DPP3 Quality Standard Variation Proposal

pursuant to clause 4.5.5 of the Electricity Distribution Services Input Methodologies Determination 2012

30 June 2020

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30 June 2020

Mr Dane Gunnell
Manager, Price-Quality Regulation
Commerce Commission
44 The Terrace
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By email only: dane.gunnell@comcom.govt.nz

Dear Dane

DPP3 QUALITY STANDARD VARIATION PROPOSAL

As the Commission knows, Aurora has applied for a 3-year customised price-quality path (CPP) to commence from 1 April 2021; however, we have outlined in our CPP application that we intend to apply for a second, consecutive, 5-year CPP. Consequently, Aurora anticipates only being subject to DPP3 for the first year of the DPP regulatory period - RY21.

The purpose of this letter is to request a quality standard variation for RY21. For the reasons set out in this document, Aurora's network performance has deteriorated during DPP2, and the proposed DPP3 targets are limited to values that are not reasonably achievable. Compliance with the DPP3 quality standards in RY21 could not be achieved with an efficient level of expenditure, appropriate to the expressed preferences of our consumers, nor is the timeframe available to achieve such a change in performance. Accordingly, we have proposed an alternative quality standard that better reflects the realistically achievable performance of our network in RY21.

We have not proposed alternative quality standards for the remainder of the DPP3 regulatory period on the basis that the Commission will determine quality standards for the remainder of the DPP regulatory period pursuant to Aurora's CPP applications.

Our DPP3 quality standard variation proposal relies on work undertaken to support the quality standard variation proposed for our three-year CPP proposal, including consumer consultation and independent verification.

Yours sincerely

Alec Findlater
General Manager – Regulatory & Commercial

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1 Summary

1. The Commission has set separate quality standards for planned and unplanned interruptions for DPP3. The unplanned quality standard sets an annual limit of 81.89 SAIDI and 1.4687 SAIFI.

2. The planned quality standard sets a limit of 979.80 SAIDI for the five years of DPP3. However, because Aurora will transition to a CPP commencing 1 April 2021, the planned quality standard is pro-rated to reflect the shorter period that Aurora will be on the DPP. Pursuant to clause 9.4 of the Electricity Distribution Services Default Price-Quality Path Determination 2020 (the DPP3 Determination), Aurora will be subject to adjusted (pro-rated) limits of 195.96 SAIDI and 1.1077 SAIFI for planned work in RY2021.

Table 1: Summary of applicable quality standards in RY2021 under DPP3

	SAIFI limit	SAIFI limit
Planned	195.96	1.1077
Unplanned	81.89	1.4687

1.1 Planned quality standard

3. Planned outages are required so we can safely access the network to maintain and replace equipment. They are notified to customers in advance, via energy retailers, and online. If the work affects a wide area, we talk directly to communities about what is planned and when.

4. Under our proposed plan, we forecast planned reliability remaining at similar levels to the past three years' average as we continue high levels of renewal and maintenance on the network.

5. Our forecast planned SAIDI and SAIFI is generally consistent with the Commission's DPP3 limit.

6. We consider that we can manage our RY21 works programme to remain within the pro-rated planned reliability limits and, therefore, we are not proposing to vary the planned quality standard. It is our intention that the de-weighting for notified interruptions / additional notice be applied consistent with DPP3.

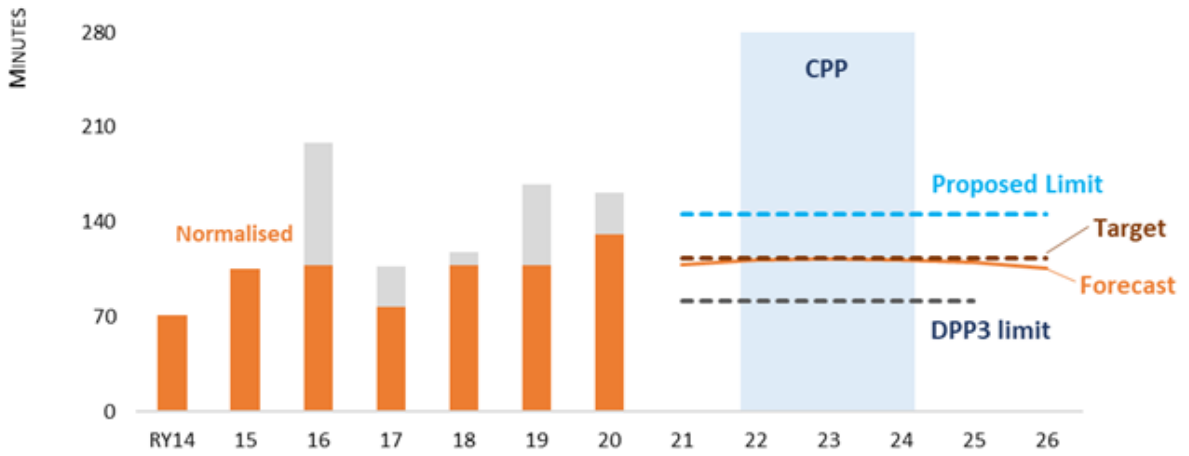
1.2 Unplanned quality standard

7. Unplanned outages, or faults, reflect the underlying condition of network assets and the impact of external events such as extreme weather, trees contacting lines and cars colliding with poles.

8. Under our proposed quality standard variation, we forecast unplanned reliability to stabilise as a result of our replacing ageing poles and overhead lines, our modelling of non-asset related outages and the impact of our forecast expenditure in relation to vegetation management.

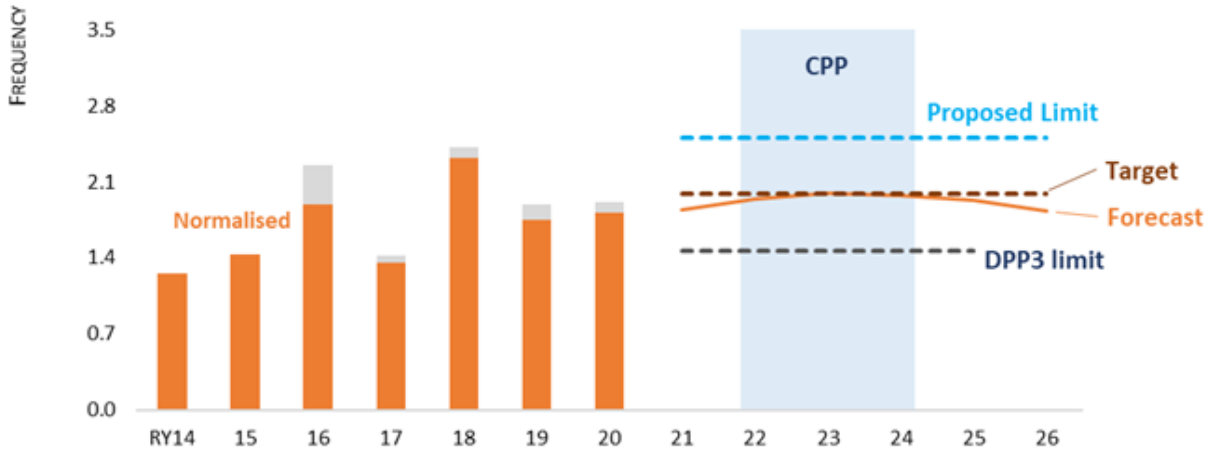
9. Figure 1 and Figure 2, below, set out our forecast unplanned reliability and proposed quality limits for RY21, into the proposed CPP period and beyond to RY26. To recognise the inherent uncertainty in our models, and almost constant level of the forecast over our proposed CPP period, we have adopted a 'flatline' target that reflects the highest annual forecast over the DPP3 regulatory period.

Figure 1: Historical and forecast duration of unplanned outages (SAIDI RY14-RY26)



10.

Figure 2: Historical and forecast number of unplanned outages (SAIFI RY14-RY26)



11. Table 2, below, shows our proposed unplanned SAIDI and SAIFI limits.

Table 2: Proposed unplanned SAIDI and SAIFI parameters

Unplanned Interruption Quality Standard	SAIDI	SAIFI
Unplanned limit	146.29	2.5067
Unplanned boundary value	5.69	0.0737
Unplanned interruption target	113.34	1.9948
Forecast average	110.33	1.9195
Scaled standard deviation	16.48	0.2560

2 Power to Amend Price-Quality Path

12. Under clause 4.5.6 of the Input Methodologies, a DPP may be reconsidered by the Commission if the Commission receives a quality standard variation proposal from an EDB and is satisfied that it complies with clause 4.5.5(2). Clause 4.5.5(2) requires a quality standard variation to include:

    12.1. different values of SAIDI and SAIFI to those which would be determined in accordance with the methodology for calculating reliability limits and incentives as specified in the DPP determination;

    12.2. an explanation of the reasons for the proposed quality standard variation;

    12.3. an engineer's report on the extent to which the quality standard variation better reflects the realistically achievable performance of the EDB over the DPP regulatory period;

    12.4. demonstration of the estimated effect of the proposed quality standard variation by use of historic data and by contrast with the quality standards specified in the applicable DPP determination; and

    12.5. demonstration of any consumer consultation undertaken by the EDB in respect of the quality standard variation, and the results of that consultation.

13. Recognising that our CPP application required us to provide equivalent information to that listed in paragraph 12, above, we wrote to the Commission on 5 December 2019 suggesting that our CPP consumer consultation could be relied upon for the purposes of the of evaluating the quality standard variation proposal, as could the CPP independent verifier's report, as this is in all material respects equivalent to an independent engineering report. Such an approach would efficiently deal with separate but equivalent compliance requirements. On 17 March 2020, the Commission advised that it was comfortable with the proposed approach, but noted that it reserved the right to request additional information if it considered the information we provide is insufficient to determine the quality standard variation.

14. Please refer to:

    14.1. section 3 for further detail on the reasons for Aurora's proposed quality standard variation;

    14.2. section 4 for further detail on Aurora's proposed SAIDI and SAIFI quality standards, and section 7 for further detail on Aurora's proposed quality incentives;

    14.3. section 4 and section 5 for further detail on the estimated effect of the proposed quality standard variation;

    14.4. section 3.3 for a summary of Aurora's consultation in respect of the proposed quality standard consultation, and our CPP consultation report. A copy of the report accompanies this application; and

    14.5. our CPP independent verifier's report (section 3.4 and Appendix E). A copy of the report accompanies this application.

3 Reasons for the Proposed Quality Standard Variation

15. In summary, the reasons justifying the variation of Aurora's DPP3 quality standards are:

15.1. the current DPP3 quality standards are not realistically achievable considering Aurora's historic and forecast performance. Compliance with the DPP3 unplanned quality standards in RY21 could not be achieved with an efficient level of expenditure, appropriate to the expressed preferences of our consumers, nor is the timeframe available to achieve such a change in performance;

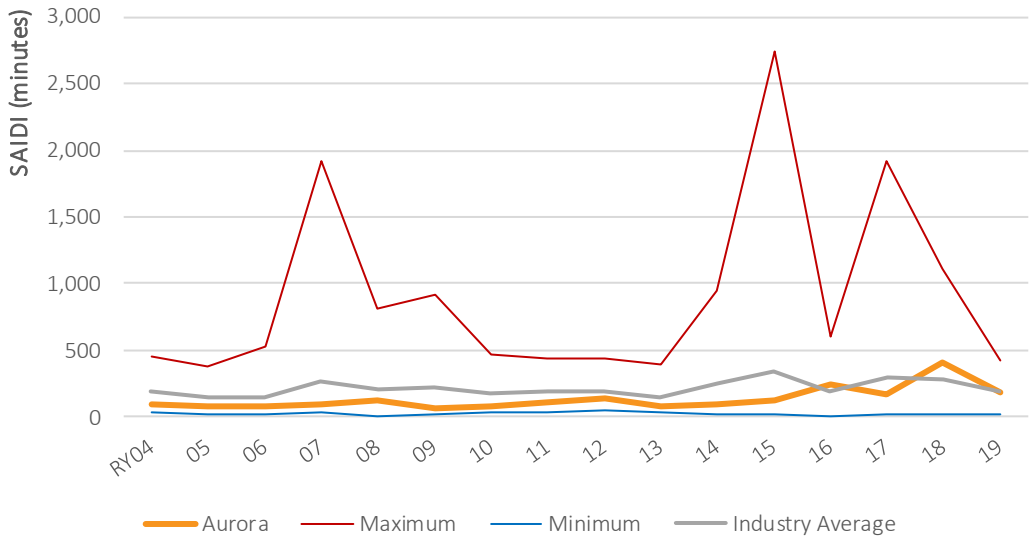
15.2. Aurora's proposed unplanned quality standards reflect the realistically achievable performance of the network considering Aurora's forecast expenditure (which exceeds the allowable expenditure in the DPP3 Determination); and

15.3. our consultation with consumers in the context of our CPP application demonstrates that there is no appetite to incur further expenditure – and price increases – to achieve compliance with the quality standards in RY2021.

3.1 Overview

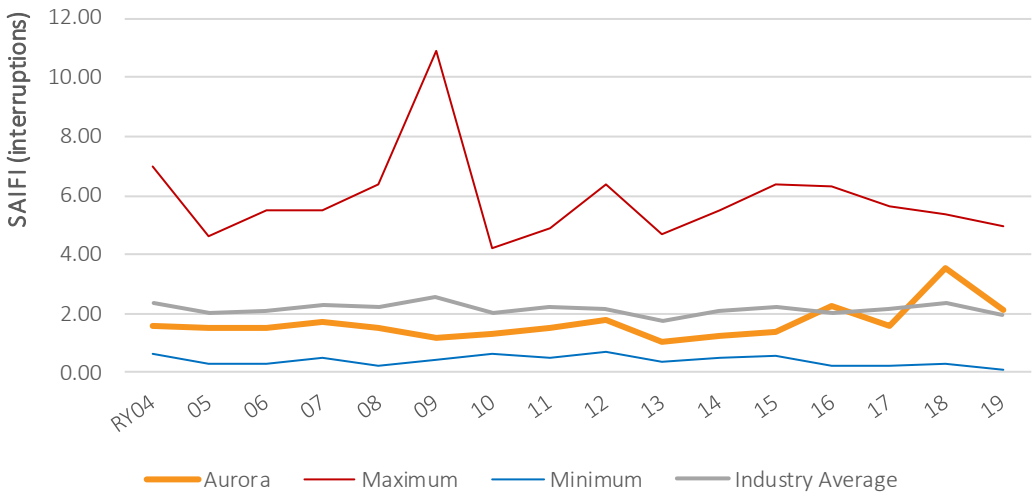
16. Our past reliability performance has historically compared favourably with our peers, as shown in Figure 3 and Figure 4, below[1].

Figure 3: Historic SAIDI performance



[1] PricewaterhouseCoopers. Electricity information disclosure compendia.

Figure 4: Historic SAIFI performance



17. Our reliability performance has been well below the industry average for many years; however, we have seen a deteriorating trend in recent years which has led to breaches of our regulatory compliance limits in 2012 and 2016 to 2019.

18. Our customers have told us they expect us to provide a reliable electricity supply and be safety conscious. Approximately 90% of the residential and business customers we surveyed described these attributes as 'essential'. They have also told us that while reliability is very important, price increases are a greater concern at this time.

19. Therefore, our immediate focus is on delivering better safety outcomes through improved asset health. This is likely to result in a modest consequential reliability improvement that will put us on track to meet customers' reliability expectations in the medium-term, which is beyond the forthcoming CPP period.

20. While our reliability performance is now close to industry average and customers have told us this is acceptable while we address safety related risks as a priority, the DPP3 limits do not reflect this lower level of reliability performance and therefore present an unacceptable risk of continued breaches and associated reputational and financial risks.

21. We are committed to arresting declining reliability in the short-term, and delivering reliability performance in the medium-term that will meet our customers' expectations. We know that turning around reliability performance is not just about asset investment. It also requires improved analytics, investigation, operational response and enhanced communication to ensure that our limited resources are channelled to maximum effect.

22. With the above observations in mind, and with the strong support of our Board, we have established a Reliability Management Plan to ensure that levers with the potential to affect reliability performance and customer service are actively managed by the business. In total, we have identified 39 levers which span each of the business's functional areas. Our Reliability Management Plan is supported by a governance process that prioritises and monitors actions that are expected to drive reliability improvements.

23. We have improved our modelling capability to forecast reliability performance, measured by SAIDI and SAIFI. Improving our analytical capability in this area assists us in understanding the root causes of our reliability performance and identifying the optimum improvement

initiatives, given our resource constraints. In addition, our modelling has informed the setting of our CPP proposal. This process has also highlighted the gaps in our current knowledge and reinforced the inherent uncertainty in forecasting future reliability performance.

24. Our quality proposal for the CPP period focuses on stabilising recent reliability performance in the short term and establishing a foundation for returning, subject to consumer support, to higher levels of reliability in the medium term.

3.2 Historical Performance

25. This section sets out our historical network reliability performance and compares that performance to the targets set by the Commission in its Default Price-Quality Path Determinations. Historical data from RY09 to RY20 is presented to demonstrate the long-term trend in network performance.

26. For simplicity, the data has been shown in two groups in the charts:

- RY16 to RY20 is denoted DPP2; and
- all years prior to DPP2 have been denoted as DPP1, noting that DPP1 dates were actually RY11 to RY15.

3.2.1 SAIDI

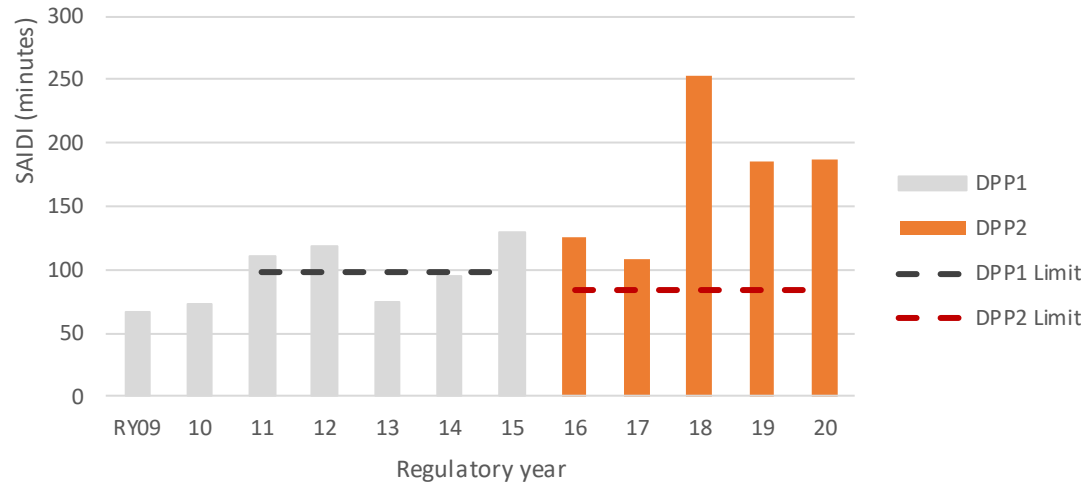
27. During DPP2, network performance was reported as the sum of normalised unplanned SAIDI plus adjusted planned SAIDI, where:

- normalised unplanned SAIDI was adjusted to replace SAIDI incurred during Major Event Days (MEDs) with the MED Boundary Value and to exclude other excludable events;
- planned SAIDI was adjusted to de-weight the SAIDI incurred by 50%; and
- an unplanned interruption is any interruption where there was less than 24 hours' notice, or no notice, provided to the public or all consumers affected by the interruption. Otherwise it was classed as a planned interruption.

28. Whilst our historical reliability performance compares favourably with our peers, Figure 5 shows the historical performance of reported SAIDI has an increasing trend and comparison to the DPP2 target shows that Aurora exceeded the target during each year of the period.

29. In addition, Aurora also exceeded the limits during DPP1, indicating the historical limits have been low compared to network performance and there has been a long-term increasing trend (declining performance) on the network.

Figure 5: Historical reported SAIDI performance

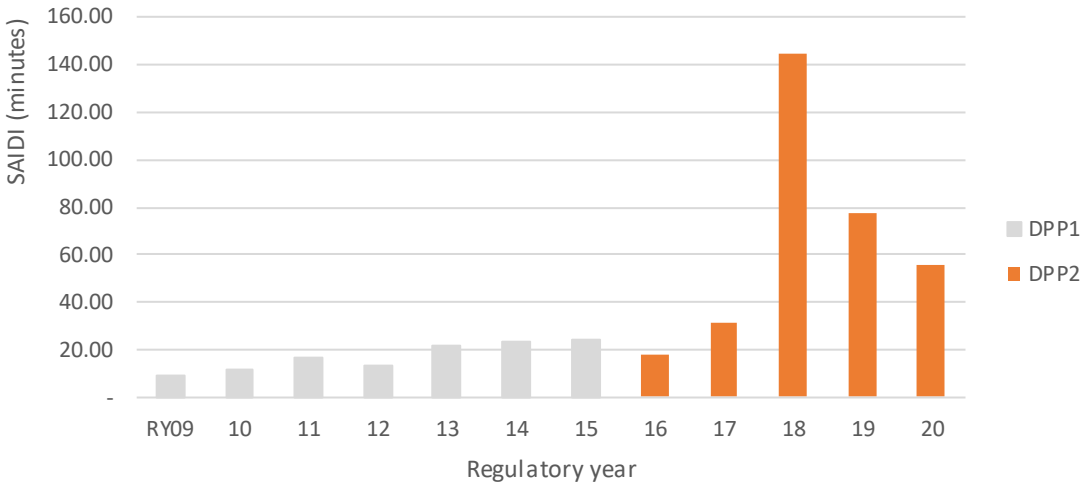


30. Performance is separated into the component parts of planned and unplanned SAIDI in Figure 6 and Figure 7. This shows that a significant driver of the total SAIDI in RY18 through to RY20 was caused by planned activities.

31. The planned activities in RY18 and RY19 are the result of Aurora's accelerated pole replacement program and other planned initiatives to improve the condition of the network and reduce safety risk.

32. The reduction in RY19 and RY20 shows that the type of asset renewals undertaken had a lower impact on planned outages. This outcome demonstrates the importance of analysis to understand the linkage between each asset renewal programme and the impact on planned outages.

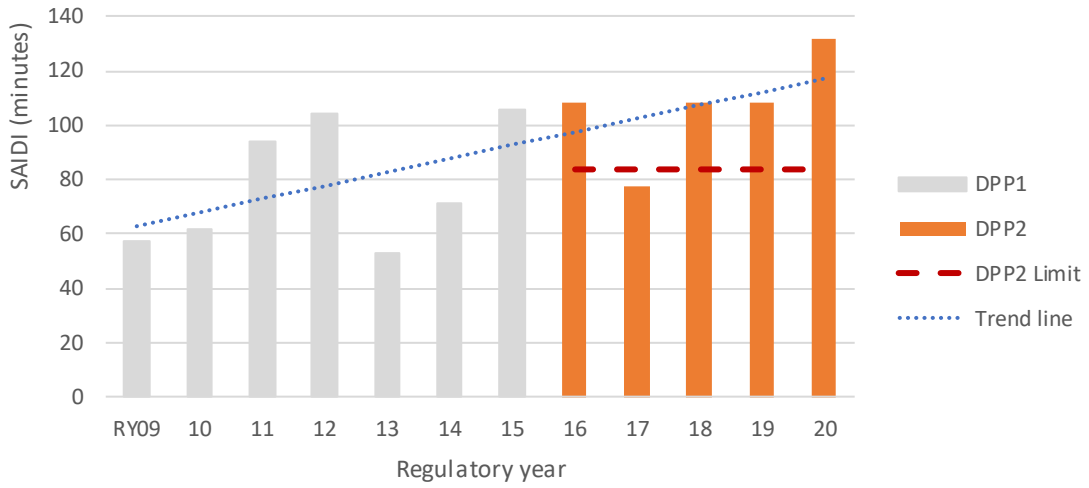
Figure 6: Historical adjusted planned SAIDI



33. However, Figure 7 shows that even excluding planned outages, the unplanned SAIDI performance would have exceeded the target in all years except for RY17. Normalised unplanned SAIDI has been demonstrating an increasing trend since 2009. During DPP2, non-

asset related outages (for example vegetation and animals) have contributed 77% of the outages.

Figure 7: Historical normalised unplanned SAIDI



3.2.2 SAIFI

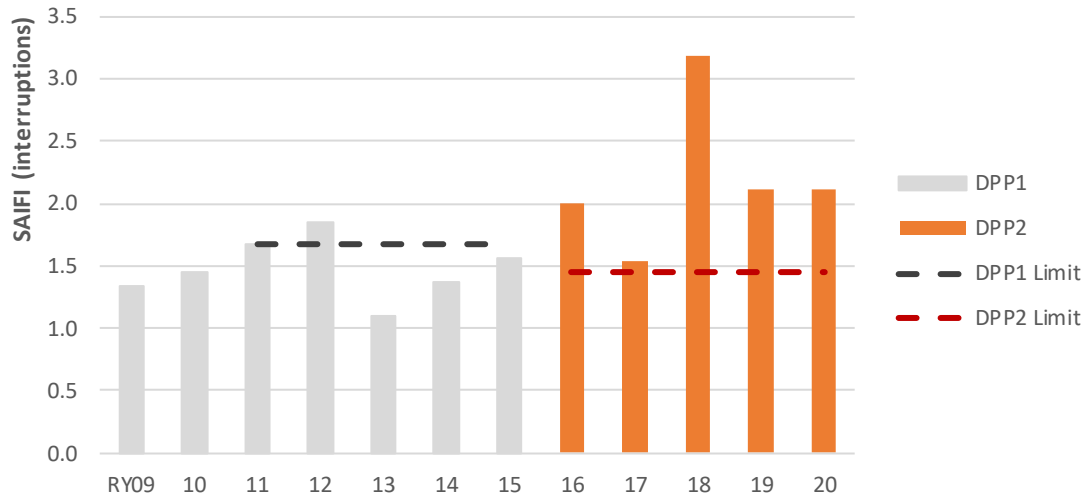
34. During DPP2, network performance was reported as the sum of normalised unplanned SAIFI plus adjusted planned SAIFI, where:

- normalised unplanned SAIFI was adjusted to replace SAIFI incurred during Major Event Days (MEDs) with the MED Boundary Value and to exclude other excludable events;
- planned SAIFI was adjusted to de-weight the SAIFI incurred by 50%; and
- an unplanned interruption is any interruption where there was less than 24 hours' notice, or no notice, provided to the public or all consumers affected by the interruption. Otherwise it was classed as a planned interruption.

35. Figure 8 shows the historical performance of reported SAIFI compared to the DPP2 target. This demonstrates that Aurora exceeded the target during each year of the period.

36. In addition, Aurora also exceeded the limits twice during DPP1, indicating the historical limits have been low compared to network performance and there has been a long-term increasing trend (declining performance) on the network.

Figure 8: Historical reported SAIFI performance

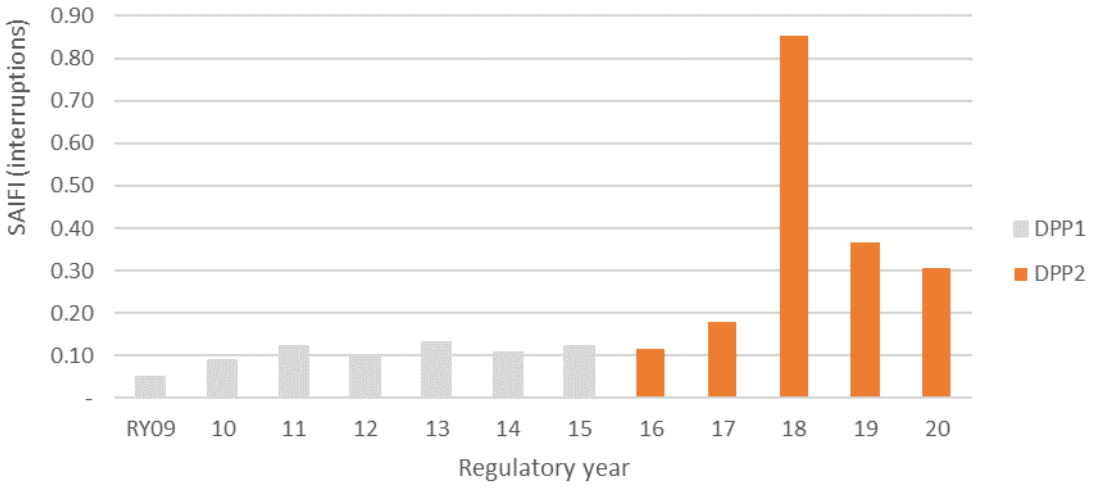


37. The performance is separated into the component parts of planned and unplanned SAIFI in Figure 9 and Figure 10. This shows that a significant driver of the total SAIFI was caused by planned activities.

38. These planned activities in RY18 and RY19 are the result of Aurora's accelerated pole replacement program and other planned initiatives to improve the condition of the network and reduce safety risk.

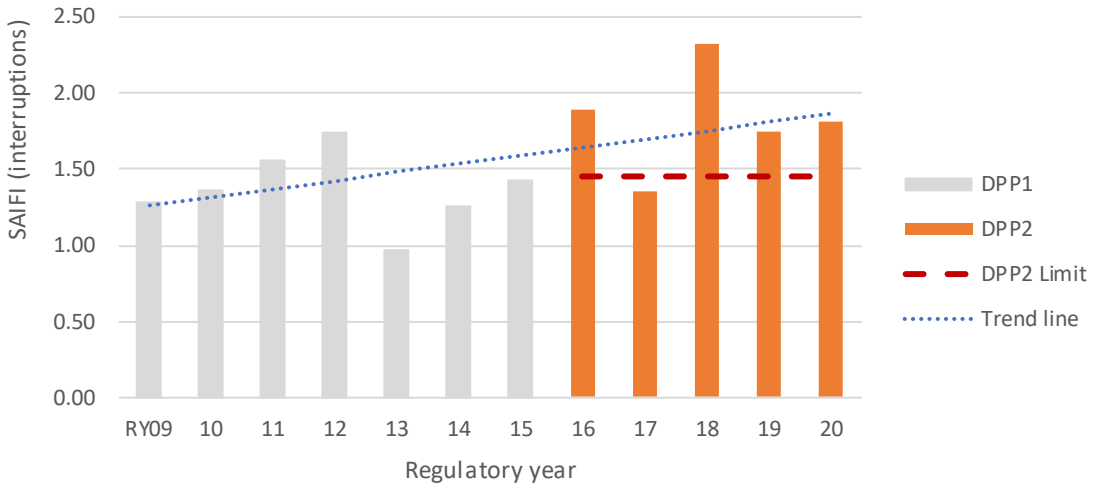
39. The reduction in RY19 and RY20 shows that the type of asset renewals undertaken had a lower impact on planned outages. This outcome demonstrates the importance of analysis to understand the linkage between each asset renewal programme and the impact on planned outages.

Figure 9: Historical adjusted planned SAIFI



40. Figure 10 shows that even excluding planned outages, the performance would have exceeded the target in all years except for RY17. Normalised unplanned SAIFI has been demonstrating a moderately increasing trend since 2009. During DPP2, non-asset related outages (for example vegetation and animals) have contributed 77% of the outages.

Figure 10: Historical normalised unplanned SAIFI



3.2.3 Outcome

41. The SAIDI and SAIFI charts presented above provide evidence of a sustained, long term increasing trend in unplanned outages and non-compliance with the reliability limits. We have undertaken investigations into network risk and reliability. In 2013, the condition of our assets was highlighted as a primary driver of the deterioration in reliability performance in a report by Strata Energy Consulting (Strata) for the Commission[2]. More recently, we engaged WSP to review the condition of our electricity networks, following public concerns regarding the safety of our assets. In its independent expert report, WSP highlighted reliability and safety issues arising from the following asset classes[3]:

- protection systems;
- support structures, including both poles and the pole top structures;
- overhead conductors; and
- distribution switchgear,

42. WSP also identified a trend increase in the percentage of unplanned outages caused by defective equipment.

43. The combined impact of deteriorating asset health, changes in operational practice to better manage safety and fire risk[4], and an increase in planned outages to support higher volumes of asset renewals, has led to our reliability performance struggling to meet the Commission's compliance standards.

44. Compliance with the unplanned quality standards in RY21 could not be achieved with an efficient level of expenditure, appropriate to the expressed preferences of our consumers, nor is the timeframe available to achieve such a change in performance.

2 Strata Energy Consulting, Report on the reliability performance of Aurora Energy Limited, Produced for The Commerce Commission, 24 June 2013

3 WSP, Independent Review of Electricity Networks, 21 November 2018, page 49.

4 These practices include inhibiting the use of auto reclosers and conducting full line patrols prior to re-energising lines during summer months, to manage fire risk.

3.3 Consumer and Stakeholder Preferences

45. Aurora undertook extensive community and stakeholder consultation to provide a key input for developing the capital and operational expenditure strategies and plans for its CPP proposal. The consultation occurred in stages throughout the development of the CPP proposal and included:

- telephone surveys of more than 1,000 residential and more than 100 business customers;
- engaging directly with local customers through six separate Customer Voice Panels in three locations across the network; and
- convening a CPP Customer Advisory Panel, which brought together community organisations, consumer advocacy groups, local Councils and sector participants through a series of facilitated workshops.

46. The overwhelming results were that consumers generally accepted the current level of network reliability provided by Aurora and were primarily concerned about network safety, the cost of electricity and other non-network service metrics. Approximately 90% of residential and business customers regarded safety attributes as either 'essential' or 'very important', while a significant amount of feedback identified that affordability was a significant issue for many customers, with price increases being a greater concern than reliability at this time.

47. The feedback and information gathered through these engagement processes was reflected in a consultation document on our draft plans published in December 2019 . The consultation document also set out alternative scenarios which had a stronger focus on improving reliability and the resulting impact on electricity prices.

48. Customers and stakeholders confirmed that there is very limited appetite for additional investment above the level set out in our draft plan. In summary, customer feedback indicates that whilst reliability remains 'essential' or 'very important', affordability and safety considerations are currently more important.

49. The outcome of the consultation has been incorporated in our expenditure forecasts through the focus on network safety and recognising reliability improvement as a secondary benefit, not the primary driver. This is reflected in the forecast reliability performance which shows the decline in reliability will be arrested and a slight improvement will be achieved from around RY24 due to safety-focused asset renewal.

3.4 Alignment to Aurora Energy's Policies

50. Our mission is to deliver electricity to our communities when and where it is needed; safely, reliably, and efficiently. Our quality standard variation proposal is governed by our policies, which reflect our network obligations and customer preferences. Our suite of network management documentation starts with our Asset Management Policy which states:

- We expect safety, nothing less. We will never do anything that undermines this core commitment.
- We will use improved asset data and complete, accurate and timely information to ensure decisions deliver value while balancing cost, risk and performance. We will monitor the performance of the network to ensure that benefits are realised.
- We will build effective relationships with our customers and stakeholders and align our asset management decisions to our understanding of their balanced needs and values.

- We will be visible in providing an enduring network that meets our understanding of customers' long-term needs, to ensure that we are recognised for providing essential electricity services to support the future growth and wellbeing of our communities.

51. Customer consultations have shown that customers place a high degree of value on the safety of the network. Our acknowledgement of this is demonstrated by building a high-performance safety culture in order to safeguard the public and to ensure an injury-free workplace. Aurora wishes to prioritise expenditure accordingly in order to deliver safety improvements, causing zero harm to the general public and eliminating, as far as is reasonably practicable, safety risks to its own workforce.

52. Whilst another priority is the delivery of excellence in asset lifecycle management, which can be measured by delivering improved asset performance and reliability, customers have expressed that they would prefer maintaining current levels of reliability if it meant that significant cost increases required for improvement could be avoided. Customer preference is that any cost increases should first and foremost result in safety improvements, and that any reliability improvements would be an additional benefit resulting from improvements in safety.

53. We have acknowledged our customers' preference in our Reliability Management Plan. The plan identifies the 'performance levers' we can use to manage network performance and customer experience. This plan, however, recognises the safety focus and constraints of the CPP expenditure program and that in the short-term, any reliability improvements will be achieved through safety-driven works and there will not be any reliability specific programs.

54. Our quality standard variation proposal therefore reflects our policies and what customers have told us are their 'balanced needs'. This means deferring reliability investment in the short-term to focus on safety while positioning the network to create reliability performance options that meet the long-term needs of our customers.

3.5 Recent Changes in the DPP3 Decision

55. A key purpose of forecasting our future reliability performance is to inform the reliability standards that we will propose for the CPP period. Our view is that these limits should be calculated in accordance with the Commission's definitions of planned and unplanned reliability performance, which have been amended in its recent DPP3 decision.

56. The Commission's DPP3 decision adopted the following design changes to the reliability standards:

- Separate standards for planned and unplanned SAIDI and SAIFI;
- Annual unplanned reliability standards for SAIDI and SAIFI;
- Unplanned reliability standard at 2.0 standard deviations greater than the historical average;
- Removed the two-out-of-three rule for planned and unplanned standards;
- Regulatory period length standard for planned SAIDI and SAIFI;
- Planned outage standard at three times the historical average;
- Introduced new measures for extreme events; and
- Applied new normalisation rules based on a 24-hour rolling window.

57. In addition, the Commission also modified the design of the incentive rates, including:

- Removing the revenue-linked quality incentive scheme for SAIFI;

- Adopting incentive rates, based on a VoLL of $25,000/MWh adjusted to reflect incentives provided by the IRIS retention factor (23.5%) and quality standards (10%);
- Setting the SAIDI targets at the historical average of unplanned SAIDI and planned SAIDI over a 10-year, 2010-2019 period;
- Setting the SAIDI cap for the incentive scheme at the compliance limit;
- Setting the SAIDI collar for the incentive scheme at zero; and
- Adopting a maximum revenue-at-risk of 2%.

58. We support the Commission's latest approach to establishing the quality path, as set out in its DPP3 decision. However, it is appropriate for us to undertake further analysis to assess whether the specific limits and targets in the DPP3 decision are reasonable for us, given our proposed expenditure plans, the condition of our network assets, and other factors affecting our future reliability performance. Our assessment has been informed by our reliability modelling, as described in section 6. We set out our findings in the following sections.

4 Proposed Quality Standard Variation

59. In this section, we set out our proposed quality standards parameters, targets and limits for planned and unplanned reliability.

60. Our analysis has concluded that the Commission's DPP3 reliability standards for planned SAIDI and SAIFI are appropriate for RY21, at pro-rated values of 195.96 (SAIDI) and 1.1077 (SAIFI).

61. However, this is not the case for unplanned SAIDI and SAIFI. In our 2020 AMP, we were required, pursuant to clause 5 of Attachment A of the Electricity Distribution Information Disclosure Determination 2012 to disclose targets that should reflect what is practically achievable given the current network configuration, condition and planned expenditure levels. We therefore developed an alternative forecast for unplanned SAIDI and SAIFI that better reflects the historical network performance, the views and feedback from our consumers, and the objectives of our safety focused capital and operational programme of works going forward.

62. These alternative unplanned reliability measures better achieve the Expenditure Objective[5] by minimizing the cost impact on consumers while still ensuring a safe network that achieves the level of reliability identified as the consumer preference during our consultation process.

4.1 Quality Standards – Planned Interruptions

63. Aurora accepts the planned accumulated SAIDI and SAIFI limits set out by the Commission in Table 3.1.1 of the DPP3 Determination for the five-year DPP period RY21 to RY25, however we propose to adjust the limits on a pro-rata basis for RY21, as set out in Table 3 below, pursuant to clause 9.4 of the DPP3 Determination.

[5] While the Expenditure Objective is a construct that applies to CPPs, we consider that it is appropriate to consider the extent to which a DPP quality standard variation better achieve the principles of the Expenditure Objective, especially under Aurora's circumstances where we have had to lift expenditure significantly above the DPP allowances. Meeting the Expenditure Objective is further discussed in section 8.

Table 3: Proposed planned accumulated SAIDI and SAIFI limits

Proposed Planned Quality Standards	DPP3	RY 21
Planned SAIDI limit (minutes)	979.80	195.96
Planned SAIFI limit (interruptions)	5.5385	1.1077

4.2 Quality Standards – Unplanned Interruptions

64. As shown in section 3.2, unplanned SAIDI and SAIFI performance of the network has been deteriorating since RY09.

65. In section 3.3, we described that extensive consultation found that consumer and stakeholder preference was to prioritise safety whilst minimising the cost impact to customers. Importantly, consumer and stakeholder sentiment was that the current level of network reliability was considered acceptable. We developed our capital and operational expenditure forecasts to achieve these objectives.

66. Our proposed SAIDI and SAIFI quality standards for unplanned interruptions are set out in Table 4, below. These values represent the reliability outcomes resulting from an efficient capital and operational expenditure programme that is primarily targeted at managing network safety.

Table 4: Proposed unplanned SAIDI and SAIFI standards

Unplanned Interruption Quality Standard	SAIDI	SAIFI
Unplanned limit	146.29	2.5067
Unplanned boundary value	5.69	0.0737
Unplanned interruption target	113.34	1.9948
Forecast average	110.33	1.9195
Scaled standard deviation	16.48	0.2560

67. Figure 11 and Figure 12 below compare the proposed parameters with the historical unplanned SAIDI and SAIFI performance of the network and the DPP3 Determination.

68. The charts demonstrate that Aurora's proposed parameters are consistent with historical performance when compared on a like-for-like basis. In addition, the target and limit require Aurora to meet the objective of arresting the historical trend of deteriorating performance and to maintain current levels of reliability.

Figure 11: SAIDI forecast, targets and limits

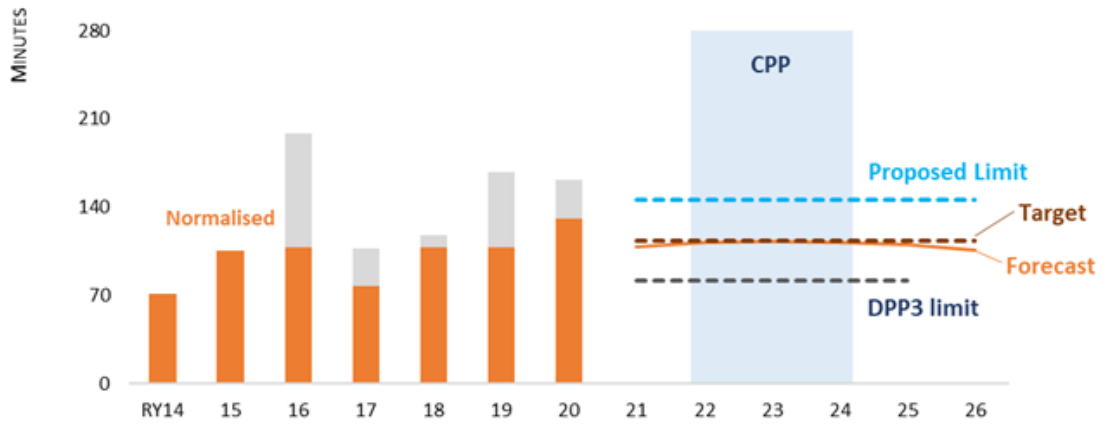
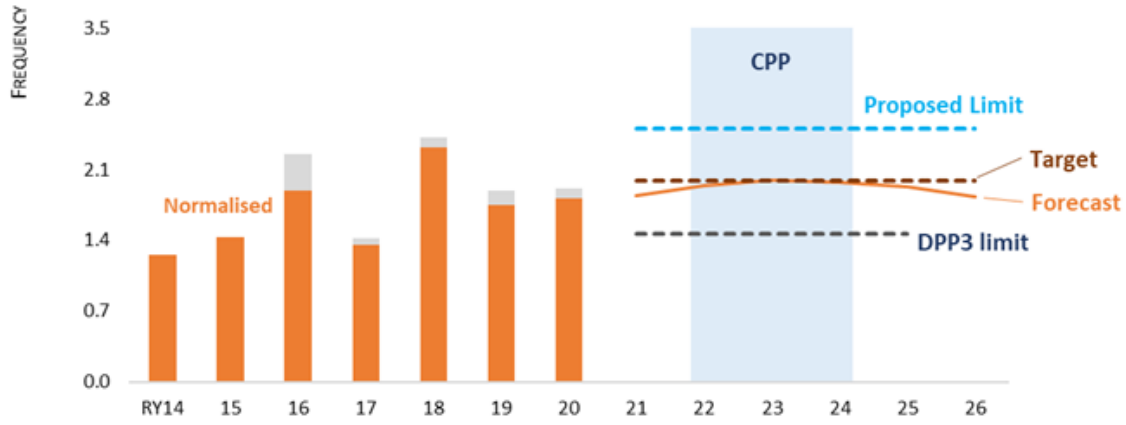


Figure 12: SAIFI forecast, targets and limits



4.3 Quality Standards - Extreme Events

69. Aurora accepts the SAIDI and customer-minutes extreme event limits set out by the Commission in Schedule 3.3 of the DPP3 Determination.

5 Comparison to the DPP3 Determination

70. In November 2019, the Commission released the DPP3 Determination that set out the reliability parameters for all EDBs that elect the default price-quality path for the period RY21 to RY25. An important constraint established by the Commission in determining the DPP3 parameters was to limit the maximum change from the DPP2 parameters.

71. As shown in section 3.2, Aurora's network performance has deteriorated during DPP2 and the proposed DPP3 targets are limited to values that are not reasonably achievable. The expected cost to achieve the Commission's DPP3 reliability performance does not represent

an efficient level of expenditure appropriate to the expressed preferences of our consumers and the timeframe to achieve such a change in performance.

72. Table 5 and Table 6 compare the parameters proposed by Aurora to those calculated by the Commission in the DPP3 Determination. They show that Aurora is proposing a significant increase in all parameters except for the boundary values for major event days.

73. The difference between the DPP3 values and the proposed values in this quality standard variation proposal is largely driven by the approach applied by the Commission. The Commission used an historical reference period to calculate the average performance and restricted the change from DPP2 to DPP3 to a maximum of 5%.

74. Aurora considers that the Commission's approach is appropriate for an EDB in a steady state, business-as-usual, situation. However, Aurora is in a dynamic state with an historical trend showing deteriorating network performance and is submitting a CPP application to enable it to make significant improvements to network management.

75. Hence, we have developed a model that reflects our unique situation. The model uses detailed analysis of historical performance data, and better reflects the current condition and performance of the network. It also accounts for our forecast capital and operational plans. This model is explained in section 6.

76. Our proposed target is calculated from our forecast performance, and we have applied a scaled version of the DPP3 standard deviation calculation based on the ratio of the forecast target compared to the DPP3 target. This will allow for annual volatility in accordance with the Commission's approach in its DPP3 decision. As already noted, our proposed limits for both unplanned SAIDI and SAIFI are materially above the DPP3 limits.

77. We have retained the boundary values for both unplanned SAIDI and unplanned SAIFI, and the extreme event standard and value, as set out by the Commission in the DPP3 Determination.

Table 5: Proposed unplanned SAIDI parameters

Proposed Unplanned Parameters	Quality Variation	DPP3	Difference
Proposed boundary value	5.69	5.69	0
Scaled standard deviation	16.48	9.22	7.26
Proposed target	113.34	63.44	49.90
Proposed unplanned limit	146.29	81.89	64.40

Table 6: Proposed unplanned SAIFI parameters

Proposed Unplanned Parameters	Quality Variation	DPP3	Difference
Proposed boundary value	0.0737	0.0737	0
Scaled standard deviation	0.2560	0.1497	0.1063
Proposed target	1.9948	1.1693	0.8255
Proposed unplanned limit	2.5067	1.4687	1.0380

Table 7: Proposed extreme event parameters

Proposed Unplanned Parameters	Quality Variation	DPP3	Difference
Extreme event standard (SAIDI)	120	120	0
Extreme event standard (customer minutes)	6,000,000	6,000,000	0

6 Forecasting Performance

78. Aurora developed a forecast for unplanned network SAIDI and SAIFI that provides target and limit parameters that are consistent with historical and forecast performance. The historical performance within the DPP3 limit, proposed limit, proposed target and forecast is shown above in Figure 11 and Figure 12 for SAIDI and SAIFI, respectively. A summary of the key parameters is shown in section 5.

79. The table and charts demonstrate that the unplanned quality standard parameters proposed by Aurora are an increase compared to the DPP3 values, but are reflective of recent historical network performance. While the proposed limit is set slightly above the historical normalised performance, the target it consistent with the historical normalised performance providing strong incentive to arrest the increasing trends and stabilise performance during the CPP period.

80. Aurora developed the forecast using four modelling approaches based on the type of fault (asset or non-asset) and the data available. An overview of the approaches taken are set out in Table 8, below, and described in further detail in the following sections.

Table 8: Forecast methodologies applied

Category	SAIDI	SAIFI
Cross-arms	Linear regression	3-year average
Distribution Cables	Linear regression	3-year average
Distribution Conductors	Linear regression	Multivariate regression
Distribution Transformers	Linear regression	Multivariate regression
Ground Mounted Switchgear	Linear regression	Multivariate regression
Other	Linear regression	3-year average
Pole Mounted Fuses	Linear regression	Multivariate regression
Pole Mounted Switches	Linear regression	Multivariate regression
Poles	Linear regression	Multivariate regression
Protection	Linear regression	3-year average
Sub transmission Conductors	Linear regression	3-year average
Non-Asset	Linear regression	3-year average
Vegetation	Linear regression	Trend to target

81. The following sections describe the approaches taken to develop the forecast, list the models used and key assumptions and inputs.

6.1 Multivariate Regression

82. As set out in Table 8, Aurora applied a multivariate regression approach to forecast SAIFI. A Generalised Linear Model (GLM), which is a type of linear regression model that is suitable for non-continuous data sets such as outage data, was applied to historical data from 2014 to 2020 to determine the relationship between asset condition and SAIFI.

83. This approach assumes that as assets deteriorate, they have a higher probability of failure, and that assets in the same asset health indicator (AHI) category have a similar probability of failure. With the AHI being a proxy for probability of failure, the number of assets in each group is then related to the reliability performance of that asset category.

84. The asset data was normalised to have a mean of zero and a standard deviation of one and outliers in the outage data, identified as outages with SAIFI greater than 1.5 standard deviations above the mean, were excluded from the modelled data set. This was done to facilitate the GLM and avoid skewing the output due to large outages in a small data sample.

85. SAIFI is calculated as the sum of all consumers interrupted divided by the average annual consumers supplied by the network. Since the total number of consumers changes annually, to remove another variable, the target variable was chosen to be customer numbers impacted annually.

86. The GLM therefore related five inputs to the number of customers impacted. These five inputs were:

- Assets with AHI of 1. These assets are in the worst condition and therefore have the greatest probability of failure and influence on network performance.
- Assets with AHI of 2. These assets are in very poor condition and therefore have a very high probability of failure and influence on network performance
- The annual change in volumes of assets with an AHI of 3. The volume of assets in AHI3 are generally significantly higher than the volume of assets in AHI 1 and 2. Testing found that including only the annual change of volumes in AHI3 provided the best relationship. Assets with AHI's of 4 and 5 are in good condition, have low probability of failure and therefore negligible impact on network performance.
- A weighting factor to increase the importance placed on the more recent years as they are more reflective of the current state of the network and operational practices.
- A factor that reflects the proportion of outages that were excluded during the normalisation and outlier removal process.

87. The coefficients calculated by the GLM were then applied to forecast the number of customers impacted each year which was divided by the forecast network consumer numbers to calculate the SAIFI performance for RY21 to RY26.

6.2 Three-year Average

88. We identified six categories for which the multivariate approach was not able to be applied. There were five asset categories where sufficient asset health data was not available, and one non-asset category, which is related to external impacts and not to the health of an asset.

89. We used a simple three-year average based on the most recent historical data from RY18 to RY20. Historical performance is a guide to future performance of the network and averaging is applied to smooth the volatility. The period selected is considered reflective of the current state of the network, representative of the future state given the forecast capital and operational plans, and is therefore appropriate for this short-term forecast.

6.3 Trend-to-Target

90. The vegetation category covers outages caused by vegetation clashes with network assets. The management of vegetation is governed by a set of regulations that set out the rights and obligations Aurora must adhere to, including where the responsibility lies with other organisations; i.e., local council. These outages are not related to any specific asset's condition. Recent years demonstrate an increasing trend, but application of the trend results in an unrealistic forecast.

915. However, Aurora has a specific Vegetation Strategy that sets out the objective and KPIs in terms of SAIDI and SAIFI contribution. Therefore, Aurora has forecast a glide path to achieving their strategic objectives. The starting point in RY21 was taken as the average of the preceding three years with a linear reduction to achieving the targets by RY24.

6.4 Linear Regression

91. SAIDI was calculated for all categories based on a linear regression against SAIFI using historical data from 2014 to 2020. The coefficients of the regression were applied to the forecast SAIFI to calculate the forecast SAIDI.

92. SAIDI and SAIFI have the relationship:

equation (1) SAIDI = SAIFI x CMOS

93. SAIFI was calculated using the methods described in the sections above, which incorporates the relationship to AHI and changes to AHI over time. However, SAIDI is dependent on additional parameters that are not able to be extracted from the outage data with a sample size large enough to be used in a statistical model. In particular, the duration of the outage and the staging of the restoration which both affect the CMOS incurred during an outage vary significantly based on local network conditions and topology.

94. Using the regression approach enables the variables affecting CMOS to be implicitly estimated in the regression through the relationship to SAIFI.

95. Since the volume of asset replacements is forecast to be a small percentage of the network, the recent historical relationship between SAIDI and SAIFI is appropriate for forecasting over the short term.

6.5 Setting the Limit and Target

96. The forecast SAIDI and SAIFI performance was then the sum of the SAIDI and SAIFI across all modelled categories multiplied by a scaling factor to convert from raw to normalised (allowing for MEDs and other excludable events).

97. Aurora set the proposed target based on the highest forecast SAIDI or SAIFI across the forecast period.

98. The proposed Limit was calculated as the target plus two standard deviations. The standard deviation was the DPP3 standard deviation, scaled to account for the higher Target.

7 Proposed Financial Incentives

99. This section sets out the methodology used to calculate the quality incentive parameters, the key inputs used, and why this is appropriate for Aurora.

7.1 Quality Incentive Parameters

100. To calculate the incentive rates for planned and unplanned SAIDI, Aurora applied the methodology set out by the Commission in Schedule 4 of the DPP3 Determination[6].

101. The Commission amended the incentive arrangements for DPP3 so that revenue-linked incentives only apply to planned SAIDI and unplanned SAIDI. The Commission also set the planned and unplanned SAIDI 'collars' to zero. This approach means that constant financial incentives for reliability improvement apply, no matter what level of improvement has already been achieved.

102. While we agree with the Commission's methodology, we are proposing a number of different input variables, namely:

- unplanned SAIDI target and limit values as described in Table 5;
- the VoLL as described in section 7.2; and
- planned SAIDI parameters as described in section 7.3.

103. Our proposed incentive rates better reflect our particular circumstances, our customers' preferences and our customers' willingness to pay for reliability.

104. Our proposed quality incentive parameters are set out in Table 9.

Table 9: Quality incentive parameters

Quality Incentive Parameters	Value	Unit
Maximum revenue at risk	2%	of MAR
IRIS Retention factor	23.5%	factor
Quality Incentive Adjustment	90%	factor
Planned incentive rate	$7,140	per minute
Unplanned incentive rate	$14,279	per minute
Planned SAIDI cap	195.96	minutes
Planned SAIDI revenue neutral point	161.63	minutes
Planned SAIDI collar	0.00	minutes
Unplanned SAIDI cap	146.29	minutes
Unplanned SAIDI revenue neutral point	110.33	minutes
Unplanned SAIDI collar	0	minutes

6 Commerce Commission. (2019). Default price-quality paths for electricity distribution businesses from 1 April 2020 – Final decision. Schedule 4.

105. We have tested the implied revenue at risk for both the planned and unplanned reliability incentive against the ranges determined for DPP3[7]. The implied revenue at risk lies within the range of DPP3 outcomes for peer EDBs, and therefore we consider that our approach preserves consistency with the DPP quality incentive framework.

Table 10: Implied revenue at risk - comparison with DPP3

	Maximum Penalty			Maximum Reward		
	Unplanned	Planned	Total	Unplanned	Planned	Total
RY2021	**0.59%**	**0.28%**	**0.87%**	**1.80%**	**1.32%**	**2.00%**
DPP Maximum	1.09%	2.28%	2.00%	3.13%	1.14%	2.00%
DPP Minimum	0.21%	0.11%	0.32%	0.24%	0.06%	0.39%

7.2 Determination of VoLL

106. The most recent and applicable review of the VoLL for customers was undertaken by Transpower and published in November 2018[8].

107. The analysis was undertaken using a survey methodology. The study investigated the VoLL across New Zealand by point of supply on the Transpower network and found that the VoLL generally varied between $17,000/MWh and $40,000/MWh depending on the composition of customer types at the supply point.

108. The results centred around $25,000/MWh which aligns to the VoLL proposed by the Commission and used in the DPP3 determination. While that is appropriate for a broad study across all of New Zealand, Aurora was able to extract the actual results for each point of supply to their network and use that as a more accurate VoLL for their consumers, as shown in Table 11.

109. Based on the information provided, the VoLL at each connection point was escalated to RY20 dollars and the average was calculated as representative of the network. We consider that this VoLL, established for the Aurora network, is better evidenced and defendable than the $25,000 per MWh set by the Commission for the DPP3 incentive framework.

935. Therefore, we have adopted the VoLL estimate of $27,136/MWh as derived from the Transpower VoLL study rather than the estimate adopted by the Commission for the DPP3. This results in an incentive rate that is more objectively derived, and which better reflects our particular circumstances and our customers' preferences than that stated in the DPP3 decision.

7 Commerce Commission. (2019). Default price-quality paths for electricity distribution businesses from 1 April 2020 – Final decision. Table M5, p444.

8 Transpower. (2019). Value of lost load study.

Table 11: Value of Lost Load by network connection point

Area	Transpower Feeder	2018+	Average VoLL (2020)[9]
Dunedin	HWB033	$21,100	$21,759
Dunedin	HWB033	$25,300	$26,090
Dunedin	SDN033	$24,500	$25,265
Central	CML033	$27,200	$28,050
Central	CYD033	$29,300	$30,215
Central	FKN033	$26,800	$27,637
Central	FKN033	$30,000	$30,937
Total			**$27,136**

7.3 Adjustments Applied for RY21

110. Aurora applied the same calculation methodology as the Commission did in the DPP3 Determination, however, we adjusted some input parameters to reflect the fact that the quality standard variation will apply for RY21 only. The adjustments were:

- Unplanned SAIDI target and limit values were calculated by Aurora using the Unplanned Reliability Forecast Model. This is described in detail in section 6.
- The planned SAIDI limit was calculated on a pro-rata basis from the five-year limit. Due to the pro-rata calculation, the annualised value is the same in both cases.
- The Maximum Allowable Revenue was taken as the starting revenue stated in Table 1.1.1 of the DPP3 Determination.
- The average annual energy distributed (used in the calculation to convert dollars per MWh to dollars per minute) was calculated based on the average of the three years of RY17 to RY19.

111. All other calculations and inputs were applied as per the Commission's methodology.

8 Demonstrating the Expenditure Objective

112. While the Expenditure Objective is a construct that applies to CPPs, we consider that it is appropriate to consider the extent to which a DPP quality standard variation better achieves the principles stated in the Expenditure Objective, especially under Aurora's circumstances where we have had to lift expenditure significantly above the DPP allowances.

113. This quality standard variation proposal demonstrates that the forecast for network reliability resulting from our capital and operational expenditure programme meets the principles of the expenditure objective.

114. As described in this proposal, the appropriate service standards with respect to network performance are SAIDI and SAIFI, and the appropriate levels of service have been identified through extensive customer consultation as maintaining current network performance.

9 The VoLL was escalated based on rates of 1.5% in RY19 and 1.6% in RY20

115. Consultation identified that customers are most concerned about network safety and the price of electricity and are generally accepting of the current levels of reliability being provided. As a result, Aurora has developed a programme of works that is focused on improving safety, but also recognises the consequential reliability benefits that are expected to be obtained.

116. The SAIDI and SAIFI targets and limits are consistent with historical performance during DPP2 but also provide incentives to arrest the historical deteriorating reliability performance. The forecast reliability targets and limits also reflect consumer preference to ensure network safety and maintain reliability to minimise any price impacts.

117. The financial incentives calculated are based on the best information available that is most specific to customers on Aurora's network and are consistent with the incentive rates applied to other EDBs in the Commission's DPP3 Determination.

118. Together, this proposal demonstrates that the proposed quality standard variation meets the principles of part (a) of the expenditure objective, as the appropriate level of network service has been identified, and Aurora has developed an expenditure forecast that will allow this to be achieved at an efficient cost to maintain compliance with regulatory obligations as required by part (b).

946. In linking to expenditure, due consideration must be given to the fact that recent and future investments are focussed on improving the health of our assets and reducing risk to the public and our contractors working on the network. Our customers have said that they accept current levels of service, and we are not proposing investments directly targeted at reliability improvement – we expect that to be a focus of our second CPP proposal, subject to customer support. We acknowledge that our investment will have an impact on reliability, to the extent that our reliability performance should stabilise, with modelling supporting that view.