Memo

To Ralph Matthes

cc

From Mike Hensen

Date 12 August 2019

Subject Analysis of Interruption timing for EDB 2020-25 DPP Draft Decision cross-submission

Introduction

The purpose of this note is to summarise analysis of the duration of planned and unplanned outages reported in the 'Interruption dataset'[1] released by the Commerce Commission as part of its '[DRAFT] Electricity Distribution Services Default Price-Quality Path Determination 2020'.

The starting point for the analysis was to allocate each the SAIDI value for each outage over the 30 minute trading periods affected by the outage based on the reported starting and end time for the outage. The SAIDI values for each outage were then added up for trading periods[2]. This sum gives an indication of the customer impact of the outage profile for different electricity distribution businesses (EDB) as the time of day affected by the outage gives an indication of whether the outage is affecting customers during periods of low moderate or peak demand. (The unplanned outage data has not been normalised but excludes Orion data for the disclosure years 2011 and 2012.)

The objective of the analysis is to focus on the evidence base for following proposed approaches in the Draft Decision:

- Increases in revenue at risk for EDB unplanned outages – as stated in previous advice to MEUG on the 'Issues paper' it is not clear how an increase in the revenue at risk will make EDB more effective in improving the resilience of the network to adverse weather events or (without better asset health and criticality measures) less vulnerable to 'defective equipment'.
- relaxation of quality standards for planned outages and lower revenue at risk weightings for planned outages relative to unplanned outages. There seems to be little research on customer valuation of planned as opposed to unplanned outages. Also, the draft decision does not appear to include any quantitative evidence on either:
  - the efficiency of planned outages in avoiding or shortening future unplanned outages
  - why a 50 percent (or 75 percent) weighting on revenue at risk reflects the trade-off EDB make between planned outages and the risk of future unplanned outages.

  These comments follow-on from comments made in paragraphs 17 and 18 of the MEUG submission on the Draft Decision.

Key messages

The key messages from the initial analysis of the interruptions dataset are:

[1] 'Electricity Distribution Business Price Quality Regulation, 1 April 2020 Reset, Interruption dataset (complied from s 53ZD responses), Draft determination version, Published May 2019, Version 1.0' and released as 'Interruption dataset.xlsx"

[2] This calculation was completed for outages where there were valid start and end dates and a SAIDI value greater than zero

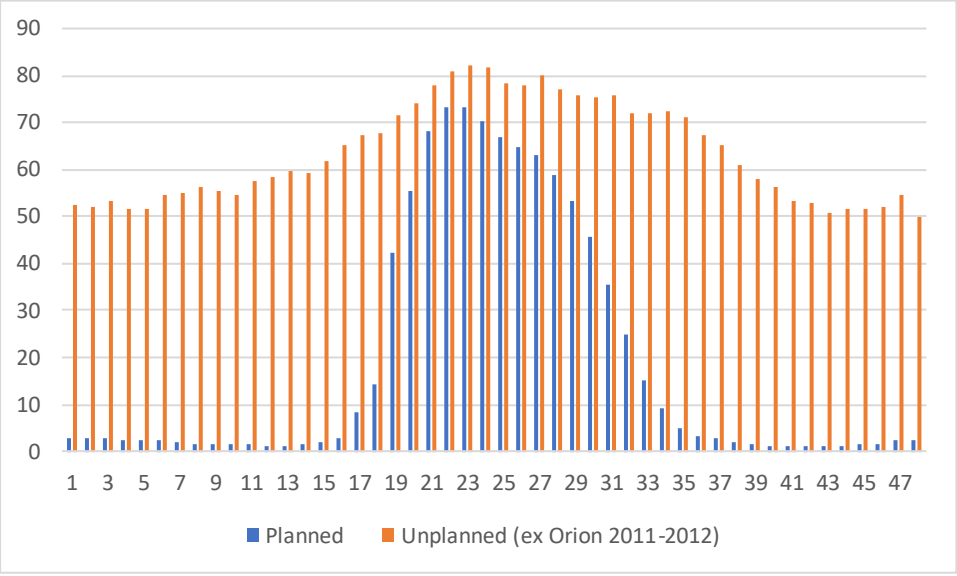
- SAIDI measures slightly overstate[3] the customer impact of unplanned outages relative to planned outages because:
  - unplanned outages seem to be evenly spread over periods of 'low demand' (23:00 to 06:00), 'moderate demand' (09:30 to 16:30 and 21:00 to 23:00), 'morning peak demand' (06:30 to 09:30) and 'evening peak demand (16:30 to 21:00)
  - planned outages tend to occur between 06:30 and 16:30 covering the morning peak and the moderate demand during the day-time
- unplanned outages:
  - as measured by the average SAIDI for each trading period for the ten year period covered by the interruptions dataset vary widely across EDB suggesting wide variation in network reliability
  - as measured by annual average SAIDI for each trading period over the ten year period covered by the interruptions dataset vary widely for individual EDB which raise doubt about its reliability as a measure of material change in the quality of the network
- planned outages as measured by the average SAIDI for each trading period for the ten year period covered by the interruptions dataset vary widely across EDB suggesting wide variation in both impact of network upgrades on customers. In the absence of usable measures of asset health, it is difficult to assess whether the difference in the impact of planned outages is driven by variation in asset quality across EDB as opposed to more different levels of effectiveness in reducing the impact of planned outages on customers.

Unplanned and planned outages

The following chart shows the annual average SAIDI for planned and unplanned outages over the ten year period covered by the interruptions dataset.

Figure 1 Average SAIDI for unplanned and planned outages – all EDB

Annual average over ten years of outages by trading period



[3] The size of the overstatement depends on the variation in load between periods. For example, the average loads for trading periods in the usual trading periods for planned outages were about 8 percent higher than the average load for the whole day over the weekdays 05 Aug 20-19 to 09 Aug 2019

Source: NZIER

Unplanned SAIDI was just over three times planned SAIDI however:

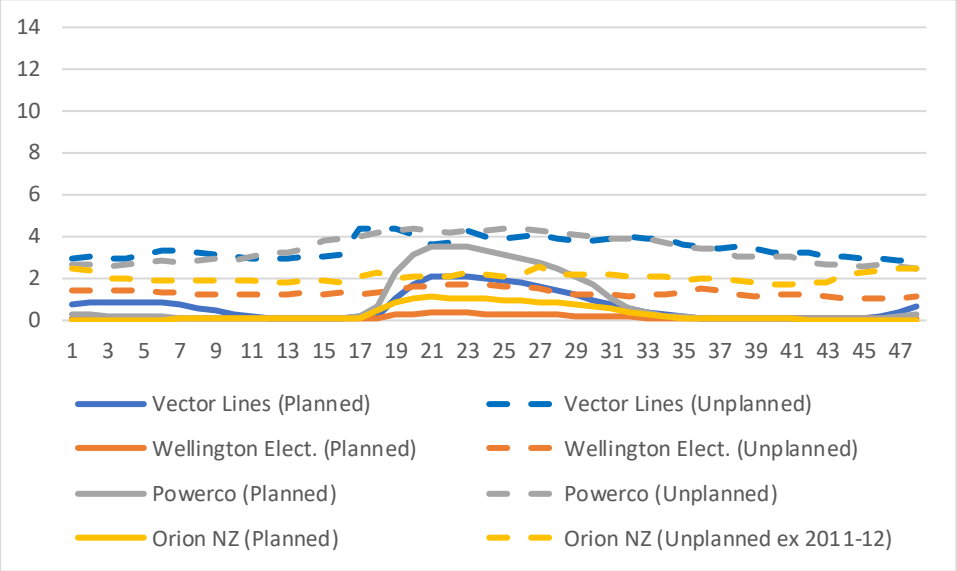
- more than one third of the unplanned outages occurred in periods where demand was 20 to 30 percent lower than over the period covered by the planned outages
- almost half of the unplanned outage SAIDI occurred in the same trading period band as planned outages.

Variation in unplanned outage across EDB

The following chart shows the annual average unplanned and planned SAIDI by trading period for the four largest EDB – Vector, Wellington Electricity, Orion and Powerco.

Figure 2 Average SAIDI for unplanned and planned outages – four EDB

Annual average over ten years of outages by trading period



Source: NZIER

Unplanned outages for each of the four EDB seem to be independent of the trading period but the level of outages and the mix of planned and unplanned outages varies by EDB.

The variation in unplanned outages for the individual EDB over the ten year history of the interruptions data set compared to both average unplanned and planned outages is much wider than is suggested by the ten year average as shown in the following charts.

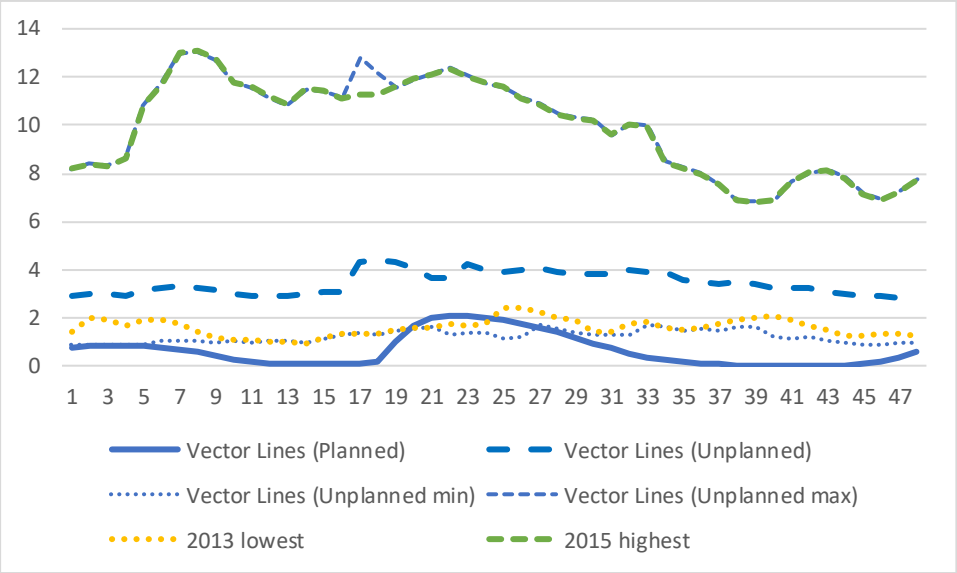
The charts show two measures of variation:

- the years with the highest and lowest total SAIDI
- a composite of the highest or lowest SAIDI for each trading period (so that the highest or lowest can come from different years).

Vector's highest and lowest years for unplanned outages were only two years apart. In the lowest year unplanned outages were comparable to average planned outages. Vector's annual planned outages have also increased – in 2018 they were almost five times the average over 2013-2015.

Figure 3 Vector average SAIDI for unplanned and planned outages

Annual average of outages by trading period

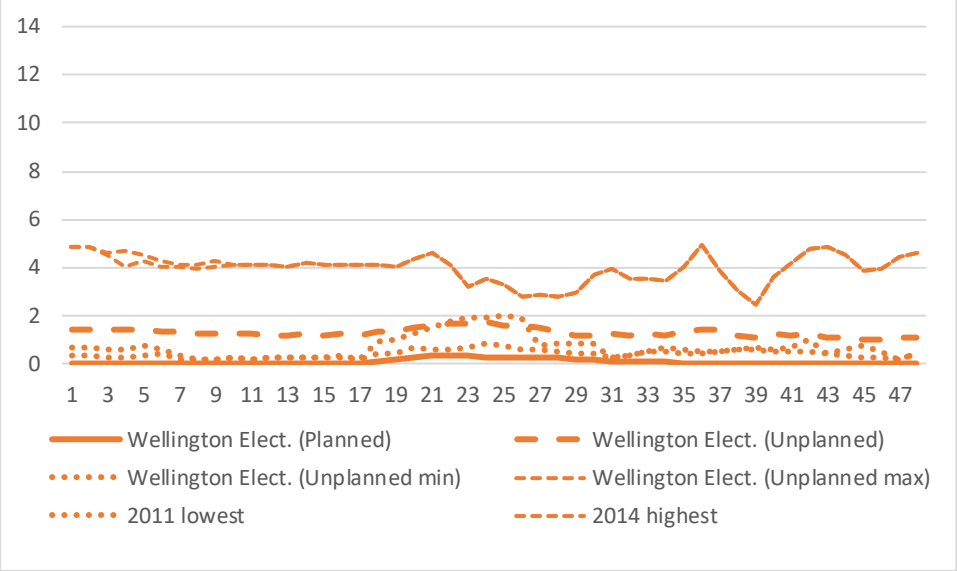


Source: NZIER

Wellington Electricity has the most tightly grouped annual totals for unplanned outage SAIDI and the lowest average level of planned outage SAIDI of the four largest EDB. However, in 2018 planned outages were about three times higher than in 2014 and 2015.

Figure 4 Wellington Electricity average SAIDI for unplanned and planned outages

Annual average of outages by trading period

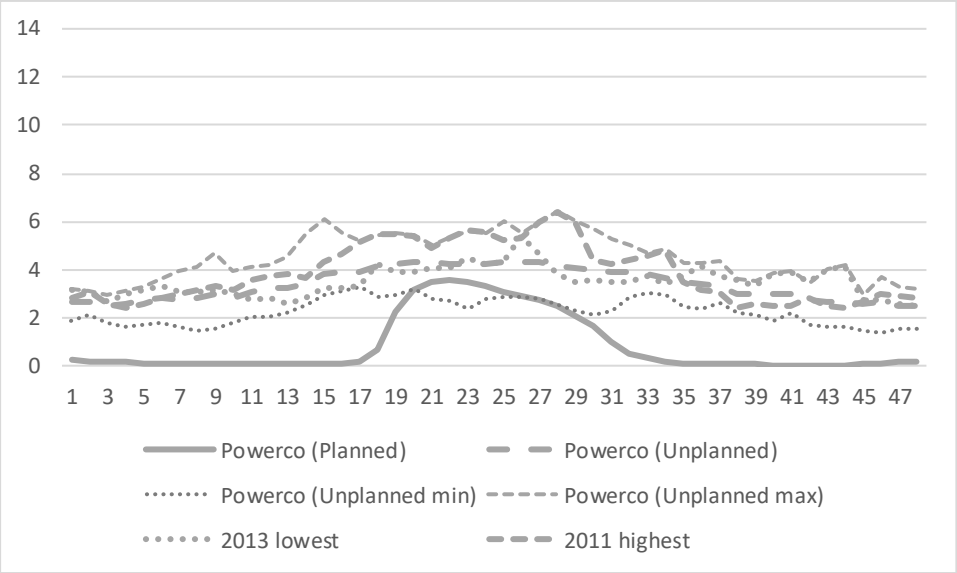


Source: NZIER

Powerco's annual unplanned outage SAIDI numbers are tightly grouped (aside from the 2011 low) Powerco's planned outage SAIDI numbers are not as tightly grouped as the unplanned SAIDI outage numbers and were low in 2016 to 2018 compared to previous years.

Figure 5 Powerco average SAIDI for unplanned and planned outages

Annual average of outages by trading period

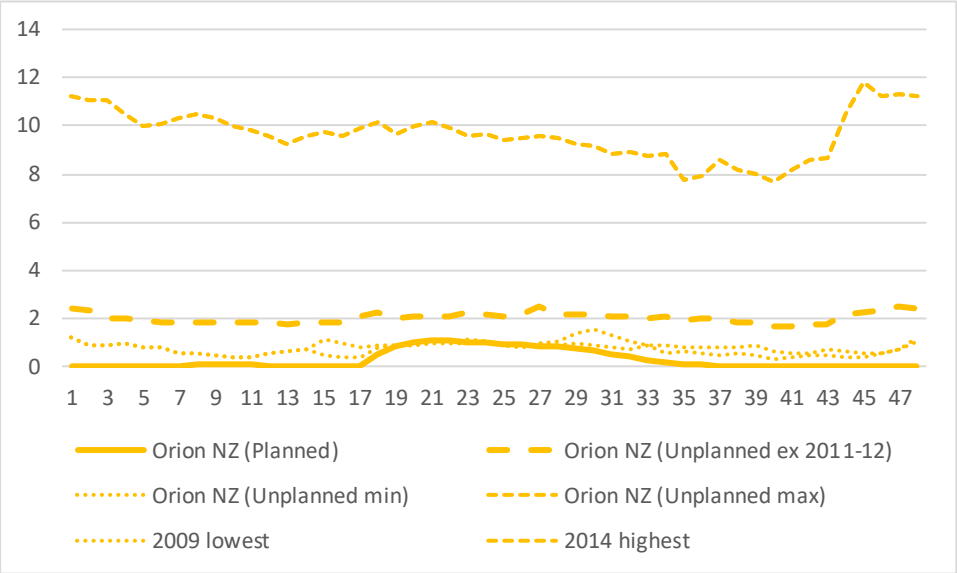


Source: NZIER

Orion planned outage SAIDI numbers are tightly grouped. Unplanned outages have fluctuated (excluding the disruption in the 2012 and 2013 caused by earthquakes).

Figure 6 Orion average SAIDI for unplanned and planned outages

Annual average of outages by trading period



Source: NZIER

Conclusion

Unplanned and planned outage SAIDI data for EDB has varied widely for the four largest EDB over the past ten years. The available data does not illustrate either a trade-off between planned and unplanned outages or any clear direction of travel in outages for the EDB as a group but does indicate that unplanned outages can fluctuate widely.