WMAC
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WMAC TRANSFORMER SENSOR

Pole Top Installation

USE CASE: High Impedance Fault Detection

HV rural feeders can break and fall to the ground or ache without tripping the upstream breaker.

These High Impedance Fault are dangerous, have the potential to cause fires and are difficult for EDB to detect.

The WMAC Voltage only DTM (DTMv) provides a low-cost way of monitoring rural LV transformers for voltage levels, voltage harmonic and loss of service/voltage. The DTMv reports over and under voltage events and records/transmits 10-minute voltages and harmonics.

A voltage loss event is reported immediately if the LV voltage at the transformer falls below 155V for more than 1 minute and is reported again when the voltage is reestablished. This voltage loss message is an effective way to monitor long rural feeders for line faults while at the same time providing voltage monitoring to ensure correct voltage levels are provide to customers.

An example of the ALARM MESSAGES activated by the loss of one HV feeder:

Device	Date/Time	Level	Message
SF24D6B5	24/08/2019 9:01	Critical	Transformer event: Loss of voltage PHA=225, PHB=145, PHC=146
SF24D6B5	24/08/2019 11:12	Critical	Transformer event: Loss of voltage PHA=236, PHB=237, PHC=231

In this case, on August 24th, there was a voltage loss event on C phase, the other phases maintained 230V. This told the control room that there was a fault on C Phase up stream for this location on the HV feeder. With multiple DTMv's installed along an HV feeder, it is easy to identify the segment of cable with the fault, and to then take the appropriate action. The recovery message shows that the voltage was back on only 131 min later.

"With information you will make better decisions."

Steve Jobs?!

For more information please contact Robert at robert.burke@wmac.cloud or call +64 21 441 032

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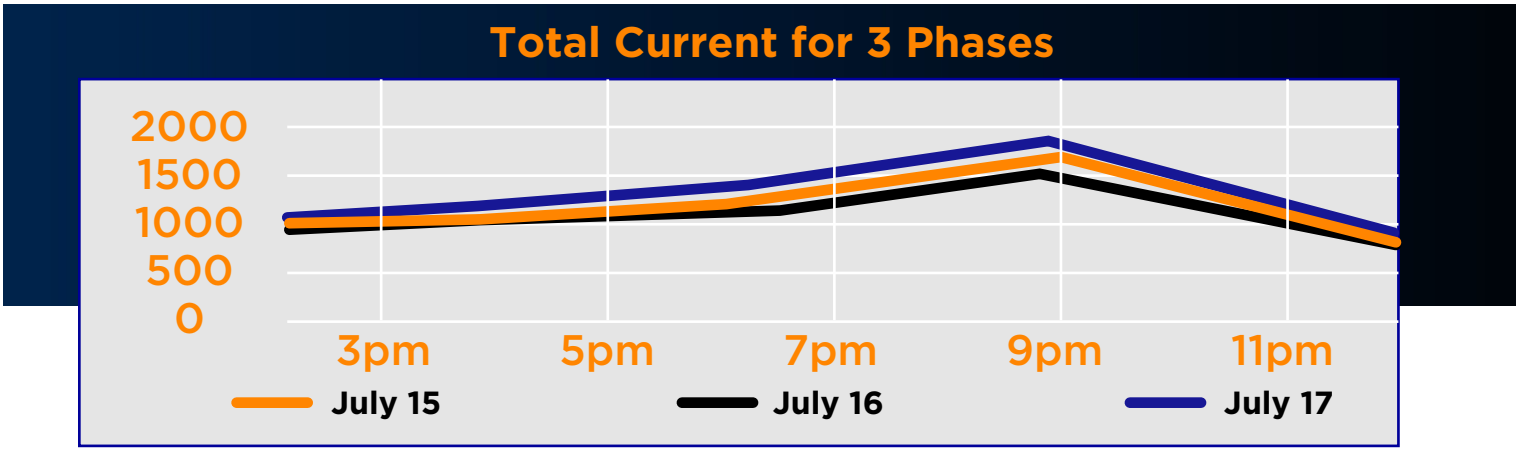
USE CASE: Effect of Electric Kiwi Hour of Free Power

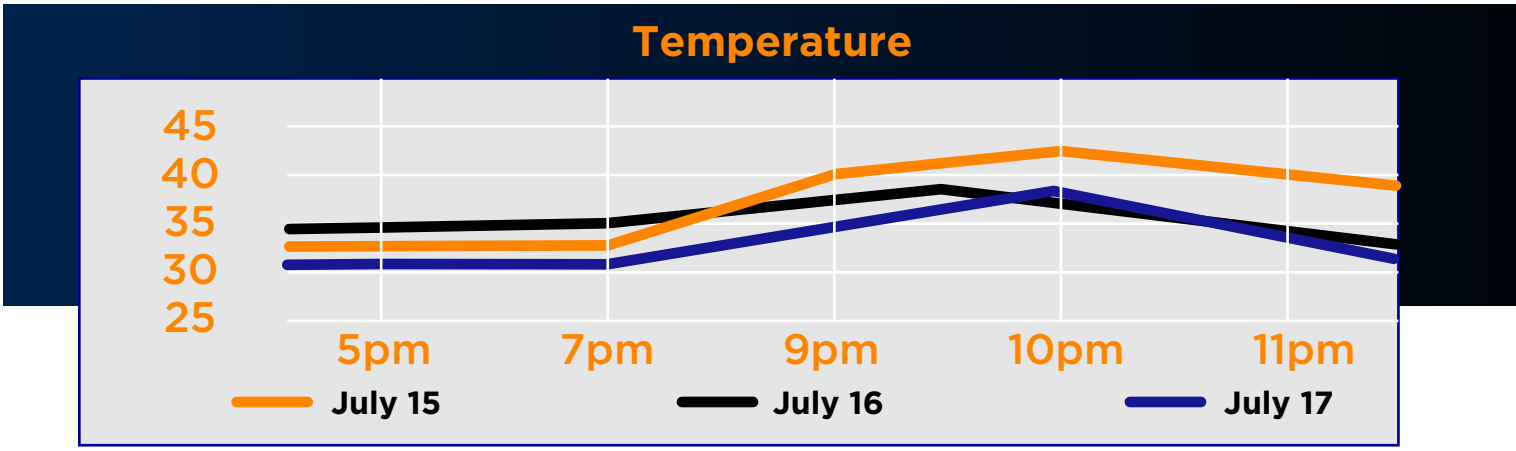
The WMAC DTM was installed in a residential transformer that serviced a large student population and the local Electricity Distribution Business was keen to understand the load characteristics. Especially the impact of the Electric Kiwi Free Hour of Power promotion https://www.electrickiwi.co.nz/hour-of-power.

Free Hour of Power allows customers to choose 1 hour of off-peak time to have free power. For students, from 9 pm to 10 pm was by far the most popular time.

Below is the average total current load for this transformer with the 1-hour average load at 3pm, 5pm, 7pm, 9pm and 11pm over 3 days. The students were not home on Friday and Saturday nights as the 9pm averages on these nights were well below weekdays.



During the 9 to 10pm period, the 300KVA transformer was operating at between 130 and 150% of capacity, during this time there was no appreciable temperature increase measured on the oil tank.



Based on a traditional approach using MDI data this transformer would have had to be replaced with a bigger transformer. But after reviewing the current and temperature data from the WMAC DTM it was obvious that although the transformer overloaded for periodsof time, was coping and there was no need to replace it with a bigger transformer.

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USE CASE: Taps Changer Setting

Maintaining 230V to customers is a key responsibility for Electricity Distribution Business.

LV Transformers are built with the ability to adjust the LV output voltage to allow for variation in HV Voltage and in the winter to allow for greater voltage drop on feeder circuits. By law Electricity Distribution Businesses need to maintain customer LV Voltage at 230V +/-6%. A Transformer TAP allows the Power Distribution Companies to adjust LV up and down to achieve their goal of 230V +/-6% at the customer's location.

The WMAC DTM is designed to continuously monitor the voltage at the transformer and to report under and over voltage events.

	Over Voltage Threshold 1 244V	Over Voltage Threshold 2 250V	Under Voltage Threshod 1 230V	Under Voltage Threshold 2 220V	Under Voltage Threshold 3 200V
20/08/2019	0	0	107	0	0
21/08/2019	0	0	117	0	0
22/08/2019	0	0	109	0	0
23/08/2019	0	0	118	0	0
24/08/2019	0	0	55	0	0
25/08/2019	0	0	0	0	0
26/08/2019	0	0	1	0	0
27/08/2019	0	0	1	0	0
28/08/2019	0	0	5	0	0
29/08/2019	0	0	7	0	0
30/08/2019	0	0	5	0	0

In this case, the transformer was struggling to maintain 230V and with voltage drop down feeders the voltage that the client would see is lower than the transformer. Before the 25th of August the transformer was struggling to maintain 230V through most of the day. On 25th of August the TAP was changed, and the number of under-voltage events dropped markedly.

Understanding the voltages at the transformers and at the corresponding end of line feeders is the only way to ensure customers are getting the voltages they are by legislation guaranteed.

"Power Quality in the responsibility of the EDB"

Steve Jobs?!

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