resolved, and the unused lights have been decommissioned and are excluded from the database.

Audit outcome

Non-compliant

Non-compliance	Description
Audit Ref: 2.1 With: Clause 11(1) of Schedule 15.3 From: unknown To: 12-Apr-19	The database contained some missing and incorrect daily kWh information. The errors were corrected during the audit. Potential impact: Low Actual impact: Low Audit history: Twice Controls: Weak Breach risk rating: 3

Audit risk rating	Rationale for audit risk rating
Low	The controls were rated as weak, because they were not sufficient to ensure that correct daily kWh values were recorded for all speed signs and traffic safety cameras. The impact is assessed to be low based on the wattage differences described above.

Actions taken to resolve the issue	Completion date	Remedial action status
The council had implemented controls to mitigate the risk, Genesis were unable to assess as the customer switched to another energy provider.	01/10/2019	Cleared
Preventative actions taken to ensure no further issues will occur	**Completion date**	

CONCLUSION

Traffic light data is maintained in RTOAD (Real Time Operations Asset Database) by CTOC. RTOAD records the quantity of each equipment type, including vehicle lanterns of various types and wattages, pedestrian lanterns of various types and wattages, illuminated signs, speed zone signs and traffic safety cameras at each intersection. The wattage for each item is multiplied by the estimated number of hours on per day, power level, and kW per hour to give a daily kWh value. The hours and power level are based on historic metering information, from when a sample of lights were metered to determine these values.

A monthly report from the database is provided to Genesis, and used to calculate submissions. Genesis submits the DUML load as NHH using the UNM profile, and multiplies the daily unmetered kWh by the number of days in the month.

Seven non-compliances were identified, and one recommendation was raised. The future risk rating of 19 indicates that the next audit be completed in three months.

Following completion of the field audit, the ICPs switched to Contact Energy, and there was a delay in receiving comments so that the report could be finalised.

The majority of the non-compliances related to an error in the calculation of daily unmetered kWh for some traffic safety cameras and speed zone signs, which were corrected during the audit. The non-compliances which were not confirmed to be cleared relate to audit trails and recording of the ICP number. These non-compliances have little to no impact but contribute nine points because controls are weak.

I recommend that the next audit is completed in a minimum of 15 months.

PARTICIPANT RESPONSE

Customer switched energy providers before Genesis were able to engage with them.