Report on submission topics

Assessment and opinions on specific submission topics related to Aurora Energy's June 2020 Customised Price Path application

Produced for the Commerce Commission

Final Report

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Preface

Strata Energy Consulting Limited specialises in providing services relating to the energy industry and energy utilisation. The Company, which was established in 2003, provides advice to clients through its own resources and through a network of associate organisations. Strata Energy Consulting has completed work on a wide range of topics for clients in the energy sector in both New Zealand and overseas.

More information about Strata Energy Consulting can be found on www.strataenergy.co.nz

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Introduction and purpose

The Commission has asked for Strata's advice on key submission topics

1. The Commerce Commission (Commission) has asked Strata Energy Consulting (Strata) to provide advice on key topics raised in submissions relating to the Commission's Draft Decision on the 2020 Aurora Energy (Aurora) Customised Price-Quality Path (CPP) application. The key topics that the Commission has asked Strata to consider relate to:
    1. Capex – Growth and Security;
    2. Capex – Asset Renewals;
    3. Opex – Non-network opex; and
    4. Quality – Unplanned Reliability.
2. In assessing each of the above topics, Strata's approach has included submitting Strata's initial views to the Commission for comment, followed by a draft report for the Commission's comment, followed by this final report.
3. This report has four main sections aligning with each of the Commission's key topics.

Strata's response to Aurora's overarching concerns

4. In its submission,[1] Aurora identified some overarching concerns regarding Strata's draft consolidated briefing reports published by the Commission in November 2020. Whilst Strata believes the Commission most likely has sufficient knowledge and information to form its views and responses to Aurora's overarching concerns, Strata has nevertheless provided some additional information that we consider will be useful to the Commission.

5. We believe that the provision of this additional information is important because the criticism that Aurora has directed at Strata under the guise of overarching concerns was unsupported and/or invalid.

Strata has considerable experience in regulatory reviews

6. When forming our views, we applied experience and knowledge gained through 17 years of reviews of electricity and gas network businesses. Whilst we have primarily completed reviews in New Zealand and Australia,[2] we have also undertaken electricity network reviews in Singapore and Malaysia.[3]

7. The advice we have given to regulators has resulted in the removal of more than $2 billion dollars of inefficient costs that consumers would otherwise have been paying. In many cases, whilst the electricity network businesses initially challenged our assessments, over time, the revisions made to expenditure forecasts were proven to be appropriate.

Strata's business structure is aligned with regulators' requirements

8. In its submission, Aurora compares Strata's organisation to that of WSP and GHD, drawing the conclusion that bigger is better and that Strata's lack of depth constrains its ability to provide effective advice to the Commission.[4]

9. The Commission is aware that, over many reviews, Strata has applied experienced and knowledgeable advisors to assignments. These have included many international specialists on electricity transmission and distribution. Strata provides high quality, experienced consultants through its network of associates that has been established over almost two decades. Similarly, Strata's New Zealand based team has applied its knowledge and experience in overseas jurisdictions.

10. An important feature of Strata's business model which Aurora has ignored is the importance of remaining free of perceived and actual conflicts of interest when working for energy regulators. Maintaining a relatively large organisation generally requires a broad

[1] Aurora Energy, 18 December 2020, Aurora Energy's CPP Proposal: Submission on the Commerce Commission's Draft Decision.
[2] For example, in Australia we have recently undertaken expenditure reviews of three Victorian and two Queensland distributors. Our previous expenditure reviews in Australia, undertaken across multiple regulatory periods, have included four electricity transmission and several electricity distribution businesses.
[3] In Singapore we have reviewed the expenditure forecasts of SP Power Assets for the Singapore Energy Market Authority (EMA) and in Malaysia we have worked for both the Energy Commission, Suruhanjaya Tenaga and the electricity utility Tenaga Nasional Berhad (TNB).
[4] Aurora Energy, 18 December 2020, Aurora Energy's CPP Proposal: Submission on the Commerce Commission's Draft Decision, sections 3.1 and 3.3.

range and quality of clients and assignments. Regulators, particularly those with relatively small jurisdictions, generally provide insufficient work opportunities from periodic expenditure reviews to maintain the viability of larger scale consultancies Because of this, traditionally structured consultancies often struggle to remain free from perceived and actual conflicts of interest.

11. When forming its business model in 2004, Strata understood these issues and the opportunities offered by the development of information technology and communications. We adopted the international associates network structure, which has proven to be well aligned with the needs and specific requirements of energy regulators.

Aurora has misrepresented Strata's role

12. In several places in its submission, Aurora claims that Strata has demonstrated a lack of understanding and poor engineering judgement.

13. In making these comments Aurora has disregarded the objective of the review of its expenditure forecast. Specifically, the Verifier, through its engagement by the Commission, is focused on assessing whether the proposed expenditure meets the Commission's Expenditure Objective.[5] It is not Strata's nor the Verifier's task to make engineering judgements on Aurora's programmes and projects. For capex, Strata's task is to advise the Commission on the reasonableness of the expenditure forecast, taking into account the Expenditure Objective, and based on the information Aurora has provided.

14. Accordingly, the intention of Strata's recommended adjustments to Aurora's expenditure forecast is to produce a forecast that better meets the Expenditure Objective. It is Aurora's responsibility to apply its expenditure to meet safety, reliability, performance, and other objectives. Strata understands that, if during the course of the CPP period, Aurora can demonstrate that the determined expenditure is insufficient to meet its requirements, there are mechanisms available for it to seek approval from the Commission for additional regulated expenditure.

The draft briefing reports were aligned with the Commission's requirements

15. As Commissioner Begg pointed out in her 27 November 2020 letter to Aurora's Chair,[6] Strata's briefing reports were sought as inputs into analysis undertaken by Commission staff, and the Commission did not initially anticipate that the reports would be published. Subsequently, the Commission decided that it was important to publish the draft briefing reports and asked Strata to combine its advice into a consolidated report. The consolidated version included introductions and other revisions to improve readability, clarity and suitability for publication.

16. In several places in its submission Aurora has commented on the level of quality assurance and review applied to the draft briefing reports. It also highlighted a relatively small number of typographical and terminology errors. Given the purpose of the reports, the fact that they were draft, and the constrained timeframes during which they were produced, it was

[5] Expenditure objective means objective that capital expenditure and operating expenditure reflect the efficient costs that a prudent non-exempt EDB would require to: a) meet or manage the expected demand for electricity distribution services, at appropriate service standards, during the CPP regulatory period and over the longer term; and b) comply with applicable regulatory obligations associated with those services.

[6] https://comcom.govt.nz/__data/assets/pdf_file/0019/229303/Commerce-Commission-Response-from-Commissioner-Begg-to-Aurora-Energy27s-Chair-27-November-2020.pdf

inevitable that some typographical and terminology errors would remain in the published reports.

17. We have reviewed each of the potential report quality issues that Aurora highlighted in its submission and found that all were minor and did not change our findings, conclusions or advice provided to the Commission. In every case, we found that Aurora's often repeated claim of lack of quality control, sufficient to invalidate our advice, was not evident.

18. We have also addressed some specific examples of Aurora's unsupported claims of lack of quality review in the relevant sections of this report.

Section 1 – Capex growth and security projects

What the Commission asked Strata to review

20. The Commission asked Strata to provide advice regarding the following two areas of Aurora's submission on the Commission's draft determination related to Capex Growth and Security:

    1. Section 6.2.1: consider Aurora's feedback in section 6.2.1 of its submission regarding the capex projects (a) Arrowtown 33 kV bus and (b) Smith Street to Willowbank subtransmission cable and advise an appropriate response.

    2. Contingent projects and Covid-19: consider Aurora's comments (various references) regarding the applicability of the 'contingent projects' mechanism in relation to project timing uncertainty driven by Covid-19 impacts on demand growth. This will require an RFI to seek zone substation demand growth information.

Section 6.2.1 – Arrowtown growth and security projects

Aurora's submission

21. In reference to the Arrowtown 33 kV bus capex project, in its submission on the draft determination, Aurora states that; if the Commission considers that the *growth* driver is 'contingent', then there remains a *replacement* driver, and:[7]

> *"… deferral of the project is not prudent. If the project does not eventuate in the time earmarked for a growth need (RY24-25), then renewal drivers will dominate with proposed installation of the 33kV bus and associated equipment in RY25."*

22. In addition, Aurora submitted that the project also serves to bring the Arrowtown 33 kV sub-transmission ring (i.e., both the two 33 kV feeders supplying various zone substations in the district and the Arrowtown 33 kV bus) up to Aurora's security standard.

23. Aurora summarises its submission points as follows:[8]

> *"On the basis of multiple renewal drivers, we propose that the Arrowtown 33kV bus is included in the network capex expenditure allowance in RY25. If growth is strong in the Arrowtown area, we will accelerate the project as required to meet appropriate network performance levels."*

Our review

24. There are two closely associated projects driven primarily by growth and security concerns related to assets in the Arrowtown 33 kV sub-transmission network:

    a) the Arrowtown 33 kV bus[9] upgrade, reviewed by us

    b) the Arrowtown 33 kV ring[10] upgrade, reviewed by the Verifier.

The Arrowtown 33 kV bus upgrade

25. In our earlier advice, we summarised the situation as follows:[11]

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[7] Aurora submission, para. 282
[8] ibid. para. 288
[9] 'Bus' is also referred to as 'switchgear'.
[10] 'Ring' is also referred to as 'loop'.
[11] Strata consolidated report, p. 18

> *Having reviewed the Arrowtown 33 kV switchgear project, our view is that the two Arrowtown ring projects should be treated as two stages of the same project. This is because both stages are required to address the identified network need, which is to provide N-1 capacity for the supply area served by the Arrowtown ring. It makes little sense to complete one stage without the other.*
>
> *Therefore, if the current winter peak demand has exceeded the previous peak (i.e. 16.7 MW in 2019), we consider both stages are justified and should be accepted with the project timings proposed by Aurora.*

26. Aurora's peak demand forecast for RY20 was:[12]

    a) Prudent (P90) 17.5 MW

    b) Expected 16.4 MW

27. The actual RY20 peak demand was 16.7 MW; that is between the two forecast bounds and comfortably above the expected forecast.

28. Updated for the following year, Aurora's peak demand forecast for RY21 was:[13]

    a) Prudent (P90) 17.9 MW

    b) Expected 16.7 MW

29. Responding to Request for Information RFI Q081, Aurora has advised the Commission that the RY21 coincident peak demand on the two Arrowtown feeders was 17.1 MW, achieved on 24 July 2020. The outcome is again between the two forecast bounds and comfortably above the expected forecast.

30. Therefore, compared with the limited information available to us when we carried out the analysis included in our report, we now have more certainty regarding the actual demand growth experienced over the 2020 winter (i.e., for the RY21 year). In fact, the actual peak demand for RY21 already exceeds the expected peak for RY22 which, at the date of the latest plan available to us,[14] was forecast to be 17.0 MW. Noting the Arrowtown 33 kV sub-transmission network has a firm capacity of 13 MVA, the continuing evidence of a demand growth trend appears to support the inclusion of capex in the regulatory years within the CPP period.

31. We therefore advise that it is reasonable to include the expenditure for commencement and completion of the Arrowtown 33 kV bus upgrade project (i.e., installation of a 33 kV indoor switchboard, requiring $1.1m in RY24 and $1.6m in RY25)[15] in the capex growth and security forecast.

The Arrowtown 33 kV ring upgrade

32. Regarding the 33 kV sub-transmission ring upgrade, the Verifier concluded:[16]

> *"In our view, Aurora Energy's expenditure forecast for the Arrowtown 33 kV ring upgrade project over the CPP and review periods does appear to satisfy the Expenditure Objective,* ***if the demand forecast that underpins it is realised****."*

33. We have added the bold highlighting in the above quote.

[12] POD31, Table 1
[13] POD32, Table 1
[14] Which is the plan set out in POD32
[15] POD32, Expenditure Summary, page 2
[16] Verifier report, section C.13.7

34. The Verifier recommended that the ring upgrade should be treated as a contingent project because, at the time the Verifier carried out its review, peak demand growth was uncertain due to the unknown impact of the Covid-19 pandemic.

35. We further advise that the expenditure associated with the Arrowtown 33 kV ring upgrade, verified by the Verifier but subject to the Commission defining a suitable trigger under the contingent project mechanism, appears to meet the Expenditure Objective.

36. This is because Aurora has established that demand growth occurred in RY21 that exceeded the expected level of annual growth forecast by Aurora. It is likely that, had the peak demand growth in RY21 not materialised, the Commission would have set a peak demand trigger within the forecast ranges for RY21 or RY22. The RY21 actual peak demand already exceeds the expected forecast for RY22.

Strata's advice summarising both Arrowtown growth and security projects

37. We consider that both Arrowtown growth and security capex projects meet the Expenditure Objective for projects included in the CPP period.

38. The reasons supporting our view are:

    a) there is a large renewals component to the Arrowtown ring capex projects that would require attention within the CPP period;

    b) the peak demand information provided by Aurora supports a demand-driven need that was previously uncertain;

    c) there is support for the project from submitters;[17] and

    d) the Arrowtown Village Association submitted that the town endures poor reliability.[18]

Section 6.2.1 – Smith Street to Willowbank Inter-tie

Aurora's submission and Strata's review

39. In its submission, Aurora pointed out that it is not appropriate to treat the project as a contingent project. We agree, and said as much in our report to the Commission:[19]

> *"Aurora has not proposed COVID-specific timing adjustments for this project. This is reasonable as the primary driver is the need to undertake 33 kV cable replacements."*

40. We fully understood, and conceptually endorsed at a high level, Aurora's strategic approach to convert Dunedin's radial network architecture into a meshed network architecture over time:[20]

> *"Without having seen more comprehensive documentation, we consider, at a high level, that the approach appears sound. That said, a $35m cable replacement programme, implemented in stages over 10+ years, requires a lot more justification than Aurora has provided. In our view, this amount of investment requires a comprehensive CBA with full probabilistic energy-at-risk planning."*

[17] Queenstown Lakes District Council submission, various paragraph references, et al
[18] Arrowtown Village Association submission, section 6
[19] Strata consolidated report, page 23
[20] ibid.

41. Our main point was that Aurora, in its CPP application, had not provided a sufficiently detailed justification to support ~$35m of capex over many years, and certainly beyond the CPP period.

42. Once it is commenced, the Smith Street to Willowbank inter-tie would lock in a specific network development strategy that would be difficult to reverse. The inter-tie would not be necessary in a straight like-for-like sub-transmission cable replacement programme.

Strata's advice

43. Aurora has not provided any new information in its submission that supports the Dunedin 33 kV sub-transmission architecture upgrade. Accordingly, our view remains that:

    a) progressively converting the existing radial network to a meshed network appears sound at a high level; and

    b) following the recently completed Halfway Bush to Smith Street cable replacements, the Smith Street to Willowbank inter-tie appears to be a sensible next step.

44. However, a ~$35m investment programme implemented over 10+ years requires a comprehensive cost benefit analysis, including probabilistic energy-at-risk planning. The network architecture conversion requires an overall concept approval up front so that replaced cable and other major plant capacities are specified appropriately.

45. Due to the absence of analysis supporting the network architecture concept, we are unable to confirm that the proposed expenditure is reasonable and prudent.

Contingent projects and Covid-19

46. We have extracted all the references to a contingent project mechanism from the draft determination, sorted them by project and included them in Table 1.

47. In summary, contingent project considerations boil down to a single consumer connection for a major tourism operator.

48. As we advised in the section above about the Arrowtown growth and security projects, we consider that there is sufficient justification to include the two Arrowtown 33 kV sub-transmission upgrade projects in forecast capex and not be made subject to the contingent project mechanism. Aurora has provided evidence of demand growth on the two Arrowtown feeders despite prevailing Covid-19 conditions through the winter of 2020.

49. Aurora's submission regarding the Commission's use of the contingent project mechanism in its draft decision relates more to the mechanism that would defer revenue recovery until the next regulatory period.

50. Given that the only project likely to fall in this category is the consumer connection for the major tourism operator, and subject to the Commission agreeing with our advice regarding the two Arrowtown 33 kV sub-transmission upgrade projects, we consider that issues related to the contingent project mechanism may now be moot.

Table 1: Contingent project references

Draft determination references	Project	Relevant draft determination quotes	Strata's advice
Table on page 216 Also: D354.6 D368	Consumer connections	The Verifier concluded that due to Covid-19 considerations, a major tourism operator driven connection should be treated as contingent, affecting $2.1 million of consumer connection capex. We have agreed with this conclusion. If this tourism connection becomes more certain, Aurora can utilise our proposed reconsideration mechanism (see Attachment J) and seek approval for additional funding. … and that $2.1 million of consumer connection capex should be treated as contingent due to demand uncertainty.	Consumer connections either happen or they don't. The relevant demand is *consumer demand*. In principle, a large consumer requiring specific new or upgraded connection assets (in this case some $2.1 million) should face the full economic costs of its decision to connect. This would include all of the connection project costs less any benefits that might genuinely accrue to Aurora from the consumer connection. Under this policy approach, Aurora's other consumers would not face the cost recovery risk that might accrue from future events outside of their control (e.g., failure of the requesting consumer's business leading to stranded assets).
Table on page 220. Also: D419, D426	Arrowtown 33 kV ring project	Arrowtown 33 kV ring project should be contingent and packaged with Arrowtown 33 kV switchboard project.	Contingent project mechanism is not appropriate. Packaging the two projects together is appropriate. Refer to our advice under section 6.2.1 – Arrowtown growth and security projects.
Table on page 371	Opex	(Consideration of whether opex should be a contingent project) No contingent projects were identified by Aurora. We have decided not to approve some projects due to demand uncertainty and we are addressing the contingent project issue with an IM amendment.	Opex appears to be addressed by an alternative mechanism.

Section 2 – Asset Renewals

What the Commission asked Strata to review

51. The Commission issued a list of topics that it required Strata to consider and respond to. The topics were related to items that Aurora had raised in its draft decision submission.

52. This section 2 provides a summary of Strata's consideration of the topics, position, and recommendations following our assessment of the relevant points raised in submissions identified by the Commission.

53. Appendix A contains a table with Strata's consideration of each of the Commission's topics.

Strata's recommendations on adjustments to capex renewals

54. In Draft Briefing Papers 2 and 3,[21] Strata advised that the following adjustments should be made to Aurora's capex asset renewals forecast.

    - For the first tranche of asset categories, we recommended an overall adjustment of -28% for the 3-year CPP period and -19% for the 5-year review period.
    - For the second tranche of asset categories, we recommend an overall adjustment of -3% in each year of the 3-year CPP period and -5.13% and -1.5% for the two additional years for the 5-year review period.

55. A primary reason that Strata recommended the adjustments was that Aurora had used outputs from its volumetric asset age-based repex models directly as inputs to expenditure forecast, and we found no evidence of:

    a) sensitivity testing of input assumptions;

    b) Board and executive challenges; or

    c) portfolio level review and adjustment.

56. We proposed adjustments to forecasts for six of the asset categories that the Commission asked us to review. We proposed these adjustment recommendations because, in our opinion, Aurora had provided insufficient information for us to conclude that the proposed expenditure met the Expenditure Objective.

57. Due to the lack of evidence of Aurora applying challenge and portfolio level reviews, we recommended that the Commission apply a -5% efficiency adjustment to the total asset replacement capex forecast in each regulatory year to reflect overestimation bias in the forecast, deliverability, and unit cost reductions. In our opinion, because of the lack of evidence of portfolio level review, we could not conclude that Aurora's forecast met the Expenditure Objective.

58. We note that, whilst the Commission accepted our advice, in the draft decision the Commission applied a 5% efficiency adjustment for other reasons including that the Aurora forecast modelling had applied an approximate 5% efficiency adjustment to two asset renewals portfolios and not others. The Commission noted that there seemed to be no

[21] 2020-11-26 Consolidated Briefing Reports v1.0, pages 28 to 76

reason why Aurora's asset management and business process improvements would not apply to all the capex projects and programmes equally.

59. In making the adjustment recommendations, Strata was not proposing an alternative asset renewals implementation programme. Aurora's role is to ensure that renewals undertaken meet safety, reliability and other objectives and measures. Strata's advice to the Commission was focused on the extent to which Aurora's proposed expenditure forecast meets the Expenditure Objective.

Aurora's submission has confirmed our primary concerns

60. In its submission, Aurora has not commented on, nor challenged, Strata's conclusion that the expenditure forecast for the asset categories we reviewed were taken directly from the relevant repex model. This confirms the validity of our concern that no adjustments to the expenditure forecast had been made as a result of sensitivity testing, Board and executive challenge, and portfolio level reviews.

61. The above is important because:

- Aurora used the output expenditure forecasts from the models to form its CPP expenditure forecast for capex renewals; and
- we identified no subsequent adjustments that Aurora had applied to the modelled expenditure forecasts.

62. In our opinion and experience, applying a basic repex model expenditure forecast without applying sensitivity testing, challenge, and portfolio level review, is not aligned with good industry practice nor is it likely to produce a forecast that meets the Commission's Expenditure Objective.

63. In its submission, Aurora implied that the Australian Energy Regulator (AER) had endorsed its repex model. However, whilst the AER promotes the use of such models, it does not endorse individual electricity utility repex models. The AER developed and applied its repex model as one tool, along with others, to evaluate the reasonableness of expenditure forecasts applied in regulatory price reset reviews.[22] However, the AER has set out its expectations and guidance on how an electricity network should develop expenditure forecasts.[23] In our opinion, Aurora's reliance on its basic repex modelling alone to form the expenditure forecasts for the asset categories we reviewed is not consistent with the AER's guidelines.

64. Aurora also claims that Strata did not take sufficient account of the Verifier's statements including:

> *Age-based models – used age as the key determinant for asset replacement. This was implemented both as a deterministic approach and as the basis for modelling asset performance. These are generally not considered GEIP but are acceptable when no other data is available, and consideration is given to historical trends. Typically, this occurs for high-volume low-cost assets when they are first entering a phase of age-related failures, which currently is typical for many network*

[22] https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/repex-model-outline-for-electricity-distribution-determinations

[23] https://www.aer.gov.au/system/files/D19-2978%20-%20AER%20-Industry%20practice%20application%20note%20Asset%20replacement%20planning%20-%2025%20January%202019.pdf

> *businesses. Aurora Energy is using this approach for most of its renewal program*[24]

65. We did not disagree with the Verifier's statement but consider that where age-based models are used, sensitivity, challenge, and portfolio level consideration should be applied. Whilst Aurora stated that it had applied a management challenge process, we found no evidence of this having any effect on the repex model expenditure forecast; nor had any sensitivity testing and portfolio analysis been applied.

66. In its submission, Aurora challenges Strata's view that portfolio level assessment is good industry practice. This reinforces our conclusion that Aurora has not applied any portfolio level assessment to its expenditure forecast. In Appendix A we have provided examples and references to support our view that portfolio level reviews reflect good industry practice.

67. In the absence of adequate testing and review, we cannot conclude that Aurora's expenditure forecasts for the asset categories Strata reviewed meet the Expenditure Objective.

Strata understands repex models

68. Our experience of asset replacement models has developed over several years through the expenditure proposal assessments we have undertaken for energy regulators, primarily the Australian Energy Regulator (AER) and the New Zealand Commerce Commission. As part of such reviews, we assess the application of network repex models when forming expenditure forecasts.

69. The repex models we have reviewed range from basic age-based spreadsheet calculations to advanced CBRM models. In the last three years, we have reviewed and assessed repex models used by Australian distributors in New South Wales, Queensland and Victoria. These models were significantly more advanced than the Aurora repex models we reviewed for the Commission.

70. We can confirm to the Commission that we took time to fully understand the repex models for each of the asset classes that the Commission asked us to review. The models in all cases were simple Excel spreadsheet-based calculations.

Strata understands Aurora's repex models

71. In its submission, Aurora questioned Strata's understanding of its repex models. Aurora's primary reasons for forming this view are based on Aurora's claims that:

    - the use of a survivor curve is relevant only when actual, historical replacement data is available to calculate a survivorship function and forecast replacements;[25]and
    - the survival rates provided in its repex models are purely for information purposes.[26]

72. From the above two points, Aurora developed a view that Strata does not have sufficient understanding of these modelling techniques to form relevant, meaningful opinions.[27]

73. In its CPP proposal, Aurora described its use of models as follows:

> *Our methodology uses a normal distribution based on life expectancy. We have used a Repex methodology instead of a survivor curve approach as we do not*

[24] Aurora - 20201218 Aurora CPP Draft Decision – Submission, B1.7
[25] Aurora - 20201218 Aurora CPP Draft Decision – Submission, B5.12
[26] Ibid
[27] Ibid

> *presently have a large enough sample of condition data to inform a survivor curve reliably*[28]

74. For the asset classes the Commission asked Strata to review, the models were all age-based and included no asset condition data. Consistent with Aurora's statement above, these models are what Aurora refers to as its repex methodology and/or repex model.

75. In Briefing Paper 2, Strata described its understanding of Aurora's aged-based models as follows:

> *Whilst Aurora says that it does not use a survivor curve approach, in effect its repex model derives a survivor curve from a life expectancy distribution. For assets that it chooses not to apply a Weibull distribution curve to, Aurora uses a normal distribution with the standard deviation set at the square root of the expected life of the asset. This is used to produce an assumed failure rate for transformers at each age.* [29]

76. Using pole mounted distribution transformers as an example, we explained that Aurora set the expected life for all transformers at 60 years. We found that the relevant model (MOD21) assumed that all transformer types have the same life expectancy and probability of failure (i.e., ≤50 kVA is the same as >200 kVA; Central Otago is the same as Dunedin, coastal is the same as highland, etc.). MOD21 also applied the same 7.75 standard deviation to all transformer types and location.

77. MOD21 applies the above input assumptions to determine a cumulative failure distribution and produces a survivor curve from the reciprocal of the cumulative failure distribution. The model then calculates a failure rate from the cumulative failure distribution.

78. In its submission Aurora states:

> *We use the repex model approach for pole mount distribution transformers. In our standard repex model, it contains a calculation to convert the normal distribution to a corresponding survival rate purely for information purposes.*[30]

79. The above point is the same as Strata described in its Briefing Report. In addition, we described the calculation Aurora used in its repex models to convert the normal distribution of equipment failure to a survival rate, and from this, an asset replacement forecast.

80. In our Draft Briefing Reports 2 and 3 we derived cumulative failure rate charts for assets directly from the data provided in Aurora's models. We consider that viewing the cumulative failure rate provides valuable perspectives on what could be expected under sensitivity testing of the key input of expected asset life. Aurora states that it included this data in its model for information purposes only and Strata has used it for this purpose.

81. We have again reviewed our understanding of Aurora's asset replacement models and found that our understanding is aligned with the actual functions of the relevant models.

Strata is not overriding asset management

82. As we noted at paragraph 12, at several places in its submission Aurora claims that Strata has applied poor engineering judgement. In doing this, Aurora confuses the setting of a

[28] Ibid, paragraph 458, page 125
[29] Aurora noted that the term 'standard distribution' had been used in the version of Strata's draft briefing report that it had reviewed. The later version of the briefing report has corrected this to 'normal distribution'.
[30] Aurora - 20201218 Aurora CPP Draft Decision – Submission, B5.12

reasonable and prudent expenditure forecast with the engineering judgement that must be applied when implementing an asset renewals programme.

83. As we discussed previously, Strata's task was to advise the Commission if, in our opinion, the proposed expenditure met the Expenditure Objective. To do this, Strata considered the process that Aurora had applied when preparing its forecast and the reasonableness of its input assumptions. It was not Strata's task to override or redesign the planning and implementation of programmes and projects. For capex, the Commission sought Strata's views on the reasonableness of Aurora's expenditure forecast by considering whether or not the forecast met the Expenditure Objective.

Strata's use of the 2019 update of the 2018 AMP was appropriate

84. Aurora asserts that use of the 2018 AMP invalidates Strata's analysis:

> *We struggle to see the relevance of these repeated references to our 2018 AMP. As explained in our proposal, since 2018 we have updated our: − renewal modelling; − asset information; − strategies and objectives; − AHI methodology; and − work programmes.*
>
> *Forming judgements on material that is out-of-date and different from our proposal is not representative of good engineering practice by any objective standard and invalidates any conclusion drawn from that material.*
>
> *We do not see any plausible rationale for this, other than our CPP proposal material was not adequately reviewed.*[31]

85. A word count on Strata's consolidated draft briefing report reveals that we refer to Aurora's 2020 AMP 34 times and to its 2018 AMP 16 times.

86. There are several reasons why we referred to the 2018 and 2019 update AMPs. These include:

- to explain changes between actual and proposed expenditure;
- to understand changes that Aurora had made to its asset management practices between 2018 and 2020;
- to understand the implications of any changes in asset data, such as condition;
- to gain a view of changes in Aurora's asset management maturity and how it determines its self assessment; and
- because the Verifier relied on the 2018 AMP.

87. With respect to capex programmes, we reviewed key documents such as previous and current AMPs and the associated portfolio overview documents (PODs) in lieu of specially developed asset class plans or business cases in the case of growth projects. We consider that it is important to understand the past when forming views on future expenditure.

88. Importantly, the Verifier also relied on the 2018 AMP[32] when undertaking its verification because the 2020 AMP was not available at that time.

89. Aurora's comment regarding the formation of invalid judgements and conclusions based on out of date material effectively means that the verification should also be invalid and not

[31] Aurora - 20201218 Aurora CPP Draft Decision – Submission, B5.11
[32] Farrierswier and GHD - Final Aurora CPP Verification Report, Section 4.2.1

based on good practice. In our opinion, this is not the case as judgements should be made using material and information available when decisions are formed.

90. We have not changed our view that consideration of the 2018, 2019 update and 2020 AMPs was appropriate and necessary.

Strata's responses to the Commission's questions are provided in two places

91. The table below contains a high level summary of Strata's consideration of the topics identified by the Commission. In Appendix A, we provide a more detailed response to each of the topics.

High level responses to submission points relevant to the proposed adjustments

Table 2: Summary of responses to submission points on asset renewals

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
Subtransmission cables	Lack of risk and criticality assessments to determine the priority order and optimal replacement timing. In 2019, the faults on Aurora's cables and the duration of repairs reduced significantly. However, Aurora provided no information of any assessment it had completed on this. In the absence of information regarding the decline in faults in 2019, we consider that the timing of the Kaikorai Valley and Corstorphine cable replacements were not adequately supported. We recommended an adjustment based on the Kaikorai Valley and Corstorphine cable replacements being deferred by 1 year. In making this recommendation, we noted that Aurora has brought the Corstorphine replacement forward due to deliverability reasons (i.e., manage the deliverability issue and defer replacement). The deferrals resulted in a -35% adjustment to Aurora's forecast over the 5-year CPP.	<u>Aurora's points</u> B2.2 Assessing single year decline in faults is not statistically significant. B2.6 The consequence of failure will not reduce, it will in fact increase over time due to higher load. <u>Points made by Aurora in its response to RFI Q082</u> Aurora has never stated that sub-transmission cable faults are increasing or that 2019 was an unusual year. Such faults occur stochastically over many years. Looking at a single year, in isolation to other years in the range, is not good practice or reasonable. Aurora restates that both failure rates per km and outage days per fault are relevant factors. The charts provided include fault frequency and duration data related to faults that caused an interruption. <u>Summary of Strata's assessment</u> We accept that these sub-transmission cables demonstrate a high failure rate over 7 years of data. Also, the reported failures are related to those that caused interruptions, which is a subset of total cable faults. We have considered further the following specific features of the subtransmission cables: 1. days to repair oil, gas and PILC cable faults are not insignificant and, at least for oil cable faults, show an increasing trend (i.e., across the years 2016, 2017 and 2018); 2. obtaining oil and gas cable jointers has become increasingly difficult as this workforce ages and retires; 3. that one of the Kaikorai Valley circuits has 8 joints along one 286 metre section; the other has 10 joints within 337 metres. Joints

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
		themselves are potential points of future failure; that is, repairing the damage can create a weak point in the circuit; and 4. sheath integrity testing on the Corstophine cables indicates potential sheath failure which is known to lead to moisture ingress and a materially reduced cable life. Such sheath defects are difficult or impossible to locate. These points lead to an overall impression of a necessary and prudent replacement programme of oil, gas and PILC cables. Aurora's Dunedin network has many such cables and deliverability is likely to be most efficiently achieved within a rolling programme progressively implemented over many years. Taking these points into consideration, and the importance of these cables for maintaining reliable supply to consumers, we have reconsidered our earlier recommendation that, to meet the Expenditure Objective, the expenditure forecast should reflect the deferment of some components in the subtransmission programme by one year. However, we maintain our view (see our advice regarding the Smith St to Willowbank inter-tie project within the growth and security capex portfolio) that Aurora has not adequately stated the case necessary to support transformation of its radial architecture Dunedin network into a meshed network ($35m+ over >10 years). A comprehensive business case and cost benefit analysis would provide confidence in the architecture transformation decision. This affects the Halfway Bush to Willowbank cable replacement decision. Revisions to draft recommendation We remove our draft recommendation for deferral of the sub-transmission cable programme by one year. This will bring $4.3m, deferred in the draft determination, back into the CPP period. We consider that the parts of the expenditure forecast that the Commission asked Strata to review meet the Expenditure Objective.

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
Distribution cables	Reducing the RY20 to RY24 volumes to remove the unsupported 'smoothing' adjustment. The proposed adjustment was -9.4% over the 5-year CPP.	Aurora's points B3.2 The forecast was built using a standard repex model and was endorsed by the AER; the Verifier concluded it was reasonable. B3.5 Replacement volumes are calculated from the failure rate, not cumulative failure rates. Further information provided by Aurora No additional relevant information provided or referenced. Summary of Strata's assessment The AER does not endorse utilities' use of the repex model it uses as one tool in its assessment of utility-proposed repex forecasts. We understand that the asset categories the Commission asked Strata to review had not been subjected to verification. The Verifier's assessment was that age-based models are not generally aligned with good electricity industry practice but that data limitations obstructed Aurora's capabilities. Aurora's repex model applies input assumptions for expected asset life and standard deviation to determine a cumulative failure distribution from which it produces a survivor curve using the reciprocal of the cumulative failure distribution. The model then calculates a failure rate from the cumulative failure rate distribution. Whilst Aurora is correct in saying that replacement volumes are calculated from the failure rates, the failure rates are derived from cumulative failure rates. Therefore, it is not appropriate for Aurora to claim that replacement volumes are not derived from cumulative failure rates. Revisions to draft recommendation The submissions have provided Strata with no new information to support amending our original opinion in the draft briefing report. In our opinion, removing the expenditure smoothing recommendation that Aurora applied

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
		when forecasting the first three CPP years results in a forecast that better meets the Expenditure Objective.
Low voltage cables	Renewal strategy is replace on failure, modelled forecast is age-based repex replacement. Modelling does not align with strategy. Forecast should be based on historical levels with some adjustment to reflect failure trends. Applying an historical level base approach resulted in a forecast that adjusted Aurora's age-based forecast by -$46.5% ($1.3m across the 5-year CPP).	Aurora's points B4.1 Aurora confirmed that it uses 100-year asset age as the trigger for replacement of PILC cables in its repex model when the actual replacement trigger is failure. B4.2 Claims inconsistency in Strata's understanding of Aurora's LV cable replacement strategy. Further information provided by Aurora No additional relevant information provided or referenced. Summary of Strata's assessment Aurora did not provide any information or analysis to support a view that the age-based repex forecast produces a more prudent forecast than an historical based projection. The claimed inconsistency in our Briefing Report was a reproduction of information from Aurora's Portfolio Overview Document for LV cables (POD08). Therefore Aurora's comments on contradiction apply to its own POD08 and not to Strata's Briefing Report. We do not consider that statements in Aurora's POD08 are contradictory. In our view, it is clear that the drivers of the expenditure relate to both the forecast and actual expenditure drivers. We consider that Aurora's submission somewhat contradicts the information provided in POD08 and MOD08 which clearly states expected life of cables as a replacement driver. Aurora's submission has confirmed that:

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
		1. there are inconsistencies between Aurora's modelled replacement forecast and the description of its assets, and the need for the expenditure; and 2. a more reasonable basis for the replacement forecast is to apply the most recent actual expenditure because this will be more reflective of the actual performance of the LV cables than the failure rates projected in the model. Revisions to draft recommendation The submissions have provided no reasons for Strata to amend its original finding that there are inconsistencies between Aurora's modelled replacement forecast and the description of its assets. Because of these issues, we could not conclude that Aurora's forecast expenditure met the Expenditure Objective. We have concluded that a reasonable basis for the replacement forecast is to apply the most recent actual expenditure because this will be more reflective of the performance of the LV cables than the failure rates projected in the model.
Pole mounted transformers	Aurora had not demonstrated that its proposed pole mounted transformer replacement volumes are reasonable and prudent. This was particularly the case for the 68% of expenditure for which investigations will only commence in 2021. No business case supporting the proposed $21.4m pole-to-ground programme. Recommended deferring >200 kVA replacements forecast for RY22 and RY23 by 75% and 33% respectively to reflect the	Aurora's points B5.12 Claims Strata is confused between *an approach and model calculations*. B5.27 Points out that five-year CPP component of the ten-year $21.4m pole to ground conversion is $11m. B5.15 and B5.16 The pole to ground conversion is a programme and does not require a business case. B5.24 and B5.29 Confirms that the replacement forecast has not been "critically optimised" and explains that it does prioritise actual pole mount transformer replacements based on safety criticality.

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
	likely timing of approval of the business case.	Further information provided by Aurora No additional relevant information provided or referenced. Summary of Strata's assessment It is difficult to understand why Aurora considers that Strata is confused given that Aurora's and Strata's explanations in the submission are consistent. Aurora's explanation: *the repex model approach …….assumes a normal replacement distribution around an expected life.* Strata's explanation: *a repex model is used and pole mounted distribution transformer life-expectancy is represented using a normal distribution as a reasonable proxy for replacement rates.* We consider that major capital programmes should be subjected to business case-level assessments. We don't accept Aurora's argument that such programmes should be considered as "business as usual" and with expenditure approved against a basic repex model output. Aurora has confirmed that its actual replacements are subjected to criticality prioritisation, yet its expenditure forecast is not. Accordingly, the expenditure forecast is likely not to represent what will actually be spent. Because of the above, our view remains that Aurora has not demonstrated that the proposed expenditure is reasonable and prudent. We consider that the application of a basic age-based repex model is insufficient to support forecast expenditure for the large pole to ground conversion component of the forecast when a main driver of the expenditure is reducing seismic risks. Revisions to draft recommendation The submissions have not provided reasons for us to amend our original recommendation in the Draft Briefing Report. We consider that Aurora has not demonstrated that its expenditure forecast meets the Expenditure Objective

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
		and, in our opinion, the adjustments we have proposed produce a more reasonable forecast.
For pole mounted fuses	Repex model highly sensitive to changes in input assumptions. Changing the expected life from 55 to 60 years reduced the 3-year CPP forecast expenditure by 51% and the 5-year review period forecast expenditure by 46%. Strata recommended a -20% adjustment.	Aurora's points B7.3 Critical of Strata's sensitivity assessment of the repex model (i.e., testing the model for changes in asset life expectancy input assumption). Further information provided by Aurora No additional relevant information provided or referenced. Summary of Strata's assessment Aurora's submission confirms that it has taken the outputs from its basic repex model to form the inputs of its asset renewals forecast without applying any sensitivity testing to its input assumptions. When we applied sensitivity testing to the expected life assumption, we found that relatively small changes made a material difference. We consider that the absence of sensitivity testing reduces confidence in the reasonableness and prudency of Aurora's asset replacement forecast. In the absence of additional information from Aurora, we retain our view that the expenditure forecast should be adjusted to reflect the absence of sensitivity testing. Revisions to draft recommendation The submissions have not provided reasons for Strata to amend its original conclusion that Aurora's forecast does not meet the Expenditure Objective.
Pole mounted switches	Reducing the expenditure to reflect smoothing over the CPP period and to compensate for potential bias towards over forecasting in the model. This resulted in a -2% adjustment over the 5-year CPP period.	Aurora's points B7.3 Critical of Strata's sensitivity assessment of the repex model (i.e., testing the model for changes in asset life expectancy input assumption). Further information provided by Aurora No additional relevant information provided or referenced.

Asset category	Reason for the adjustment	Consideration of relevant points in submissions
		Summary of Strata's assessment Aurora and other submitters did not comment on the proposed adjustment or the reasons for it. Revisions to draft recommendation - Our view remains that the adjustment we proposed produces a forecast that is better aligned with the Expenditure Objective.

Portfolio level adjustments

92. Strata advised the Commission[33] that the portfolio level adjustment would be made to reduce:

    1. bias towards over estimation in age-based volumetric models;
    2. effects of aggregation of a wide range of projects and programmes (e.g., potential planning and deliverability issues, interdependencies); and
    3. capture cost efficiency opportunities from the larger value overall programme (e.g., in price negotiations, material procurement, consultants, legal advice).

93. The first point is linked to volumetric models so should only be applied to asset fleets that relied on volumetric modelling.

94. The second and third points apply to both volumetric and bespoke projects and programmes. However, if there is clear evidence that a major project or programme has addressed the aggregation and cost efficiency points then it can be excluded from the portfolio level adjustment.

95. If the outputs from models have been entered directly into the expenditure forecast it indicates that top down challenge and portfolio level assessment have not been applied. The forecasts for asset fleets that Strata has reviewed are directly from the models.

Relevant general points that Aurora made in its submission on portfolio adjustments

96. Aurora made the following points in its submission regarding portfolio level assessments and adjustments:

97. Aurora disagrees with Strata's opinion that it is good electricity industry practice to consider the forecast at portfolio level and apply an adjustment for over-investment bias:

    1. Aurora claims that Strata has not justified its opinion by referencing examples;
    2. Aurora disagrees with Strata's claim that its forecasts are formed by the combined outputs from the models suggesting that a portfolio level review has not yet been completed; and
    3. Aurora disagrees with Strata on portfolio deliverability.

Portfolio level reviews are good industry practice

98. Particularly relevant to asset replacements is the Verifier's comment that "*Aurora Energy is at an early stage of its asset management maturity journey.*"[34] The Verifier's point aligns with the conclusion we formed when we considered the documents relevant to the scope of our review. Aurora's claim that portfolio level consideration is not good industry practice is possibly a consequence of the immaturity of its asset management practices.

99. It is common practice for businesses to subject expenditure forecasts, formed on bottom-up building block methods, to rigorous top-down challenges. Such challenges generally focus on asset portfolios and the overall portfolio forecasts.

100. The Commission has applied similar adjustments when determining Transpower's first Individual Price Path (IPP) capital expenditure forecasts. The portfolio level adjustments included factors such as the consideration of probability of expenditure roll-overs. Transpower subsequently applied this portfolio level adjustment in its RCP forecasts.

[33] Email to Simon Todd

[34] For example, Farrierswier and GHD - Final Aurora CPP Verification Report, page 61

AER's reviews of electricity network businesses commonly include portfolio level assessments of proposed expenditure forecasts

101. The Australian National Electricity Rules (NER)[35] explicitly require the AER to form a view on total capex and total opex, not on individual projects or programmes.

102. The AER applies portfolio level adjustments to NSP capex forecasts and expects to see evidence that the NSP has undertaken portfolio level reviews in deriving its expenditure forecasts. The AER states that:

> *'We typically analyse a distributor's total capex forecast from a top-down perspective. This top-down review forms the starting point of our capex assessment to determine whether further detailed analysis is required, but is also used throughout our review process to test the results of our bottom-up assessment. We apply both top-down and bottom-up reviews so that our decision is fully informed.…A top down analysis focusses on overall trends and adjustments rather than a bottom-up analysis which focusses on aggregating category specific drivers'*[36]

103. We have provided the Commission with further information on the AER's application of portfolio reviews in a separate advice note.

Australian electricity distributors apply portfolio level adjustments

104. It has become good industry practice for Australian electricity distributors to apply portfolio level assessments and adjustments to both capex and opex expenditure forecasts. Examples include:

- the application of adjustments across a portfolio of projects rather than specific projects;[37]
- deliverability efficiencies across the overall capex portfolio;[38]
- ensuring delivery and scope efficiencies are reflected in total forecast expenditure;[39] and
- assessing if projects could be better prioritised or delivered more efficiently to optimise value for customers.[40]

105. We have provided the Commission with further information on Australian electricity distributor's application of portfolio reviews in a separate advice note.

Aurora claims to have applied challenge and moderation to its forecasts

106. In its submission, Aurora described information it shared with the Verifier on its Board and Executive challenge and moderation processes. Aurora states that this included consideration of deliverability. Aurora's submission also noted its view that *"… any moderation to the forecasts needs to be in the context of a renewal backlog situation where reductions in the forecast expenditure will further extend the period of elevated risk on the network."*[41]

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[35] NER, clauses 6.5.6(c), 6.5.7(c), 6.12.1(3)(i), 6.12.1(4)(i); AEMC, Rule determination, 29 November 2012, p. 113
[36] AER, Attachment 5: Capital Expenditure Draft Decision - Jemena 2021-25, Sep 2020, pp 8-9
[37] AusNet Services Pty Ltd, Electricity Distribution Price Review 2022-26, Part III, January 2020, pages 61 and 67
[38] Ibid
[39] Jemena, 2021–26 Regulatory proposal – attachment 05-01 – forecast capital expenditure, Jan 2020, p. B-3
[40] SA Power Networks, 2020-25 Revised Regulatory Proposal, Attachment 5 Capital Expenditure, December 2019, section 5.2.5, p13
[41] Aurora - 20201218 Aurora CPP Draft Decision – Submission, B5.10

107. Aurora provided no further information on the changes and adjustments made to its forecasts following the Board and Executive challenge and moderation process.

We found no evidence that a challenge and moderation process had been applied

108. As noted previously, we found that outputs from the repex models were applied directly to the CPP proposal renewals expenditure forecast. Because of this, any Board and Executive challenge and moderation process has not resulted in any adjustments to outputs from the repex models. It appears that the CPP replacement expenditure forecast has remained a bottom-up forecast created by the repex models.

109. Whilst Aurora has claimed that a deliverability adjustment was made to some asset categories, for the models relating to the asset categories we were asked to review,[42] these adjustments were a component of the models and we have seen no documents evidencing that these were the result of a top-down portfolio level review.

Aurora's criticisms are not supported

110. In its submission, Aurora claims that Strata's opinions on portfolio level adjustments "… *evidence that Strata did not adequately review our proposal or the Verifier's report."*[43] However, Strata did consider the relevant comments made by the Verifier but concluded that, for the asset categories the Commission asked Strata to review, there was no evidence that a top-down challenge and portfolio level assessment had been completed.

111. Strata's view is supported by the last modified date of the models being July and August 2020, and that for all asset categories reviewed, unmodified repex model outputs had been used to form the expenditure forecast.

Application of a -5% adjustment better meets the Expenditure Objective

112. Aurora considers that its use of market tested rate-reflecting unit costs is an example of why using a 'blanket' 5% adjustment is unjustified and inappropriate.

113. Whilst Strata agreed that the market costs provided a level of assurance that the unit costs were appropriate, this does not include gains that can be made when the expenditure forecast is viewed from a portfolio level. For example, at one end of the scale, the repex model applies a cost per unit (e.g., transformer, switch, fuse etc.), whereas at the portfolio level, consideration is given to aspects such as economies of scale, market leverage, advantages for long term commitments, contract negotiation, purchasing leverage etc.

114. Also, portfolio adjustments are made for broader reasons than for potentiality high unit costs.

115. Aurora's submission points highlighted its lack of awareness of the application of portfolio level assessments and this is possibly a reason why there is no evidence that it has applied one to its forecast.

Revisions to draft recommendation on a portfolio level adjustment

116. Aurora's submission point did not provide reasons for Strata to amend its original recommendation on a portfolio level adjustment and the -5% adjustment. In our opinion, such an adjustment will produce an expenditure forecast that is more aligned with the Expenditure Objective. As we noted at paragraph 58, in its draft decision the Commission applied a -5% adjustment for alternative reasons.

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[42] We note that Aurora did apply 5% adjustments in the crossarms and LV enclosures renewals programmes to account for delivery considerations, we were not asked to review these asset categories.
[43] Aurora - 20201218 Aurora CPP Draft Decision - Submission(3983676.1), page 115

Section 3 – Non-network opex

Introduction

117. This section of our report considers Aurora's proposed non-network opex. In particular, it updates Strata's initial assessment of the reasonableness of Aurora's proposed non-network opex relating to:

- the system operations and network support (SONS) opex category; and
- the 'People costs' opex portfolio within the business support opex category.

118. The SONS portfolio covers the costs relating to managing and operating Aurora's electricity network. It excludes expenditure on capital projects, network equipment, field services and corporate costs.[44]

119. The People costs portfolio covers the cost of employing business support staff and external service providers. It contains people costs for several corporate functions—accounting and finance and risk assurance, communications, human resources, information technology (IT), regulatory and commercial.[45]

120. The People costs portfolio excludes expenditure on capital projects, costs and staff directly relating to the management and operation of Aurora's network, premises and plant costs, operational technology, and governance and administration costs that are not employment related.[46]

Our 2020 draft advice to the Commission

We could not conclude that the proposed uplift in SONS and People costs opex met the Expenditure Objective

121. In our draft briefing report on SONS and People costs opex,[47] we could not conclude that Aurora's proposed SONS and People costs opex was consistent with the Expenditure Objective.

122. This was based on the opex benchmarking and consideration of an efficient level of staffing set out in the draft briefing report. Our opinion was reinforced by the fact that we had not seen evidence of a business case-based approach to the substantial uplift in resourcing since Aurora became a standalone business on 1 July 2017.

We were not convinced all of Aurora's new work activities are new activities

123. We were not convinced all the work activities described by Aurora as new activities are in fact new. Reviews of Aurora's historical documentation and disclosures (e.g., asset management plans) indicated that tasks, which Aurora said are new, were being undertaken in the past, mostly through Delta.

We had a number of initial reflections on Aurora's decision making around staffing levels

124. Our initial reflections on Aurora's decision making around staffing levels included:

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[44] Aurora Energy, 29 April 2020, SONS portfolio overview document, p. 1.
[45] Aurora Energy, 29 April 2020, People costs portfolio overview document, p. 1.
[46] *Ibid*
[47] Refer to Strata's draft opex briefing report 6.

- the absence of an independent expert assisting Aurora to assess an appropriate level of staffing was surprising;
- there appeared to be little focus placed on looking for efficiency and productivity gains across roles;
- Aurora provided no evidence, either to the Verifier or to the Commission, of the business cases supporting the uplift in staffing levels;
- there appeared to be limited focus on Aurora's resourcing profile over time;
- the approach to benchmarking needed to be carefully evaluated; and
- how did Aurora's Board gain sufficient comfort to commit Aurora to tens of millions of dollars of expenditure in staffing over the space of just a few years?

Based on our benchmarking we concluded Aurora's proposed non-network opex is high

125. Based on our benchmarking analysis, we concluded that Aurora's proposed SONS opex, and non-network opex more generally, is high over the CPP period relative to Aurora's peers.[48] This conclusion differed from that of Aurora and the Verifier.[49]

126. We found that historically, Aurora's non-network opex was below the average of the cohort of peers we compared Aurora against. However, Aurora's proposed uplift in non-network opex, driven primarily by SONS and People costs opex, puts Aurora significantly above the cohort average not only over the CPP period, but throughout the RY21–RY30 forecasting period we used in our initial analysis.

127. The fact that Aurora's forecast non-network opex is still significantly above the cohort average in RY30 reinforced our conclusion. Aurora's 2020 asset management plan points to Aurora being in a 'steady state' by RY30, certainly regarding capex. Therefore, we would have expected to see non-network opex (in real terms) lower in RY30 than over the CPP period. However, this was not the case.

We had reservations about using a base-step-trend approach to forecast SONS and People cost opex

128. We had reservations about using the base-step-trend approach to forecast SONS and People costs opex. For the purposes of forecasting SONS and People costs opex, we considered Aurora to not be in a 'steady state' over the CPP period. We believed Aurora could not point to its RY2019 year of operation and say that the coming few years would be similar apart from a slight trend in opex (either up or down).

We considered an efficient level of staffing would be less than that proposed by Aurora

129. We concluded that Aurora's proposed level of staffing under the CPP does not meet the Expenditure Objective. This was based on three considerations:

    - extending our benchmarking of Aurora's business-as-usual (BAU) non-network opex over the long run, to include an estimate of the effect of the proposed CPP on Aurora's

[48] We benchmarked Aurora's non-network opex against the following EDBs:
- Counties Power;
- Orion NZ;
- Powerco;
- Unison Networks; and
- WEL Networks.

[49] See, for example:
- Farrierswier, 8 June 2020, Verification report – Aurora Energy CPP application, p. 323 and p. 334; and
- Aurora Energy, Response to RFI Q036 and RFI Q040, Industry benchmarking Non-network operational expenditure, pp. 7-9.

SONS and People costs opex during the CPP period and dividing this non-network opex figure by an estimated salary figure to give an estimated number of fulltime equivalent (FTE) staff;

- undertaking a top-down 'senior management' challenge of Aurora's staffing levels; and
- comparing Aurora's proposed SONS expenditure against Powerco's SONS expenditure under its CPP.

130. We concluded that Aurora's staffing levels over 2022–2026 should fall within a range of approximately 120–140 FTEs.

We recommended Aurora's SONS and People costs opex be two-thirds of what Aurora proposed

131. We recommended that:

- Aurora's SONS opex be approximately $55,626,267 over the period 2022–2026; and
- Aurora's People costs opex be approximately $24,796,675 over the period 2022–2026.

132. The total came to 67% of what Aurora proposed in its CPP application.

133. Under our recommendation, Aurora would have received approximately 75% of its proposed non-network opex before any other adjustments made by the Commission.

Aurora disagrees with our draft advice on revised SONS and People costs opex

134. Aurora considers Strata's initial analysis to be:

> *demonstrably flawed – both in principle and in its execution. This is clear from the expert analysis undertaken by both PWC and WSP, on (Aurora's) behalf.*[50]

Criticisms of Strata's draft advice

135. Strata has reviewed Aurora's submission and the attached reports prepared by PWC and WSP, along with other submissions that comment on our draft advice on SONS and People costs opex.[51] Table **3** summarises what we identified as key criticisms of our draft advice.

136. We have provided a response to each of these key criticisms in the same table.

Table 3: Key criticisms of draft advice on Aurora's proposed SONS and People costs opex and staffing, and Strata's summary responses to these criticisms

Key criticisms of draft advice on Aurora's proposed SONS and People costs opex and staffing	***Strata's summary responses to key criticisms***
Partial performance indicator (PPI) benchmarking should not have been used to determine expenditure levels. This is due to the inherent limitations in the accuracy of PPI benchmarking e.g., some expenditure programmes of EDBs in the benchmarking cohort may not have been	We agree there are limitations inherent in PPI benchmarking. In response to submissions, we have corrected model calculation errors, updated assumptions, and refined the PPI benchmarking methodology used in our draft advice. We have also undertaken descriptive modelling

[50] Aurora Energy, 18 December 2020, Letter from Richard Fletcher to Sue Begg, p. 1.
[51] For example, Orion NZ's submission, Powerco's submission, Electra's cross-submission.

known to Strata when developing the benchmarking resulting in Strata incorrectly perceiving inefficiencies in the relevant EDBs' opex.	to test the reasonableness of the non-network opex recommended in the draft advice. Please refer to the sub-section below that summarises our descriptive modelling.
The cohort Strata used in its benchmarking was inappropriate because: • it was too small; • it should not have included Powerco, which is significantly larger than Aurora in terms of ICPs and circuit length; and • it used benchmark metrics ($/ICP and $/km of circuit length) that are inconsistent with the drivers of Aurora's non-network costs during the CPP.	We are aware of the statistical limitations of small sample sizes. For the purposes of the PPI benchmarking used in our draft advice, we sought to strike a reasonable balance between these limitations and avoiding a comparison of Aurora against EDBs that are quite dissimilar to Aurora in terms of network characteristics. Using the results of K-Means clustering analysis undertaken by the Commission, we have compared Aurora's proposed non-network opex against the following cohort of EDBs: • Northpower; • Orion NZ; • The Power Company; • Unison Networks; • WEL Networks; and • Wellington Electricity. The average non-network opex of these EDBs over the period 2021–2030 is 60% of Aurora's, which is identical to the percentage used in our draft advice last year. We considered it reasonable to include Powerco in the benchmarking cohort used in our initial analysis because: • its customer density is similar to Aurora's; • it is the only other EDB in New Zealand with a non-contiguous network like Aurora's; and • we assessed that any difference in the non-network opex of Aurora and Powerco over the period 2021–2030 due to Powerco having economies of scale would be more than offset by Powerco's CPP raising its non-network opex.

	Of most interest to us in benchmarking Aurora's non-network opex is the period after Aurora became a standalone business (i.e., 2018-2030). For all but the first year of this period, Powerco's non-network opex has an upward step change embedded in it because of Powerco's CPP.[52] Regarding the third point of criticism of our benchmarking cohort, there appears to be a misunderstanding over Strata's use of $/ICP and $/km of circuit length as benchmarking metrics. These were used in benchmarking Aurora's BAU non-network opex over the long run (i.e., excluding the effect of Aurora's proposed CPP). We considered these to be appropriate metrics to use for this purpose because of the Commission's findings from its analysis supporting the DPP 3 final decision. Specifically, the Commission found growth in the number of ICPs and growth in circuit length to be the two key drivers of growth in non-network opex.[53] We did not proffer growth in ICPs and circuit length as representing the drivers for the Powerco and Aurora CPP step changes. Instead, we used growth in ICPs and circuit length to convert the absolute dollar value of Powerco's estimated CPP step change into the same metric used in benchmarking Aurora's BAU non-network opex over the long run. We noted in the draft briefing report that, at a high level, Powerco's CPP was about significant network investment and improving asset management capability and practices, as is Aurora's CPP.
Strata relied on a single normalisation parameter, which did not appropriately account for differences within the comparator group. Strata did not consider different outcomes that arise when	The EDBs in our comparator group had similar customer densities, enabling us to use a single normalisation parameter.

[52] This effect exists beyond Powerco's CPP period because of the extrapolation of expenditure in Powerco's forecasts of non-network opex.
[53] Commerce Commission, 27 November 2019, Default price-quality paths for electricity distribution businesses from 1 April 2020 – Final decision, Reasons paper, p. 105.

multiple normalisation parameters are used.	
The data used in the benchmarking contained inaccuracies: • the reporting of the 'SONS' and 'Business support' components of non-network opex differs across EDBs; EDBs have different operational structures and allocate non-network opex to the SONS and Business support components in an inconsistent manner which results in unreliable data at the component level; • there is no benchmark data for the People costs opex portfolio; and • the accuracy of the data disclosed by EDBs falls over time.	We agree. We discussed the first two of these inaccuracies in our draft briefing report. We were asked to look specifically at SONS and People costs opex. We did so, as far as was reasonable, given data limitations. We factored into the analysis non-network opex in aggregate, assigning it the same weight as the disaggregated non-network opex. Under the scope of our updated analysis, we have focused on non-network opex in aggregate. In relation to the third point of criticism of the data used in our analysis, we formed the view that the relative accuracy of the data across the EDBs in the benchmarking was similar enough to not influence the analysis materially. (We tested for this by removing the data for the out years 2027–2030.)
The use of benchmarking to compare Aurora's proposed expenditure to other EDBs operating at different levels of maturity and with differing business operating models is completely at odds with the CPP process which is intended to be a bespoke and tailored price path to reflect an EDB's unique circumstances. The benchmarking failed to account for the relative activity levels of Aurora and the cohort group, and Aurora's unique situation during the CPP period which included the need to: • undertake a major capex programme; • undertake a significant network opex programme; • invest in the set-up of a new business structure; and • invest in necessary asset management capability and maturity improvements. The substantial uplift in capex sought by Aurora would intuitively require a	Strata was requested to undertake benchmarking as part of its initial analysis. Benchmarking can provide useful insights into Aurora's proposed non-network opex, particularly given the information asymmetry that exists between Aurora and the Commission. As noted above, the benchmarking was of Aurora's *BAU* non-network opex over the long run (*BAU non-network opex*). To then prepare a reasonable estimate of the level of non-network opex for Aurora under its CPP, we took account of the effect of Powerco's CPP on Powerco's non-network opex. We noted the shortcomings of this approach in our draft briefing report. We wanted to take account of the effect of Orion NZ's CPP on its non-network opex, but we did not identify suitable data at the time. Subsequently, we have done so, and have included this in our updated advice to the Commission.

commensurate uplift in non-network opex, especially for the human resources to support planning and delivery. The use of activity-based benchmarking (i.e., using totex or network spend as a normaliser) goes some way to providing a comparison of Aurora's non-network opex with that of its peers, which takes account of Aurora's unique situation.	Our draft advice explicitly considered Aurora's asset management maturity and Aurora's establishment as a standalone business from Delta. For example, we noted that Aurora will have been a standalone entity for almost five years when the CPP period begins and so consequently we would expect to see non-network opex fall as establishment activities come to an end during the CPP period. However, this is something that we have not seen in Aurora's CPP proposal. The descriptive benchmarking we have undertaken as part of our updated advice specifically accounts for Aurora's increased activity during the CPP period (by factoring in capex and network opex). For example, the linear model we have used to investigate associations between EDB characteristics and non-network opex shows that a 10% increase in capex is, on average, associated with a 2.5% increase in non-network opex. In dollar terms, this means that a $5.3 million (10%) increase in capex relative to the average EDB capex of $53 million in 2020, is associated with a $0.35 million (2.5%) increase in non-network opex relative to the average EDB non-network opex of $14m in 2020.
Using Powerco to derive a step change factor does not account for significant differences between Aurora and Powerco in terms of the respective organisations' CPPs and in terms of network size (Powerco will have economies of scale relative to Aurora), topology, weather, a non-contiguous network, and asset management maturity.	Our draft briefing report noted that differences between the Powerco and Aurora CPPs and between the organisations' characteristics were a shortcoming of our analysis. We note that a non-contiguous network is not a difference between Aurora and Powerco. In our updated analysis, we apply an upward CPP step change to the estimated BAU non-network opex for Aurora for each year of the CPP period by using primarily the step change in non-network opex proposed by Aurora. In addition, and as noted above, we have obtained data that enables us to also consider the step change in Orion NZ's non-network opex under its CPP. We have used this data in our updated analysis for comparative purposes.

Equal weighting of $/ICP and $/km of circuit length was inconsistent with the Commission's DPP 3 determination.	We agree. This was a simplifying assumption that we used as a guide to, rather than as a determinant of, the percentage of Aurora's BAU non-network opex that the BAU non-network opex of the benchmarking cohort represented. For SONS opex, the BAU non-network opex of the benchmarking cohort as a percentage of Aurora's BAU non-network opex was identical using $/ICP and using $/km of circuit length (44%). We used 45% in the 2020 modelling. For business support opex, the BAU non-network opex of the benchmarking cohort as a percentage of Aurora's BAU non-network opex differed by 4% using $/ICP (72%) and using $/km of circuit length (68%). We used 70% in the 2020 modelling. For non-network opex, the BAU non-network opex of the benchmarking cohort as a percentage of Aurora's BAU non-network opex differed by 2% using $/ICP (58%) and using $/km of circuit length (56%). We used 60% in the 2020 modelling.
The modelling contained errors in the calculations.	We agree and thank PWC for bringing these to our attention. Correcting the calculation errors increased the point estimate of non-network opex to 77% of Aurora's proposed non-network opex (the draft briefing report contained an estimate of 75%).
Strata applied incorrect assumptions to the modelling particularly in relation to the split of staff and non-staff costs in the SONS and People costs opex portfolios, and in relation to the average salaries in the SONS and People costs portfolios.	We welcome the provision of data from Aurora, via PWC, which has enabled us to model staff and non-staff costs, and salaries, more accurately in the SONS and People costs opex portfolios.
The use of Strata's 'senior management' challenge makes significant assumptions and is not a counterpoint to the benchmarking, as claimed by Strata, but is instead used in estimating the upper bound for SONS and People costs opex.	In the draft briefing report, we noted the limitations of the 'senior management' challenge. The challenge was not an attempt to benchmark Aurora's FTEs or Aurora's SONS and People costs opex. Instead, it was a counterpoint to the estimate of FTEs that came from the benchmarking of Aurora's non-network opex.

Strata's updated analysis

Summary of updated approach to benchmarking

137. As noted in Table 3, in response to submissions, Strata has corrected model calculation errors, updated assumptions, and refined the PPI benchmarking methodology used in our draft advice to the Commission. We have also undertaken descriptive modelling to test the reasonableness of the non-network opex recommended in the draft advice.

138. Strata's revised methodology for estimating Aurora's non-network opex over the CPP period may be summarised as follows.

Step 1:

139. We estimate BAU non-network opex for Aurora, for each year of the CPP period, using the long-run average BAU non-network opex of a cohort of EDBs selected via K-Means clustering analysis undertaken by the Commission.[54] Specifically, we scale down Aurora's proposed BAU non-network opex to the 2021–2030 average of the $/ICP and $/km values for the BAU non-network opex of six EDBs selected using the Commission's K-Means clustering analysis.

Step 2:

140. We apply an upward CPP step change to the estimated BAU non-network opex for Aurora, for each year of the CPP period, by using primarily the step change in non-network opex proposed by Aurora in its CPP application less adjustments made after reviewing:

- Aurora's proposed step change for the SONS opex category; and
- Aurora's proposed step change for each of the opex portfolios in the business support opex category, except for ICT opex.

Step 3:

141. For comparison purposes:

- we repeat Steps 1 and 2, but in Step 1 we use our 2020 benchmarking cohort;
- we repeat Steps 1 and 2, but in Step 2 we use a step change in non-network opex under Aurora's proposed CPP equal to the average of the (equally weighted) $/ICP and $/km values for Orion NZ's and Powerco's estimated CPP step changes; and
- we repeat Steps 1 and 2, but in Step 2 we use a step change in non-network opex under Aurora's proposed CPP equal to the upper bound of the (equally weighted) $/ICP and $/km values for Orion NZ's and Powerco's estimated CPP step changes.

Step 4:

142. We use a linear panel regression model and a non-linear generalised additive model to predict Aurora's non-network opex over the CPP period, conditional on network characteristics and activity levels for all 29 EDBs over the past decade.

Step 5:

143. We estimate Aurora's non-network opex over the CPP period by drawing from:

- the non-network opex estimates for Aurora over the CPP period using the updated 2020 analysis; and
- Aurora's non-network opex over the CPP period as predicted by the non-linear generalised additive model.

[54] Aurora's 2021-2030 forecast non-network opex is taken from Aurora's CPP application. The 2021-2030 forecast non-network opex for EDBs other than Aurora is taken from EDBs' RY2020 asset management plans.

Description of updates to our 2020 analysis

144. Set out below are the updates Strata has made to its 2020 analysis, in particular the methodological changes associated with Steps 1 to 3 of our revised approach to the analysis.

Correction of errors

145. The first change Strata made to the benchmarking in its draft advice was to correct the calculation errors that PWC identified in the data spreadsheets. This increased the recommended level of non-network opex contained in our draft advice from 75% of what Aurora proposed to 77%.

Updating of data

146. No RY2020 data for EDBs was available when we undertook our initial analysis, except for Aurora. Given this information is now available, we have incorporated it into our updated analysis.

147. We have also used circuit lengths from schedule 9(c) of EDBs' information disclosures rather than from schedule 9(a). Doing so aligns this aspect of our data with that used in the Commission's DPP 3 final decision. This update to the data also includes some changes to schedule 9(c) circuit lengths that Aurora provided to the Commission leading up to the DPP 3 final decision.

148. Lastly, we have identified data on Orion NZ's 2008–2012 non-network opex.[55] This provides another important data point for assessing what constitutes a reasonable step change in Aurora's BAU non-network opex due to its proposed CPP.

Updating of key assumptions

149. We have updated the modelling to use the following information that Aurora provided to PWC for the latter's critique of our initial analysis:

- the split of staff and non-staff costs for SONS and People costs opex; and
- the average salary in each of the SONS and People costs opex portfolios which has meant that capitalisation of salary costs is more accurately factored into our analysis.

150. This information has had a material impact on our analysis, resulting in a substantial reduction in the number of FTEs associated with any given level of non-network opex. This result accords with PWC's analysis.

Key methodological changes

Material change 1

151. The first key methodological change we have made to our 2020 analysis is to estimate Aurora's BAU non-network opex for each year of the CPP period using the BAU non-network opex of the following EDBs:

- Northpower;
- Orion NZ;
- The Power Company;
- Unison Networks;
- WEL Networks; and
- Wellington Electricity.

[55] Orion, 19 February 2013, CPP Proposal, Real Opex Summary by asset type, p. 1.

152. Using K-Means clustering analysis, the Commission has identified that these six EDBs and Aurora form one of four clusters of New Zealand's 29 EDBs when EDBs are analytically identified as having similar network characteristics and drivers of opex.[56] Vector and Powerco each form their own cluster, with the remaining 20 EDBs forming the fourth cluster.

153. Strata has used the Commission's K-Means clustering analysis as a means of addressing WSP's criticism that we removed EDBs from our 2020 benchmarking cohort prematurely.[57]

154. Strata notes that it does not have the software[58] used by the Commission in its clustering analysis. Therefore, we have been unable to do quality assurance on the Commission's analysis by looking at the model files. Instead, we have sought to replicate the Commission's analysis. We find that Northpower and The Power Company are not in the same cluster as Aurora when four clusters are used, per the Commission's approach. Other cluster memberships are the same.

155. We have tested the sensitivity of our preferred estimate of Aurora's non-network opex over the CPP period to the removal of Northpower and The Power Company from Aurora's cluster. The effect is relatively minor; our preferred estimate increases by approximately $2 million (RY2020 dollars).[59]

156. We also note that K-Means clustering analysis requires the number of clusters to be designated by the modeller. WSP used two clusters in its analysis, while the Commission has used four clusters in its analysis because using two clusters may not necessarily be the optimal number since many smaller-scale EDBs in Aurora's cluster may not necessarily be comparable to Aurora. We note that the data can be used to justify either number of clusters. We consider it is reasonable to use the Commission's four cluster analysis because:

- many smaller-scale EDBs may not be comparable to Aurora; and
- our descriptive modelling will include information relevant to estimating Aurora's non-network opex that is omitted under a four cluster approach.

Material change 2

157. The information on staff/non-staff costs and (SONS) salaries post-capitalisation has caused us to relax the assumption that Aurora receives 100% of its proposed non-network opex not related to staff costs. The purpose of this change is for the analysis to more closely reflect the business decision making process that Aurora would follow for any difference between its approved non-network opex and that sought under its CPP application. That is, we expect Aurora will allocate its approved non-network opex across and within the various non-network opex portfolios in a manner it considers appropriate for its business needs and obligations.

158. To this end, in calculating our estimate of Aurora's non-network opex over the CPP period, we adjusted each non-network opex portfolio, rather than just the SONS and People costs portfolios per our initial analysis. Specifically, we:

[56] The Commission's cluster analysis is based on ICP numbers and total circuit length, as the Commission's DPP 3 analysis found these variables to be the most significant drivers of opex. The analysis uses RY2019 information disclosure information.
[57] Recalling that the 2020 benchmarking cohort comprised Counties Power, Orion NZ, Powerco, Unison Networks, and WEL Networks.
[58] Strata.
[59] i.e., from approximately $129 million to approximately $131 million (RY 2020 dollars).

- *scaled down* each non-network opex portfolio by the percentage adjustments stemming from our benchmarking of Aurora's BAU non-network opex against other EDBs; and then
- *adjusted up*[60] each non-network opex portfolio to account for Aurora's proposed CPP.

Material change 3

159. Strata's third key methodological change is intended to ensure our approach to estimating Aurora's change in non-network opex due to the proposed CPP considers the unique circumstances facing Aurora during the CPP period.

160. To do this, we have used primarily the step change in non-network opex proposed by Aurora in its CPP application less adjustments made after reviewing:

- Aurora's proposed step change for the SONS opex category; and
- Aurora's proposed step change for each of the following opex portfolios in the business support opex category:
  - people costs;
  - premises, plant and insurance;
  - governance and administration; and
  - Upper Clutha DER solution.

161. We did not review the remaining portfolio in the business support opex category (ICT) because the Commission did so in making its draft decision concluding that Aurora's proposed expenditure in this portfolio met the Expenditure Objective.

162. Our review of Aurora's proposed step change in non-network opex (excluding ICT) built on the Verifier's review of whether Aurora's proposed non-network opex over the CPP period met the Expenditure Objective.

163. Following our review of Aurora's proposed step changes for non-network opex (excluding ICT), we removed $137,660 per annum in training costs from the People costs opex portfolio. This adjustment stems from other draft advice on opex that Strata provided to the Commission in 2020.[61]

164. We calculated the downward adjustment in training costs as follows:

- start with the upper bound staffing estimate of 140 FTEs from the advice in Strata's draft briefing report because the Commission used this in its draft decision; and
- calculate the downward adjustment in training costs as the sum of:
  - 140 multiplied by $735; and
  - 16 multiplied by $2,735.[62]

165. In other draft advice on opex that we provided to the Commission in 2020 we recommended another portfolio level adjustment to Aurora's proposed CPP step change—remove $247,026 per annum of insurance premiums.[63]

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[60] Note, these adjustments are not scalar-based for two of our four scenarios—refer to the next sub-section.
[61] Refer to Strata's draft Opex Briefing Report 4.
[62] We note that Aurora calculated its proposed training cost step change using 156 staff rather than the 158 staff in its CPP application. Refer to 2020-04-21, Memo from Aurora Energy to Farrierwier, titled Aurora Energy CPP Application – Revised SONS and PEOPLE Forecasting Models and Step Change support, Appendix 1 - Major SONS and PEOPLE Step Changes and Guide to Supporting Information, p. 8.
[63] Refer to Strata's draft Opex Briefing Report 4.

166. Having considered Aurora's submission on the draft decision, we accept Aurora's rationale for its proposed step change in insurance costs. Therefore, we have removed our recommended downward adjustment of $247,026 from the updated analysis.

167. We have not used Aurora's proposed (negative) step change[64] for the premises, plant and insurance opex portfolio. This is because both the base year opex and the step change opex for this portfolio include building leases, which Aurora capitalises in accordance with the input methodologies. This means we do not know the step change contained in Aurora's proposed opex for the portfolio. Given this, and our assessment that Aurora's proposed expenditure for this portfolio meets the Expenditure Objective, we have made a step change adjustment for this portfolio that lifts the opex to that proposed by Aurora.

168. Aurora's proposed step change in non-network opex averages $4.8 million (RY2020 dollars) per year over the CPP period.[65] Therefore, the adjusted average annual step change in Aurora's proposed non-network opex under the CPP is approximately $4.66 million (RY2020 dollars).

169. We note that, in relation to our estimate of the SONS opex step change, we have had to assume the percentage of the step change in staff costs that Aurora proposes to capitalise. We have assumed 17.25%. This is based on information contained in the WSP and PWC reports accompanying Aurora's submission on the Commission's draft decision.[66]

170. As a counterpoint to the CPP related increase in non-network opex estimated using Aurora's adjusted CPP numbers, we have retained our 2020 approach of estimating the CPP step change in Aurora's non-network opex by looking to other CPPs. Strata considers it reasonable to look to Orion NZ's and Powerco's CPP related step changes in non-network opex for guidance on the size of Aurora's CPP related step change in non-network opex for two reasons.

171. Firstly, there is the argument that an EDB's non-network opex under a CPP is largely driven by the increase in the EDB's activity levels. The Powerco, Orion NZ and Aurora CPPs are each characterised by significant increases in activity levels, particularly in relation to capex. Secondly, there are similarities between Aurora's proposed CPP and Powerco's CPP.[67] At a

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[64] -$16,107 for RY2022, -$22,339 for RY2023, -$41,013 for RY2024, -$38,958 for RY2025, and -$38,958 for RY2026.

[65] Refer to Table 3 of Schedule E of Aurora's CPP Financial Model, p. 240. We note the base year for ICT opex is RY2020 rather than RY2019 as for the other portfolios within non-network opex.

[66] The 17.25% is based on the following:

1) the WSP report accompanying Aurora's submission on the draft decision said that circa $2 million of remuneration in the SONS and People costs opex portfolios is capitalised each year (refer to footnote 34 on p. 14);
2) the PWC report accompanying Aurora's submission said a portion of SONS staff costs are capitalised (refer to p. 27);
3) the PWC report accompanying Aurora's submission said there are 107 SONS "FTEs" ("staff" is intended) in each year of the CPP period (refer to p. 27);
4) dividing $2 million by 107 gives an average capitalisation per staff member of approximately $18,700;
5) adding $18,700 to an average capitalised SONS salary over the CPP period of $89,600 gives an average SONS salary over the CPP period of $108,300; and
6) dividing $108,300 by $18,700 gives an estimated average percentage of SONS staff costs that are capitalised of 17.25%.

[67] Strata agrees with Aurora and its advisors that the activities Aurora is proposing under its CPP differ from those under other CPPs. We noted this point in our draft briefing report (refer to p. 24 of our draft Opex Briefing Report 6). Nevertheless, there are also similarities across the CPPs.

high level, Powerco's CPP and Aurora's proposed CPP are both about significant network investment and improving asset management capability and practices.[68]

Note that, in our updated analysis, we have used RY2011–RY2015 to estimate Powerco's CPP step change, instead of RY2013–RY2015 and RY2018. This acknowledges that Powerco's RY2018 non-network opex was probably influenced by the CPP commencing in RY2019. Our estimate of Orion NZ's CPP step change also uses five years of pre-CPP data (the period RY2008 to RY2012).

Results from updated analysis using the revised 2020 benchmarking approach

172. Table 4 through to Table 7 show the following estimates of Aurora's non-network opex during the CPP period, using the revised 2020 benchmarking approach.

Preferred estimate

- Scales down Aurora's proposed BAU non-network opex to the average of the $/ICP and $/km values for the BAU non-network opex of the EDBs selected through the Commission's K-Means clustering analysis.
- Adds the CPP-related step change in non-network opex proposed by Aurora less a downward adjustment to training costs.

Comparison estimate 1

- Scales down Aurora's proposed BAU non-network opex to the average of the $/ICP and $/km values for the BAU non-network opex of the EDBs used in Strata's initial analysis.
- Adds the CPP-related step change in non-network opex proposed by Aurora less a downward adjustment to training costs.

Comparison estimate 2

- Scales down Aurora's proposed BAU non-network opex to the average of the $/ICP and $/km values for the BAU non-network opex of the EDBs selected through the Commission's K-Means clustering analysis.
- Scales up the benchmark-based estimate of Aurora's BAU non-network opex, using the average of the (equally weighted) $/ICP and $/km values for Orion NZ's and Powerco's estimated CPP step changes.

Comparison estimate 3

- Scales down Aurora's proposed BAU non-network opex to the average of the $/ICP and $/km values for the BAU non-network opex of the EDBs selected through the Commission's K-Means clustering analysis.
- Scales up the benchmark-based estimate of Aurora's BAU non-network opex, using the upper bound of the (equally weighted) $/ICP and $/km values for Orion NZ's and Powerco's estimated CPP step changes.

[68] See, for example, Powerco, 12 June 2017, Customised price-quality path (CPP) Main Proposal, p. i.

Preferred estimate

173. Table 4 shows Strata's preferred estimate of Aurora's non-network opex during the CPP period, under our revised 2020 benchmarking.

Table 4: Results from updated analysis using revised 2020 benchmarking – preferred estimate

	CPP Year 1	CPP Year 2	CPP Year 3	CPP Year 4	CPP Year 5	Total	
SONS	12,848,985	14,691,626	12,997,117	12,744,203	11,950,318	65,232,248	83% of CPP proposal
People costs	5,076,097	6,739,503	5,580,497	5,081,406	5,093,926	27,571,430	68% of CPP proposal
Total	17,925,082	21,431,128	18,577,614	17,825,609	17,044,244	92,803,678	78% of CPP proposal
IT Opex	3,181,916	2,925,114	3,201,253	3,106,765	3,024,860	15,439,909	91% of CPP proposal
Premises, Plant and Insurance	288,000	307,000	310,000	515,000	534,000	1,954,000	100% of CPP proposal
Governance and Administration	3,032,000	3,134,000	3,141,000	3,114,000	3,139,000	15,560,000	100% of CPP proposal
Upper Clutha DER Solution	265,000	594,000	582,000	699,000	862,000	3,002,000	100% of CPP proposal
Business support opex	11,843,013.06	13,699,616.64	12,814,750.28	12,516,171.77	12,653,786.53	63,527,338	82% of CPP proposal
Total non-network opex	24,691,998.56	28,391,242.16	25,811,867.00	25,260,374.50	24,604,104.57	128,759,587	83% of CPP proposal

174. Strata prefers this estimate over the comparison estimates because:

- this estimate uses K-Means analysis to select the benchmarking cohort thereby addressing a key criticism of the methodology for selecting the 2020 benchmarking cohort; and
- this estimate uses Aurora's numbers as the starting point for estimating a step change in non-network opex over the CPP period that meets the Expenditure Objective rather than using Strata's estimates of Orion NZ's and Powerco's CPP related step changes. We consider that this addresses the criticism that our initial methodology for estimating Aurora's step change in non-network opex did not take account of Aurora's unique circumstances.

175. The average BAU non-network opex of the EDBs selected through the Commission's K-Means clustering analysis is 60% of Aurora's over the period 2021–2030. This is identical to the percentage used in our draft advice last year, using the different benchmarking cohort.

176. As noted in Table 3, we acknowledge that applying equal weighting to the $/ICP and $/km benchmark metrics is inconsistent with the Commission's conclusion in its DPP 3 final determination. While applying a greater weighting to $/ICP (e.g., 67%) would change the total non-network opex figures in Table 4 (reducing them) the impact is negligible and the correct weighting to apply is not clear.

Comparison estimate 1

178. Table **5** shows Strata's estimate of Aurora's non-network opex during the CPP period, under our revised 2020 benchmarking, but with the 2020 benchmarking cohort used to estimate Aurora's BAU non-network opex.

Table 5: Results from updated analysis using revised 2020 benchmarking – estimate using 2020 benchmarking cohort

	CPP Year 1	CPP Year 2	CPP Year 3	CPP Year 4	CPP Year 5	Total	
SONS	12,947,523	14,798,136	13,097,840	12,844,373	12,047,434	65,735,306	84% of CPP proposal
People costs	5,125,809	6,796,218	5,632,621	5,131,607	5,144,262	27,830,517	69% of CPP proposal
Total	18,073,332	21,594,354	18,730,461	17,975,980	17,191,696	93,565,823	79% of CPP proposal
IT Opex	3,204,197	2,946,359	3,223,611	3,128,744	3,046,511	15,549,422	91% of CPP proposal
Premises, Plant and Insurance	288,000	307,000	310,000	515,000	534,000	1,954,000	100% of CPP proposal
Governance and Administration	3,032,000	3,134,000	3,141,000	3,114,000	3,139,000	15,560,000	100% of CPP proposal
Upper Clutha DER Solution	265,000	594,000	582,000	699,000	862,000	3,002,000	100% of CPP proposal
Business support opex	11,915,006.06	13,777,576.91	12,889,231.79	12,588,351.25	12,725,773.11	63,895,939	82% of CPP proposal
Total non-network opex	24,862,528.61	28,575,712.97	25,987,071.83	25,432,724.31	24,773,207.10	129,631,245	83% of CPP proposal

179. The average BAU non-network opex of the EDBs in the 2020 benchmarking cohort is also 60% of Aurora's over the period 2021–2030.

180. As noted in Table 3, we acknowledge that applying equal weighting to the $/ICP and $/km benchmark metrics is inconsistent with the Commission's conclusion in its DPP 3 final determination. While applying a greater weighting to $/ICP (e.g., 67%) would change the total non-network opex figures in Table **5** (reducing them) the impact is negligible and the correct weighting to apply is not clear.

Comparison estimate 2

182. Table 6 shows Strata's estimate of Aurora's non-network opex:

- using the benchmarking cohort determined by K-Means analysis to estimate Aurora's BAU non-network opex; and
- using the average of our estimates of Orion NZ's and Powerco's CPP step changes to estimate Aurora's CPP step change (using the average is consistent with our 2020 approach).

Table 6: Results from updated analysis using revised 2020 benchmarking – estimate using 2021 benchmarking cohort, and average of Orion NZ and Powerco CPP step changes

	CPP Year 1	CPP Year 2	CPP Year 3	CPP Year 4	CPP Year 5	Total	
SONS	11,996,674	12,967,431	12,262,849	12,195,523	11,823,660	61,246,137	78% of CPP proposal
People costs	6,052,355	6,904,899	6,345,931	6,111,853	6,128,293	31,543,330	78% of CPP proposal
Total	18,049,029	19,872,329	18,608,780	18,307,376	17,951,953	92,789,467	78% of CPP proposal
IT Opex	2,712,639	2,586,597	2,722,033	2,675,844	2,635,918	13,333,030	78% of CPP proposal
Premises, Plant and Insurance	225,466	240,341	242,689	403,177	418,052	1,529,725	78% of CPP proposal
Governance and Administration	2,373,657	2,453,509	2,458,989	2,437,852	2,457,424	12,181,431	78% of CPP proposal
Upper Clutha DER Solution	207,460	465,024	455,629	547,225	674,832	2,350,171	78% of CPP proposal
Business support opex	11,571,576.61	12,650,369.15	12,225,271.65	12,175,950.84	12,314,518.64	60,937,687	78% of CPP proposal
Total non-network opex	23,568,250.71	25,617,799.97	24,488,120.99	24,371,473.50	24,138,178.85	122,183,824	78% of CPP proposal

183. We consider that it is not unreasonable to apply equal weighting to our estimates of Orion NZ's and Powerco's CPP step changes. A key reason for giving Powerco's CPP step change more weight than Orion NZ's is that the drivers for Powerco's CPP are more like Aurora's than Orion NZ's were. On the other hand, a key reason for giving Orion NZ's CPP step change more weight than Powerco's is that Orion NZ is closer to Aurora in size (ICPs and circuit length) than Powerco is. Therefore, giving more weight to Orion NZ's CPP step change reduces the 'economies of scale' effect that Aurora faces relative to Powerco and Orion NZ (see the discussion below in relation to the next comparison estimate).

184. As noted in Table 3, we acknowledge that applying equal weighting to the $/ICP and $/km benchmark metrics is inconsistent with the Commission's conclusion in its DPP 3 final determination. While applying a greater weighting to $/ICP (e.g., 67%) would change the total non-network opex figures in Table 6 (reducing them) the impact is negligible and the correct weighting to apply is not clear.

Comparison estimate 3

186. Table **7** shows Strata's estimate of Aurora's non-network opex:

- using the benchmarking cohort determined by K-Means analysis to estimate Aurora's BAU non-network opex; and
- using the upper bound of our estimates of Orion NZ's and Powerco's CPP step changes to estimate Aurora's CPP step change.

Table 7: Results from updated analysis using revised 2020 benchmarking – estimate using 2021 benchmarking cohort, and upper bound of Orion NZ and Powerco CPP step changes

	CPP Year 1	CPP Year 2	CPP Year 3	CPP Year 4	CPP Year 5	Total	
SONS	12,445,694	13,452,785	12,721,832	12,651,986	12,266,205	63,538,502	81% of CPP proposal
People costs	6,278,887	7,163,340	6,583,451	6,340,612	6,357,667	32,723,957	81% of CPP proposal
Total	18,724,581	20,616,125	19,305,283	18,992,597	18,623,872	96,262,459	81% of CPP proposal
IT Opex	2,814,169	2,683,410	2,823,915	2,775,997	2,734,577	13,832,069	81% of CPP proposal
Premises, Plant and Insurance	233,905	249,336	251,773	418,268	433,699	1,586,980	81% of CPP proposal
Governance and Administration	2,462,500	2,545,341	2,551,026	2,529,098	2,549,402	12,637,367	81% of CPP proposal
Upper Clutha DER Solution	215,225	482,429	472,683	567,707	700,091	2,438,134	81% of CPP proposal
Business support opex	12,004,686.04	13,123,856.42	12,682,848.06	12,631,681.23	12,775,435.45	63,218,507	81% of CPP proposal
Total non-network opex	24,450,380.43	26,576,641.72	25,404,680.28	25,283,666.83	25,041,640.25	126,757,010	81% of CPP proposal

187. As noted in Table 3, a criticism of our 2020 analysis was that using Powerco to derive a CPP step change factor for Aurora did not account for significant differences between Aurora and Powerco. Key amongst these differences was the respective organisations' size, with Powerco being significantly larger than Aurora and having economies of scale relative to Aurora.

188. In our third comparison estimate, we have made an allowance for this in estimating Aurora's CPP related step change by taking the upper bound of our estimates of Orion NZ's and Powerco's CPP related step changes.

189. There will be factors other than economies of scale that cause the average non-network opex of Powerco and, to a lesser extent, Orion NZ (as the two largest EDBs in the cohort), to be relatively lower than Aurora's on a $/ICP and $/km basis. Examples might include human resourcing and the use of enabling technologies.

190. We also note the findings of a 2018 report by TDB Advisory which was commissioned by five electricity generator-retailers and seven EDBs. This report presented an analysis of how the efficiency of EDBs is affected by their size.[69] The analysis was undertaken at a relatively high level using EDBs' information disclosure data provided to the Commission.

191. TDB Advisory found that around two-thirds of the systematic variation of costs between EDBs can be explained by customer density and size.[70] Of these two explanatory variables, customer density has the most important influence on EDBs' costs although size has a small negative influence on labour intensive costs.[71] We note labour intensive costs are more prominent in non-network opex.

192. As noted in Table 3, we acknowledge that applying equal weighting to the $/ICP and $/km benchmark metrics is inconsistent with the Commission's conclusion in its DPP 3 final determination. While applying a greater weighting to $/ICP (e.g., 67%) would change the total non-network opex figures in Table **7** (reducing them) the impact is negligible and the correct weighting to apply is not clear.

[69] TDB Advisory, 31 August 2018, Estimated Efficiency Gains from Amalgamation of Electricity Distribution Businesses, p. 9.
[70] TDB Advisory used three measures of EDB size:
- energy delivered (GWh);
- maximum demand (MW); and
- customer connections (number of ICPs) (refer to p. 13 of the TDB report).

[71] TDB Advisory, 31 August 2018, Estimated Efficiency Gains from Amalgamation of Electricity Distribution Businesses, p. 25.

Staffing estimates under the different non-network opex estimates

193. The four non-network opex estimates from Strata's updated 2020 analysis give the following estimates of staffing for Aurora over the CPP period:

- preferred estimate; 118 FTEs which equates to a headcount of approximately 122;[72]
- comparison estimate 1; 118.5 FTEs which equates to a headcount of approximately 122.5;
- comparison estimate 2; 122 FTEs which equates to a headcount of approximately 126; and
- comparison estimate 3; 126.5 FTEs which equates to a headcount of approximately 131.

194. These estimates come from dividing the staff costs component of our estimated SONS opex and People costs opex by the average salaries contained in Appendix C of the PWC report accompanying Aurora's submission on the Commission's draft decision.

195. The proportional scaling of non-network opex across all portfolios is the reason why the comparison estimates 2 and 3 generate a higher estimated number of FTEs over the CPP period than the first two estimates of non-network opex. This is despite the amount of estimated non-network opex being several million dollars lower under the comparison estimates 2 and 3. Proportionally more non-network opex relates to the SONS and People costs portfolios.

196. This highlights our earlier point that it will be up to Aurora how it wishes to allocate total non-network opex between the SONS and business support categories, and across the various portfolios within business support. Aurora may also wish to treat the components of opex within the various portfolios as being interchangeable; for example, external consultancy costs and internal staff costs.

[72] In its CPP application, Aurora's proposed headcount of 158 equates to 152.86 FTEs. We have used this same ratio to scale our FTE estimates to be headcount estimates. Refer to Aurora Energy, 12 June 2020, Customised Price-Quality Path application, Appendix P, pp. 275–283.

Strata has tested the robustness of its findings by broadening its empirical analysis of EDBs' non-network opex

197. As noted in Table 3, key criticisms of the benchmarking used in our draft advice on SONS and People costs opex were that:

- the cohort used in the benchmarking contained an EDB (Powerco) that was not a reasonable comparator, and excluded EDBs that were reasonable comparators;
- applying the estimated step change in Powerco's non-network opex because of Powerco's CPP understates the step change in Aurora's SONS opex as a result of Aurora's CPP;
- it is inappropriate to benchmark SONS opex and Business Support opex because non-network opex data is unreliable at this component level; and
- the benchmarking did not account for the range of factors that influence variations in non-network opex across EDBs. Instead, it relied on a single predetermined parameter to control for differences across EDBs (a single normalisation parameter).

198. Therefore, we have undertaken further analysis of EDBs' non-network opex:

- to test the sensitivity of our 2020 benchmarking methodology to these criticisms; and
- to consider whether our benchmarking results were, or could be, outside the realms of a reasonable estimate of Aurora's non-network opex over the CPP period.

199. This analysis:

- includes all EDBs, rather than a pre-defined set of comparators;
- focuses solely on non-network opex, rather than components of non-network opex, which may be subject to idiosyncratic differences in the categorisation of spending across EDBs; and
- considers a range of factors that might influence levels of non-network opex, including investment activity and the presence of a CPP without relying on the selection of a single comparator EDB such as Powerco.

200. This analysis is descriptive in the sense that it:

- is intended to capture empirical associations, rather than causal or behavioural relationships;
- is based on a limited set of prior information, such as intuitively reasonable presumptions that non-network opex is likely to be related to network size without imposing theoretical restrictions or structures on these relationships; and
- is used as a sense-check focused on potential ranges for efficient non-network opex for Aurora rather than a single point estimate.

201. This approach is broadly similar to that used by the Commission, and by WSP in the report attached to Aurora's submission on the draft decision, to identify clusters of similar EDBs. It is similar in the sense that simple bivariate K-Means cluster analysis (similar to analysing correlations between two variables) relies heavily on statistical relationships without imposing much conceptual structure or theory on the analysis. An example of more structural or theory-driven analysis would be the estimation of production functions that specify relationships between inputs and outputs.

202. We have fitted linear and non-linear statistical models to explain non-network opex by EDB. We then use these models:

- to predict Aurora's non-network opex, conditional on network characteristics and measurable (and measured) activity levels; and
- to evaluate the precision of those predictions given the variation that exists in the data, by way of confidence and prediction intervals.

203. Specifically, we have fitted a linear panel regression model and a non-linear generalised additive model that each predict the non-network opex of EDBs, other than Aurora, conditional on network characteristics and activity levels for all 29 EDBs.

204. We have then used each model to predict Aurora's non-network opex over the CPP period, and to test the following:

- whether past non-network opex was below expectations;
- what level of non-network opex would be expected in the future given Aurora's expected network growth and proposed capex and network opex; and
- the reasonableness of the non-network opex in:
  - Aurora's CPP application;
  - our draft advice;
  - our updated advice; and
  - the Commission's draft decision.

Data

205. We have used data for all 29 EDBs over the period RY2010–RY2020.

206. We have sourced most of the required data from the Commission's published information disclosure files for the period RY2008–RY2019 with the Commission providing us with RY2020 data. We have sourced the remaining data (e.g., EDBs undertaking rollouts of advanced metering infrastructure (AMI)) from publicly available information.

207. Due to significant missing data for regulatory years 2008 and 2009, we have restricted the data to the period RY2010–RY2020.

Predictors

208. We have selected 10 predictors of non-network opex from an initial set of 33 possible predictors or controls likely to influence non-network opex levels (shown in Table **8**).

Table 8: Variables in the data set used to estimate models for predicting non-network opex

Code	Description
year	Regulatory year
edb	Electricity Distribution Business
opx_non	Non-network opex
opx_biz	Business support opex
opx_ops	System operations and network support (SONS) opex
icp	Installation control points (ICPs) 'At year end' for RY2008-RY2012 'Average in disclosure year' for RY2013-RY2020

km	Total circuit length
km_ohd	Total circuit length (for supply) overhead
km_urb	Urban overhead circuit length
km_rur	Rural overhead circuit length
km_rug	Remote and rugged overhead circuit length
km_ugd	Underground circuit length (for supply)
mva_tran	Distribution transformer capacity (EDB owned) at year end
mw_dmd	Maximum coincident system demand
mwh_dmd	Energy delivered to ICPs
k_rab	Total closing regulatory asset base value
dk	Total capex on assets
dk_nwk	Capex on network assets
dk_non	Capex on non-network assets
opx_nwk	Total network opex
opx_rtn	Routine and corrective maintenance and inspection opex
opx_rpl	Asset replacement and renewal opex
opx_itr	Service interruptions and emergencies opex
opx_vmg	Vegetation management opex
opx_othr	Other opex (excluding pass-through costs)
saidi	System average interruption duration index (SAIDI)
saifi	System average interruption frequency index (SAIFI)
dg_conn	Distributed generation connections made in year
cpp	Customised price path (Y/N)
pqr	Subject to price / quality regulation (Y/N)
contig	Non-contiguous network (Y/N)
ami	EDB AMI roll-out or smart meter data usage at regulatory year end (Y/N)
icp_dens	Connection point density (ICPs divided by total circuit length)
mwh_dens	Volume density (Electricity supplied to customers' connection points divided by Total circuit length)
mw_dens	Demand density (Maximum distribution transformer demand divided by Total circuit length)

209. The 10 predictors used in each of the descriptive models are:

- the natural logarithm[73] of an EDB's circuit length, in km, to control for network scale;
- the share of an EDB's circuit length that is remote and in rugged terrain;
- the natural logarithm of an EDB's ICPs per km of circuit length, to control for customer density, and relatively urban versus relatively rural networks;
- the natural logarithm of an EDB's total capex one year into the future, divided by distribution transformer capacity (to control for size, without introducing more variable/random demand variables);
- the natural logarithm of an EDB's total capex in the prior year, divided by distribution transformer capacity (to control for size without introducing more variable/random demand variables);
- the natural logarithm of an EDB's network opex, divided by distribution transformer capacity (to control for size but without introducing more variable/random demand variables);
- whether an EDB is subject to price-quality path regulation;
- whether an EDB is subject to a CPP;
- whether an EDB has AMI or is rolling out AMI; and
- the year of observation, to control for trends including inflation.

210. As can be seen, these predictors incorporate various measures of EDBs' activity—in particular, capex and network opex.

211. These 10 predictors accounted for collinearity of the predictors and their explanatory power. Numerous predictors are highly correlated, such as scale variables like circuit length and number of ICPs. Including all highly correlated variables in the models would add little or nothing to the predictive power of the models.

212. To predict Aurora's annual non-network opex for each year of the CPP period, we have adjusted the 2019 information disclosure data to reflect:

- annual capex and network opex approved in the 2020 CPP draft decision; and
- expected growth in ICPs and circuit length over the CPP period, using the forecasting approach in the Commission's DPP 3 final decision.

213. These adjustments are made holding prices at the levels used in each model for the 2019 model fit. That is:

- the draft decision nominal network opex is rebased to 2019 dollars;
- capex lead values are rebased to 2020 dollars; and
- capex lag values are rebased to 2018 dollars.

Results

214. Table **9** summarises the mean predictions of Aurora's non-network opex over the CPP period produced by the generalised additive model and the linear panel regression model.

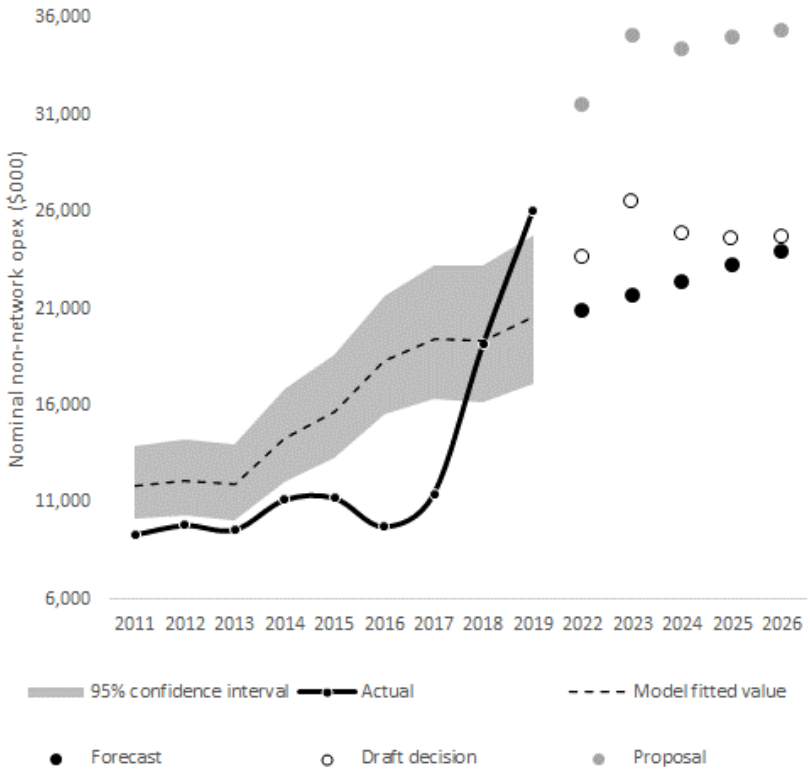
[73] The natural logarithm is used in the modelling so that there is a constant proportional change in non-network opex across EDBs over different circuit lengths, ICP numbers, levels of total capex, and levels of network opex.

Table 9: Predicted non-network opex (RY2020 000s dollars)

	2022	2023	2024	2025	2026	***Total***
Generalised additive model	20,316	20,700	21,054	21,441	21,709	***105,220***
Linear panel regression model	18,476	18,928	18,997	19,237	19,435	***95,073***

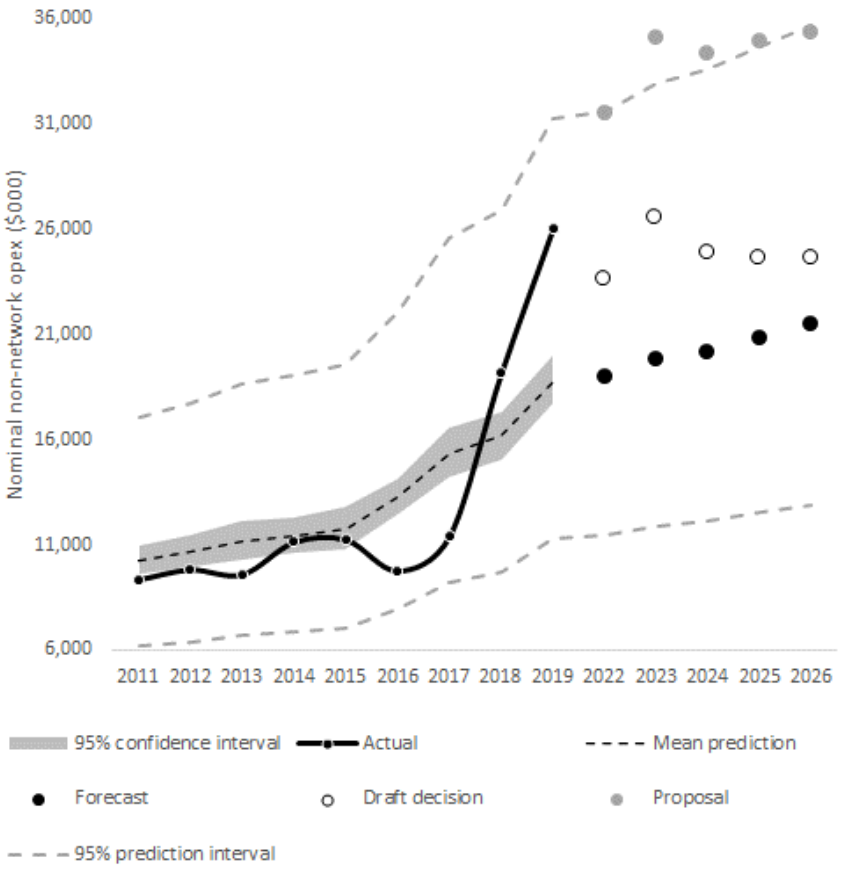
215. Figure 1 and Figure 2 show each model's mean prediction of Aurora's non-network opex over the period 2011–2019 and 2022–2026.[74] A prediction interval has been produced for the linear panel regression model.[75] As can be seen, Aurora's proposed non-network opex is at or outside the model's 95% prediction interval.

Figure 1: Non-linear generalised additive model's prediction of Aurora's non-network opex



[74] Due to the significant amount of missing data for RY2009, we had to start the mean predictions in 2011 because of the use of capex lagged by one year. The predictions using actual (information disclosure) values stop at RY2019 because of the need to use year-ahead capex values, for which actuals stop in 2020. The mean predictions for the CPP period rely on forecast values rather than actual values. We estimated a mean prediction for Aurora for 2026 by using Aurora's forecast RY2027 capex from its 2020 asset management plan.
[75] Computing a prediction interval for the generalised additive model is a non-trivial task which has not been undertaken.

Figure 2: Linear panel regression model's prediction of Aurora's non-network opex



216. Confidence intervals provide a measure of uncertainty in the model fit, given:

- differences between the values fitted by the model, or within-sample predictions; and
- the data (technically the model standard errors).

217. Prediction intervals measure uncertainty about model predictions when a new set of explanatory data is added to the model. Prediction intervals are much wider than confidence intervals because they combine the uncertainty of observing the explanatory data with the uncertainty of the model predictions.

218. Both confidence intervals and prediction intervals are, by convention, expressed as a 95% probability that the true value lies within that range, given the data and the model.

219. We tested the linear panel model for serial correlation in model residuals (errors) and whether random effects were statistically better than the model's predictions. We found:

- evidence of serial correlation (Durbin Watson statistic 0.34 using the modified Bhargava, Franzini, Narendranathan panel Durbin-Watson test), which adds a note of caution to the model's results; but
- that random effects were shown to produce a worse model based on the Akaike information criterion.

220. Serial correlation means that the model tends to consistently over predict or under predict some EDBs' non-network opex—not necessarily for every year, but for two or more years. Indeed, an illustration of this can be seen in Figure [Y], where the model consistently overestimates Aurora's actual non-network opex. Similar results are found for other EDBs. By extension, serial correlation means that predictions will be biased from their true value.

221. Serial correlation implies that predictively important, albeit potentially idiosyncratic explanatory factors are missing from the model, such as organisational decisions to increase spending at the beginning of, or end of, a regulatory control period. In the absence of data to measure them, these sorts of idiosyncratic variations are unavoidable, at least for our purposes.

222. In other settings, one might take steps to remove the serial correlation by including fixed effects or autoregressive terms. However, including such terms in this model would make it unusable for the purposes of predicting Aurora's non-network opex. This is because we would have to use Aurora's non-network opex as an input to the model or else prejudge which EDB Aurora is most like—a prejudgement that this sort of descriptive analysis is intended to avoid.

223. Serial correlation can also arise in a linear model where there is non-linearity in relationships between explanatory variables. Indeed, the non-linear generalised additive model we estimated shows a substantially reduced amount of serial correlation (Durbin Watson statistic of 1.15) in the residuals, which provides a reason for preferring the non-linear model over the linear model.

Comparing results under the updated 2020 analysis and the descriptive modelling

224. Using both the non-linear and linear models, the descriptive modelling indicates that the level of non-network opex recommended for Aurora in Strata's draft advice was not unreasonable (refer to Table 10 for the level of non-network opex in our draft advice). The descriptive modelling also indicates that the level of non-network opex for Aurora in the Commission's draft decision was not unreasonable. Indeed, both Strata's recommended level of non-network opex for Aurora and the level of non-network opex in the draft decision appear to be high.

Table 10: Non-network opex in Strata's draft 2020 briefing report on SONS and People costs opex

	CPP Year 1	CPP Year 2	CPP Year 3	CPP Year 4	CPP Year 5	Total	
SONS	11,068,770	12,273,841	11,070,457	10,821,954	10,391,245	55,626,267	69% of CPP proposal
People costs	4,659,337	5,722,031	4,999,190	4,688,704	4,727,414	24,796,675	62% of CPP proposal
Total	15,728,107	17,995,872	16,069,646	15,510,658	15,118,658	80,422,942	67% of CPP proposal
Check	-	-	-	-	-		
IT Opex	3,465,314	3,304,496	3,477,496	3,418,183	3,366,683	17,032,173	100% of CPP proposal
Premises, Plant and Insurance	1,024,651	1,029,409	1,019,462	1,030,318	1,039,191	5,143,031	100% of CPP proposal
Governance and Administration	3,032,479	3,133,763	3,141,106	3,113,655	3,138,912	15,559,915	100% of CPP proposal
Upper Clutha DER Solution	264,777	593,592	581,522	699,000	862,420	3,001,310	100% of CPP proposal
Business support opex	12,446,557.41	13,783,290.10	13,218,776.34	12,949,860.98	13,134,620.57	65,533,105	81% of CPP proposal
Total non-network opex	23,515,327.77	26,057,131.19	24,289,232.95	23,771,814.87	23,525,865.23	121,159,372	75% of CPP proposal

225. In comparison, the updated 2020 analysis indicates that the level of non-network opex in Strata's draft advice and in the Commission's draft decision was low.

226. Of the two approaches, the descriptive modelling incorporates the most data on EDBs' network characteristics and activity levels thereby addressing drawbacks associated with the 2020 benchmarking (and the benchmarking that uses the K-Means cluster analysis to draw the sample used in Strata's updated analysis).

227. Of the two descriptive models, we place more weight on the non-linear model because it better reflects relationships between distribution network characteristics and activity levels i.e., relationships between these variables are not always linear.

228. The key issue for consideration is the extent to which a further adjustment needs to be made to the mean predictions of the two descriptive models to reflect factors that are unique to Aurora's CPP i.e., information that is not captured by the modelling.

229. The modelling's mean predictions of Aurora's non-network opex incorporate the increase in Aurora's activity during the CPP period due to its significant capex and network opex programmes. In doing so, the mean predictions draw on changes in actual non-network opex from these activities across the distribution sector over the past 10 years.

230. However, Aurora's circumstances may mean that it requires relatively higher non-network opex for a given level of increased capex and network opex under its CPP than can reasonably be predicted by the modelling using historical data.

231. Examples of such circumstances cited by Aurora are:

- its planned material improvement in asset management maturity to be achieved over a relatively short period of time; and
- that Aurora is still establishing itself as a standalone business during the CPP period.

232. We consider it reasonable to expect that Aurora will require such additional non-network opex in relation to these circumstances, and other obligations such as reporting progress in delivering the planned investment under the CPP.

233. An upper bound on this additional non-network opex is Aurora's proposed step change of approximately $24 million in non-network opex. This would lift Aurora's estimated non-network opex under the non-linear generalised additive model to approximately $129 million over the CPP period. However, Strata considers that one must make some downward adjustments to this.

234. The first such adjustment is the one described under Strata's preferred estimate and the first comparison estimate.

235. We also need to subtract an allowance for Aurora to complete the process of establishing itself as a standalone business midway through the CPP period, rather than at the end of the CPP period. We consider allowing 7 years for Aurora to be fully established as a standalone business would be very generous; allowing 9 years would be excessive. Other electricity industry businesses in a similar situation to Aurora were established in much shorter timeframes (e.g., Contact Energy, Genesis Energy, Mercury Energy and Meridian Energy).

236. Strata does not know how much of Aurora's proposed step change relates to establishing itself as a standalone business over the second half of the CPP period. We believe it could be anywhere between hundreds of thousands of dollars to the low millions of dollars. Another possibility is that this cost is in Aurora's base year opex rather than in its step change opex.

237. Strata also considers that we must not forget that the descriptive modelling should be picking up some of Aurora's proposed step change in non-network opex. This is because the modelling data includes the CPPs of Orion NZ, Wellington Electricity and Powerco.

238. Given the above adjustments and other considerations, Strata considers it reasonable to expect an adjusted non-network opex figure under the non-linear generalised additive model might fall within the lower half of the range of non-network opex estimated using the updated 2020 analysis.

239. We believe it is also reasonable to expect that the adjusted non-network opex figure may fall below the lower bound estimate of our updated analysis, although we expect this would be less likely.

Other matters

We continue to have reservations about using a base-step-trend approach to forecast SONS and People costs opex

240. After considering Aurora's submission, Strata now has stronger reservations about Aurora's proposed use of a base-step-trend approach to forecasting SONS and People costs opex than we did when preparing our draft briefing report.

241. We consider it is not possible to identify a 'steady state' year since Aurora separated from Delta in 2017 that can be used as the base year in a base-step-trend approach to forecasting non-network opex. This is because of the well documented shortcomings with Aurora's previous business model, coupled with the significant change that Aurora has undergone since separating from Delta.

242. Aurora's submission has reinforced our reservations; for example, its references to an organisational structure that failed and the acknowledgement that it has undergone significant change.[76]

243. Rather than adopting a base-step-trend approach to forecasting SONS and People costs opex, Strata considers it would have been more appropriate for Aurora to adopt a bottom-up assessment, supported by the application of a top-down challenge.

244. We believe this should have been a relatively straightforward approach for Aurora to adopt, because it should have mirrored the approach adopted by Aurora since separating from Delta in 2017.

How does Aurora make decisions about appropriate staffing levels?

245. Aurora's submission has not provided evidence to change our initial reflections on Aurora's process for resourcing up to its current level since 1 July 2017. Aurora points to its business case for required FTEs focusing on industry best practice and the following independent reviews:

- reviews undertaken during quality breach enquiries;
- the AMCL ISO 55001 asset management maturity assessment and report;
- FTE analysis relative to comparator organisations; and
- the Commission-appointed Verifier's report.[77]

246. We maintain our view that committing an organisation to tens of millions of dollars of expenditure in staffing over the space of just a few years should entail the preparation of robust business cases. These would draw on the above reviews as the basis for change and then consider, amongst other things, different staffing options that could meet the identified needs of the business, and the extent to which the recommended staffing changes optimised value for money. We have not seen such business cases in relation to Aurora's staffing levels.

247. An independent expert could have usefully assisted Aurora to assess an appropriate level of staffing post its separation from Delta in at least a couple of ways:

- they could have brought knowledge of staffing practices across the distribution sector (i.e., analogous to Aurora's approach to establishing organisation-wide salary levels); and/or

[76] Refer to pp. 99–100 and p. 103 of Aurora's submission on the Commission's draft decision.
[77] Refer to p. 99 of Aurora's submission.

- they could have been an independent subject matter expert whose industry/sector knowledge and experience was similar to those recommending the resourcing changes and whose role was to act as an advocate (e.g., on behalf of customers/consumers).

248. We remain concerned that there appears to be little focus placed on looking for efficiency and productivity gains across roles.[78] We do not consider efficiency improvements on the one hand, and risk management and public safety on the other hand, to be mutually exclusive.

Strata's top-down 'senior management' challenge of Aurora's proposed staffing levels

249. Aurora and its advisors made several criticisms of Strata's top-down 'senior management' challenge of Aurora's proposed staffing levels. These included that:

- the challenge was based on opinion rather than fact;
- the analysis assumed more accuracy than was proven;
- some recommendations were inconsistent with industry practice;
- no evidence was provided to show that actual workloads were considered in the estimated number of roles following the challenge session;
- the challenge altered Aurora's key goals (e.g., achieving ISO 550001 certification by 2023), meaning the estimated number of roles was partially based on reduced workloads without considering the impact to the business of altering the goals; and
- the challenge relied on assumptions about Aurora's average salaries and staff and non-staff costs that were materially incorrect.

250. The Commission asked Strata to consider what level of staffing is efficient for a distribution network like Aurora's, referencing New Zealand or Australian examples. As part of our considerations, we looked for evidence that Aurora's executive leadership team (ELT) and Board had undertaken rigorous top-down challenges of the increase in staff numbers from the 104 positions on 1 July 2017 to the 158 positions proposed in Aurora's CPP application. We could not find evidence of this in the CPP material made available to us.

251. Aurora's submission appears to say Strata did not adequately review material from Aurora and the Verifier that provided evidence of Aurora's challenge processes relating to staffing.[79] If this is Aurora's intended meaning, then we disagree. We reviewed the material from Aurora and the Verifier that related to Aurora's challenge processes around staffing and took it into account in our considerations.

252. However, the material we saw from Aurora on the staffing challenge processes did not include the period 1 July 2017 to 30 June 2018 when staff numbers increased by 25% to around 130.[80] Nor did it show the effect of the ELT challenge process on proposed staffing for the financial year ending 30 June 2019. We have not identified in Aurora's submission

[78] Refer, for instance, to Aurora Energy, 2020-04-21, Memo from Aurora Energy to Farrierswier, titled Aurora Energy CPP Application – Revised SONS and PEOPLE Forecasting Models and Step Change support, Attachment 5 – Non-network Opex – SONS and People costs, slide 14: "*We do expect to achieve efficiency improvements in the future. However risk management and public safety are the current priorities ahead of cost reduction.*"
[79] Aurora Energy, 2020-12-18, Aurora Energy's CPP Proposal: Submission on the Commerce Commission's Draft Decision, Appendix B1.5, p. 111.
[80] Aurora Energy, 2020-04-21, Memo from Aurora Energy to Farrierswier, titled Aurora Energy CPP Application – Revised SONS and PEOPLE Forecasting Models and Step Change support, Attachment 5 – Non-network Opex – SONS and People costs, slide 8.

any further information on the senior management challenge process during the period 2017 to 2019. The 40–45% uplift in approved staff positions from 1 July 2017 to 30 June 2019 is critical to the level of SONS and People costs forecast for the CPP period.

253. Given the information gaps relating to the top-down challenges of increased staff numbers since Aurora separated from Delta, Strata applied a top-down challenge. In doing so, we drew on the experience of our directors who have senior management, executive and Board-level experience.

254. Strata's challenge was, by its nature, based on opinion. However, it was opinion drawn from many years of experience in the electricity industry and based on information provided by Aurora to the Commission. In our draft briefing report, we noted that there is an information asymmetry between Strata and Aurora's ELT and Board. This means we are not as well informed as Aurora's ELT and Board. The relatively broad range of staff position numbers resulting from our challenge reflects this information asymmetry. Our challenge identified areas that, in our opinion, required further scrutiny.

255. We expected Aurora would provide additional information to support its staffing levels in response to the Commission's draft decision. One example is work programming and delivery. When challenging staff numbers, our concern was to ensure there was no doubling up of Aurora's staffing in this area with the staffing of Aurora's contractors. We expected Aurora to take the opportunity to provide:

- clear evidence of the reporting lines between contractors and Aurora; and
- proof that there is no unnecessary duplication of project management roles across Aurora and its contractors.

256. As this information has not been provided in Aurora's submission, our concern remains. Accordingly, we have made no change to our opinion that Aurora has not demonstrated that this aspect of its proposal meets the Expenditure Objective.

257. The only specific area identified and discussed in submissions was in relation to the ELT structure. PWC said Strata's proposed reduction was inconsistent with other EDBs of a similar size. Strata acknowledges this. Our main point was that an objective of a top-down senior management challenge would be to save Aurora's customers' money through reducing the ELT by one person. We have suggested one way of doing this which is to put the regulatory function with accounting and finance and risk assurance, and to put the commercial function with customer and engagement. There are other options, which may fit Aurora's circumstances better.

258. We agree that our 'top-down' senior management challenge altered Aurora's goal of achieving ISO 550001 certification by 2023, meaning the estimated number of roles is partially based on reduced workloads. However, we disagree with the assertion that we altered this goal without consideration of the impact to Aurora. We noted in our draft briefing report that *targeting ISO 55001 certification by 2023 requires significant resourcing and risks distracting from key activities associated with gaining an accurate picture of the health of the network's assets—this risk is compounded by the strong probability of Aurora missing its target date for certification*.[81]

259. It is not uncommon for EDBs to align with ISO requirements without gaining ISO certification. Generally, this achieves the benefits of ISO certification without incurring all the costs. Given Aurora's historical network issues, consumers on its networks may take extra comfort from Aurora having ISO certification rather than aligning its practices with ISO

[81] Refer to p. 19 of Strata's draft Opex Briefing Report 6.

requirements. However, we have not seen a business case that sets out benefits such as this alongside the costs of ISO certification over ISO alignment. We would have expected a top-down senior management challenge to have covered this and considered any related points made during customer consultation.

260. In relation to the final criticism of our top-down challenge listed at the beginning of this sub-section, we note that our challenge did not rely on assumptions about Aurora's average salaries and staff and non-staff costs that were materially incorrect. This submission point applies to the benchmarking analysis which we have discussed earlier in this section.

Conclusion and recommendation

Strata has updated its draft analysis in response to submissions

261. Strata has updated its draft analysis in response to submitters' points. We have:

- corrected the identified model calculation errors;
- updated key assumptions after receiving new information;
- refined the PPI benchmarking methodology used in our draft advice by:
  - selecting an updated benchmarking cohort using K-Means analysis; and
  - benchmarking only at the non-network opex level;
- based our estimate of the step change in Aurora's non-network opex under the CPP primarily on the step change proposed by Aurora;
- compared benchmarking results when using:
  - the 2021 and 2020 benchmarking cohorts; and
  - the estimated CPP step changes of Aurora, Orion NZ and Powerco; and
- undertaken descriptive modelling to test the reasonableness of the non-network opex recommended in our draft advice.

262. As part of our updated 2020 analysis, we have prepared:

- a preferred estimate of Aurora's non-network opex over the CPP period which addresses what we consider to be the key criticisms of our initial analysis; and
- three comparator estimates.

263. As part of our descriptive modelling, we have prepared:

- a linear panel regression model; and
- a non-linear generalised additive model.

264. We place more weight on the non-linear model because it better reflects relationships between distribution network characteristics and activity levels i.e., relationships between these variables are not always linear.

Sources of change in Strata's estimates of Aurora's non-network opex

265. The largest changes to the non-network opex recommended in last year's draft advice stem from:

- updated key assumptions after receiving new information; and
- basing our estimate of the step change in Aurora's non-network opex under the CPP primarily on the step change proposed by Aurora, rather than our estimate of Powerco's CPP step change.

266. The correction of the calculation errors had the effect of increasing Strata's point estimate of non-network opex over the CPP period from 75% of Aurora's proposed non-network opex to 77%, using the methodology in our draft analysis.

267. The replacement of Strata's 2020 benchmarking cohort with a cohort selected using K-Means analysis had a negligible effect on our estimates of Aurora's non-network opex.

268. The benchmarking undertaken using both cohorts points to Aurora's proposed BAU non-network opex being sufficiently high as to not meet the Expenditure Objective. The descriptive modelling, which incorporates all EDBs in its analysis, also points to Aurora's proposed BAU non-network opex not meeting the Expenditure Objective.

Revised estimates of Aurora's non-network opex over the CPP period

269. Table 11 compares the non-network opex outputs from our updated 2020 analysis and descriptive modelling analysis with Aurora's proposed non-network opex and the non-network opex in the Commission's draft decision.

270. Our updated 2020 analysis points to Aurora's non-network opex falling within the range of approximately $122 million to $129.5 million (when rounded to the nearest $0.5 million). Our preferred descriptive model, the non-linear generalised additive model, predicts that Aurora's non-network opex should be approximately $105 million.

271. However, we believe Aurora's circumstances mean that it requires relatively higher non-network opex for a given level of increased capex and network opex under its CPP than can reasonably be predicted by the modelling using historical data. Taking account of Aurora's circumstances, we believe the generalised additive model points to Aurora's non-network opex over the CPP period being in the lower half of the estimated range produced by our updated analysis.

Table 11: Non-network opex (RY2020 000s dollars)

	2022	2023	2024	2025	2026	***Total***
Aurora's CPP application[82]	30,106	32,723	31,280	31,132	30,833	***156,074***
Strata 2020 draft briefing report[83]	23,515	26,057	24,289	23,772	23,526	***121,159***
Commission's draft decision[84]	22,968	25,379	23,405	22,728	22,334	***116,815***
Generalised additive model	20,316	20,700	21,054	21,441	21,709	***105,220***

[82] Refer to Aurora's CPP application document titled 'Customised Price-Quality Path CPP Financial Model', Table 7 of Schedule E, p. 255. Please note these amounts *exclude* capitalised SONS staff costs and operating leases, which are capitalised in accordance with the input methodologies.
[83] Please note these amounts *include* capitalised SONS staff costs and operating leases.
[84] Refer to the Commission's draft decision file titled 'Copy of Aurora-CPP-Expenditure-Model-With-ComCom-Adjustments-Draft-Decision-12-Nov-2020', Table 7 of Schedule E. Please note these amounts *exclude* capitalised SONS staff costs and operating leases, which are capitalised in accordance with the input methodologies.

Linear panel regression model	18,476	18,928	18,997	19,237	19,435	***95,073***
Strata revised 2020 benchmarking: Preferred estimate[85]	24,692	28,391	25,812	25,260	24,604	***128,760***
Strata revised 2020 benchmarking: Comparison estimate 1[86]	24,863	28,576	25,987	25,433	24,773	***129,631***
Strata revised 2020 benchmarking: Comparison estimate 2[87]	23,568	25,618	24,488	24,371	24,138	***122,184***
Strata revised 2020 benchmarking: Comparison estimate 3[88]	24,450	26,577	25,405	25,284	25,042	***126,757***

Recommended level of non-network opex over the CPP period

272. Based on our updated analysis in response to submissions, we conclude that Aurora's proposed non-network opex does not meet the Expenditure Objective. While Aurora's proposed non-network opex falls within the bounds of probability, it is significantly higher than:

- the mean estimates of our updated 2020 analysis; and
- the mean predictions of our descriptive modelling which draws on network characteristics and measured activity levels across the distribution sector over the past decade.

273. We consider that setting Aurora's level of non-network opex in the range of $122–$129.5 million (RY2020 dollars) over the CPP period would better meet the Expenditure Objective than Aurora's proposed expenditure of approximately $156 million.

274. Within this range, our point estimate recommendation is $125.75 million, being the mid-point of the range.

275. We note an argument could be made for our point estimate to be lower, perhaps in the lower quartile of the range, because the adjusted generalised additive model's predicted non-network opex over the CPP period is unlikely to be in the upper half of the range. However, Strata has insufficient information to say that the generalised additive model's predicted non-network opex will not be in the middle of the range estimated by our updated analysis.

[85] Please note these amounts *exclude* capitalised SONS staff costs and operating leases.
[86] Please note these amounts *exclude* capitalised SONS staff costs and operating leases.
[87] Please note these amounts *exclude* capitalised SONS staff costs and operating leases.
[88] Please note these amounts *exclude* capitalised SONS staff costs and operating leases.

Section 4 – Quality Unplanned Reliability

Strata's response on the Commission's initial two questions

276. The Commission asked Strata to consider and answer two questions related to recommendations made in its Draft Briefing Report 11 on Quality Reliability Benefits.

The Commission's first question

277. Aurora disagrees with 5% improvement factor (para. 311- 313) applied to GLM age-based modelling portion of the unplanned outages, stating there are complex factors to consider and the 5% applied is arbitrary and not justified.

278. The Commission wanted to know how the 5% improvement factor (to reflect improvement in fault response) was derived, if not based on fully supported calculations, what factors and method was used to come up with the 1% to 5% range and 5% improvement factor recommended by Strata?

Strata's recommendation in Draft Briefing Report 11

279. Strata recommended that the Commission consider making the following adjustments to Aurora's unplanned reliability forecast:

1. a 4-year average of historical SAIFI was applied in the Group 2 and Group 3 models rather than a 3-year average;
2. a 5% adjustment was recommended to reflect the bias due to use of age-based asset health index in the GLM Group 1 model;
3. a 1% to 5% adjustment to SAIDI only was recommended to reflect the reductions in interruption duration due to improved fault response and operational management; and
4. a 1% adjustment was recommended to reflect the increased focus on preventive and corrective maintenance.

280. The starting position for our proposed improvement factor adjustments was to acknowledge that determining such adjustments on a bottom-up quantifiable basis is difficult, especially when the forecast is largely formed on an average of historical performance. Aurora's use of the composite model adds to the difficulty as the GLM component is not based on an historical average but on a projection of asset health.

The three relevant paragraphs from Aurora's submission identified by the Commission

281. The relevant paragraphs from Aurora's submission that the Commission asked Strata to consider are:

> *In our view, there are complex factors that need to be considered when assessing the impact of historic and future asset replacement regimes on reliability. Strata and the Commission have potentially misunderstood the application of our asset health model to inform the unplanned reliability forecast and, therefore, may have incorrectly applied the Verifiers (sic) comments on age-based versus risk-based replacements to reliability forecasting.*

Aurora's forecasting model develops a relationship of asset health scoring to reliability performance. When we replace an asset, the asset is updated with a healthier score which, as part of a fleet programme, statistically flows through to improved reliability. The actual time of replacement for historic and future asset replacements will vary from the assumed age-based allocation of asset health scores, and with a risk lens, this is good asset management. As long as the model has historical asset health determined in a consistent way over time (age-based assumption) then the relationship of forecast asset health to reliability is consistent over time, irrespective of actual asset health.

The Draft Decision provides an example of better targeting those assets with poorest condition leading to better than forecast reliability. However, you could equally choose an example where an asset's replacement is deferred (as per the Verifiers (sic) view) based on lower safety risk, which will intuitively result in a decline in reliability performance. To reiterate, there are complex factors to consider, and to apply an arbitrary 5% improvement factor to the modelled results has not been justified.

Our response to the Commission's first question

282. In our answer to the Commission's first question we cover the calculation of both the 1% to 5% range and 5% improvement factor recommended by Strata.

283. We understand that Aurora's submission point is related to the second adjustment listed above, specifically the proposed 5% adjustment attributable to the GLM component. We discuss this point first.

284. The Commission's reference to a 1% to 5% adjustment recommendation is related to Strata's third adjustment recommendation for improved fault response and operational management. We discuss this second.

Basis of our 5% adjustment recommendation to the GLM based forecast

285. Our understanding is that it is only the GLM component of the composite model that implicitly includes an adjustment to reflect improved asset health attributable to increased asset replacement and network operational expenditure. The historical averaging components do not include an adjustment for expected improvement.

286. Given that use of a quantitative basis for calculating an overall adjustment was too difficult, we took a qualitative approach. Our reasons[89] for recommending the qualitative top-down adjustment to the GLM component were:

1. the GLM Group 1 component will implicitly include some benefits attributable to asset replacements made prior to and during 2020, and also through the prediction timeframe (this is because the age, and therefore assumed asset health, will reflect the replacement programmes); and
2. the GLM Group 1 component did not account for any improvements in opex, including for preventive and corrective maintenance.

287. When establishing the level of adjustment to the GLM attributable component we considered that the age-based health index values that Aurora used as inputs to the GLS model should be adjusted for a bias towards overestimating asset condition deterioration. Applying our experience of potential gains seen during our reviews of other electricity

[89] 2020-11-26 Consolidated Briefing Reports v1.0.pdf, page 175

networks we concluded that a -5% adjustment to the GLM component would be modest and appropriate.

288. In recommending this adjustment, we noted that it related only to the 9% - 15% of the SAIFI (and derived SAIDI) forecast that utilised the GLC output; this made a minor adjustment to the overall SAIDI and SAIFI projections.[90]

289. We agree with Aurora's submission point that better targeting of assets with poorest condition may lead to better than forecast reliability but could result in reduced reliability if an asset replacement is deferred because it has a lower safety risk. Conventionally, safety risk tends to be associated more, but not always, with assets in poorer health.

290. Whilst our view remains that our recommended adjustment of 5% to the GLM forecast component is modest, we consider that the Commission could consider not applying the adjustment as this would have little effect on the overall SAIDI and SAIFI limits.

Basis of our 1% to 5% adjustment recommendation

291. We recommended the following 1 to 5 year adjustments (i.e., an annual 1% adjustment for five years of the CPP:

1. 1% to 5% adjustment to SAIDI to account for Improved fault response and operational management; and
2. 1% to 5% adjustment to SAIFI to account for Increased focus on preventive and corrective maintenance.

292. As noted previously, due to the difficulty of applying a quantitative approach, calculating an adjustment was too difficult; we therefore took a qualitative approach. Our qualitative assessment included:

1. achieving annual performance improvements is good practice for most business;
2. business cases for increased operational expenditure and approval of operational initiatives would be expected to deliver performance improvements,
3. reviewing the reliability benefits that Aurora identified for its initiatives in its CPP proposal and other documents; in doing this we considered that the refocused operations strategy was likely to deliver material benefits in shortening interruption durations by creating swifter responses when interruptions occur;
4. considering that the increased preventive and corrective maintenance strategy, as described by Aurora in its CPP proposal, would improve performance;
5. noting that Aurora had already reduced its vegetation component to reflect an adjusted trend; and
6. taking into account that the three-year average and trend to target applied to approximately 90% of the forecast, we limited the level of adjustment to recognise this.

293. Taking the above into consideration we formed the view that:

1. a 1% annual adjustment across the CPP was modest and aligned with performance gains that a business would normally be targeting, especially when it is increasing operational expenditure and improving its working practices; and
2. a 1% annual adjustment was modest given the reliability benefits Aurora identified to support its improved operations management and increased maintenance expenditure.

[90] 2020-11-26 Consolidated Briefing Reports v1.0.pdf, page 183

The Commission's second question

294. Aurora argues reliability targets and limits have not been adjusted to take account of the proposed reductions in corrective maintenance expenditure, vegetation management (6 minutes of reliability improvement factored into their modelling) expenditure and 5% efficiency adjustment to network capex (para. 315-318).

295. The Commission asked Strata to consider if there was enough information previously provided from Aurora:

1. to indicate improvements to reliability due to the above expenditure categories had been factored into Aurora's reliability model; and
2. that would enable us to respond to their assertion raised in their recent submission.

Strata's recommendation in Draft Briefing Report 11

296. Related to improved fault response and operational management:

> *We consider that Aurora can reduce its unplanned SAIDI through the proposed improvements in its fault response and network operational management. Over time, the impact of these initiatives will be material. Based on the information Aurora has provided, we consider that the benefits from these initiatives will begin to emerge at the commencement of the CPP and grow as the CPP progresses.*
>
> *It is difficult to establish a fully supported value for an adjustment, so we recommend that the adjustment be conservative. Taking into consideration the reliability benefits that Aurora attributes to the increased people and SONS opex, the refocussed operations strategy, and initiatives in vegetation management, we have concluded that an adjustment to the predicted SAIDI only of minus 1% in 2022 rising to minus 5% in 2026 is appropriate.* [91]

The four relevant paragraphs from Aurora's submission identified by the Commission

297. The relevant paragraphs from Aurora's submission that the Commission asked Strata to consider are:

> *Similarly, the 1% per annum improvement in reliability associated with our preventive and corrective maintenance objectives is certainly not attainable with the reduction to the corrective maintenance allowance proposed in the Draft Decision.*
>
> *Furthermore, our reliability forecasts do not include a maintenance component, as the modelling assumed that as our assets age, we will have sufficient corrective maintenance allowance to stabilise/maintain their current/recent level of performance. The Draft Decision reliability targets and limits have not been adjusted to take account the proposed reduction in corrective maintenance expenditure.*
>
> *The Draft Decision also proposes to reduce our vegetation management opex allowance (based on unproven inefficiency) which will ultimately impact our ability to deliver vegetation management improvements and reduce vegetation-*

[91] 2020-11-26 Consolidated Briefing Reports v1.0.pdf, page 183

related faults. Our forecast includes six minutes (pre-normalisation) of improvement to reliability associated with delivering our vegetation management plan. The Draft Decision's reliability limits have not been adjusted to take the proposed reduction in vegetation management expenditure into account.

Similarly, the proposed all-inclusive 5% efficiency adjustment to network capex is not achievable and will therefore result in a reduction of renewal volumes, leading to a consequential deterioration in asset health and a decline in reliability performance of the associated assets.

Strata's answer to the Commission's second question

Our answer to the Commission's specific question on information provided by Aurora

298. The primary information provided by Aurora was its composite model and descriptions of the model and how it had been applied.

299. Strata took considerable care in developing its understanding of the approach Aurora took when forecasting its unplanned reliability SAIDI and SAIFI. This included:

1. reviewing the supporting and relied upon material Aurora made available to the Commission;
2. submitting and reviewing Aurora's responses to additional information requests;
3. setting out Strata's understanding of Aurora's forecasting approach and composite model;
4. meeting with Aurora personnel on 1 July 2020 to confirm and, if necessary, correct Strata's understanding of Aurora's composite model; and
5. revising Strata's description of the composite model based on Aurora's advice.

300. Section 12.5 of our Draft Briefing Paper 11 described our understanding of the composite model which included a reasonably detailed diagram of the various components and their relevance to the output reliability forecasts. Aurora did not raise any issues with this description in its submission.

301. A primary reference for the development of our understanding of the composite model was a May 2020 memorandum document from WSP to Aurora.[92] This document clearly sets out the use of individual components of the composite model including descriptions of the application of:

1. multivariate regression Generalised Linear Model (GLM) for some asset categories;
2. 3-year averaging for some asset categories, other and non-asset categories; and
3. the trend to target vegetation.

302. We found that WSP's description aligned with the SAIDI and SAIFI forecasting that Aurora included in its CPP proposal.

303. Aurora provided a 23 July 2020 document[93] setting out its understanding of the reliability forecasting model. Notably, Aurora's description of its forecasting model had a significant and material difference to that in WSP's memorandum in that it did not include the 3-year averaging approach for some asset categories.

[92] PS117857-ADV-MEM-004 RevC1 Unplanned Reliability Model.pdf
[93] 200723 Aurora Reliability Model Description.pdf

304. This omission is important because, as we set out in Draft Briefing Report 11, only between 9% and 15% of its forecast SAIDI and SAIFI was predicted using the statistical GLM and between 85% and 91% was forecast based on the projected RY18 – RY20 average and trend to target. The second paragraph from Aurora's submission only discusses the GLM component of Aurora's composite model and not the averaging and trend to target models it used for 90% of its forecast.

305. Aurora's comments in its submission,[94] combined with the description of its forecasting approach in is Reliability Model Description paper and the WSP description, are inconsistent. We have assumed that the WSP description of the composite model is accurate and that Aurora's description was incorrect because the WSP description aligns with the method embodied in Aurora's composite model.

We considered changes in Aurora's opex when forming our views on adjustments

306. The starting position for our proposed improvement factor adjustment was to acknowledge that determining such an adjustment on a bottom-up quantifiable basis is difficult when the forecast is largely formed on an average of historical performance. It is much easier to adjust for these gains in the GLM based component of the forecast, as Aurora has done.

307. Importantly, Aurora did not include any adjustment to its historical averaging in the composite model to account for its increased opex and improvements in operational performance.

308. Therefore, our starting point was a position that did not include any adjustments for the proposed increases and improvements that would occur in RY2021 and during the CPP RYs.

309. Aurora's question is valid as it is seeking to identify if Strata considered the difference in performance that would result prior to and following adjustments proposed in the Draft Decision.

310. Due to the constrained timeframe and sequence for undertaking our assessments, the Quality Unplanned Reliability was required and completed earlier than opex. In discussions with the Commission on Briefing Report 11 we noted the linkages between the opex adjustments and performance incentive scheme and discussed with the Commission the need to consider this following the decisions it made relating to network expenditure.

311. Clearly, the appropriate sequence would be to first determine the level of network opex before setting the unplanned reliability target. We recommend that this is the sequence that the Commission takes prior to making its final decision on the unplanned reliability targets and limits.

312. When we established our proposed adjustment for vegetation related SAIDI and SAIFI we noted that Aurora's adjustment of SAIFI and SAIDI from 2024 to reflect its new vegetation management was appropriate but that the adjustments should have been ramped downwards from 2020 to reflect the recent past improvements and the gradual application of the new vegetation management strategy. This recommendation is not affected by Aurora's point; however, the vegetation management opex proposed in the Final Decision will need to be considered when setting unplanned reliability targets and limits in the final decision.

[94] Aurora - 20201218 Aurora CPP Draft Decision - Submission(3983676.1), paragraphs 311 to 313

The Commission's subsequent questions

313. The Commission asked Strata to consider and answer six additional questions related to points made by Aurora in its submission. The Commission set its questions out in table format and Strata has inserted its responses in the table provided in Appendix B.

Appendix A:

Strata Energy Consulting's responses to the Commission's specific questions on Capex Renewals

Network capex

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
1.01	B1.3	Point/s made by Aurora Strata's comment that: its assessment of Aurora's policies, standards and practices is that it continues to be work in progress. Is inconsistent with its statements that Aurora did not provide any policies, planning standards, or key assumptions.	In its response to the Commission's Request for information (RFI) 032 Aurora supplied a list of technical specifications and procedures. Aurora stated[95] that these were the published policies, standards, and procedures that it relied upon when determining the asset replacement forecast for its renewal capex forecasts. In addition, Aurora provided several asset Portfolio Overview Documents (PODs). Whilst we concluded that Aurora had not provided specific policies, planning standards, or key assumptions, Strata used the information Aurora had provided in its response when assessing Aurora's policies, standards and practices. In doing so we also considered references to policies and strategies in section 4 of Aurora's 2020 AMP. Our comments reflect that: Aurora did not supply actual policies, standards, and procedures in its response to the Commission's (RFI) 032 request; and

[95] Aurora Energy Information Request Response - RFI Q032, page 1

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		Aurora considers this to be an example of the many internal inconsistencies and contradictory statements it believes exist in Strata's Briefing Reports. Additional information provided by Aurora in its submission.	the information Aurora did send in its response, and that contained in its 2020 AMP, reflected that work was being undertaken on developing strategies and planning documents. Whilst we do not accept that the statements identified by Aurora are inconsistent when taken in context of the discussion on section B1.3 of Briefing Report 02, we consider that amending the statement as follows would avoid any misinterpretation: Our assessment of the information that Aurora represented as its policies, standards and practices is that it continues to be work in progress. <u>Consideration of additional information provided by Aurora</u> The Draft Decision presented Aurora with an additional opportunity to provide further information to support its CPP submission. However, Aurora did not provide any policies, standards or procedures in, or accompanying, its submission. <u>Aurora's claim of inconsistencies is not supported</u> We consider that Aurora's inference that the example it has given represents a material inconsistency in Strata's analysis throughout its briefing reports is not supported nor material to our conclusions When taken in context with similar comments Aurora has made on other sections of our draft briefing reports the claim is, in our view, exaggerated and unsupported. <u>We have not changed our original conclusions</u> We have reviewed our original assessment set out in Section 3.3 of our Draft Briefing Report 2 and consider that Aurora has failed to provide any evidence that its policies, standards, and procedures are not a work in progress. It is also clear that in many cases Aurora did not provide the required policies, standards and procedures to support its CPP application. The submissions have not provided reasons for Strata to amend its original conclusion that Aurora's capex forecast for the asset renewals categories reviewed does not meet the Expenditure Objective.
1.02	B1.4	Strata's comment that:	<u>What the Commission asked Strata to assess</u> As set out in section 3.2 of Briefing Report 2, the Commission required Strata to assess:

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		its assessment of Aurora's policies, standards and practices is that it continues to be work in progress is incorrect because Aurora's governance framework has been overhauled since 2018 and was reviewed by the Verifier.	whether the policies, standards and procedures that Aurora relied on in determining the capex forecast are generally of the nature and quality required to meet the Expenditure Objective. The Commission did not ask Strata to review the Verifier's views on Aurora's Governance Framework. Nor did the Commission ask Strata to review Aurora's governance framework. The Commission's question relates to important aspects of the application of the governance framework which the Verifier did not review (this is discussed further below). <u>Aurora failed to provide important documentation</u> To assist Strata in addressing the Commission's questions on Aurora's policies, standards and procedures, the Commission submitted Request for Information (RFI) 032 to Aurora. This RFI asked Aurora to provide (or identify in documents already supplied by Aurora) the policies, planning standards and procedures Aurora relied upon in determining its asset replacement capex forecast. In its response, Aurora supplied a list of technical specifications and procedures. Aurora stated that these were the published policies, standards, and procedures that it relied upon when determining the asset replacement forecast for its renewal capex forecasts. In addition, Aurora provided several asset Portfolio Overview Documents (PODs). We consider that the information provided by Aurora did not constitute policies, planning standards, or key assumptions and procedures that we would expect from a well managed electricity distributor. We note that the Verifier held a similar view: *Aurora Energy's policies and standards are currently at a low level of maturity and hence by their nature and quality they may not have been able to be relied upon in the full extent to meet the Expenditure Objective.*[96] To form our views, we reviewed the information Aurora provided in its response, together with relevant information from its CPP application, AMP and information disclosures. If Aurora wanted further documents to be included in our review, there was the opportunity to provide these in its information response. Similarly, Aurora could have identified where specific documents were in the information pack provided with its proposal.

[96] Farrierswier and GHD - Final Aurora CPP Verification Report, section 4.2.3, page 60

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			Notwithstanding the above, from the documents Aurora did provide and from information contained in its 2020 AMP, we formed the view that the development of Aurora's policies, standards and practices is that it continues to be work in progress. The implication in Aurora's submission point is that the overhaul of its policies, standards and practices has been completed. From the information Aurora provided in its response to the Commission, and in its 2020 AMP, whilst it may have a Governance Framework, it is continuing to develop its policies, standards and procedures, and there remains a significant amount of work to be done. In the information made available through its Office 365 portal, Aurora included an Excel file index of Supporting and Relied Upon Material Folder Information. We understand that this included all the material made available to the Verifier. Searches of Aurora's Supporting and Relied Upon Material for policy, standard, procedure and practice identified the following files: Policy documents: AE-Policy-01 - Health and Safety AE-Policy-04 - Asset Management AE-Policy-05 - Information Disclosure AE-Policy-06 - Customer Charter 20120628-Interim-Policy-Statement-Harmonics Standards: 20120910-NS5-5-Rural-Harmonic-Standard AE-NP01 - Sub-Transmission and Zone Substation Protection Standard S014-Network-Connection-Standard-Issued-9-May-2016 AE-S031 Network Operations Standard

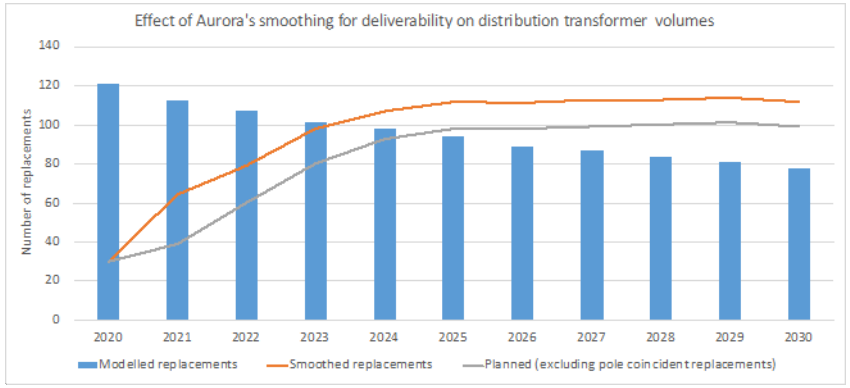
Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			APPENDIX 2 - Aurora's Standard Trench Profile for 33 kV Two Circuits Attachment 6 - Aurora Energy Remuneration Standard RFI No D261 - Vegetation Management Standard v1.0 RFI Nos D218 D236 and D468 - Capitalisation of Expenditure Standard **Procedure**: - No files **Practice :**- No files The single policy in the above list relevant to the questions that the Commission asked Strata is AE-Policy-04 - Asset Management. This is a one page policy statement which provides the overarching policy for asset management. It is a useful guiding document on which to build strategies, policies and procedures. The listed standards that could be considered relevant to the questions that the Commission asked Strata are: 3. AE-NP01 - Sub-Transmission and Zone Substation Protection Standard (17/05/2017); and 4. RFI No D261 - Vegetation Management Standard v1.0 (28/02/2020). Strata did review and consider the Vegetation Management Standard v1.0 when forming its advice to the Commission on vegetation management opex. The Sub-Transmission and Zone Substation Protection Standard is relevant to our consideration of Aurora's proposed DC Systems expenditure. At page 73 of our Briefing Report 3 (asset renewals) we considered Aurora's proposed capex for DC Systems and accepted this without adjustment. There is nothing in the Sub-Transmission and Zone Substation Protection Standard that changes our assessment.
		Strata seem (sic) unaware of governance related material that has been reviewed by the IV and	<u>Consideration of additional information provided by Aurora</u> The Draft Decision provided Aurora with an opportunity to provide further information to support its CPP submission. However, Aurora did not provide any policies, standards or procedures in, or accompanying its submission.

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		supplied to the Commission with Aurora's CPP proposal.	In our view, this provides a strong indication that its policies, standards and procedures remain immature. <u>The Verifier did not provide a view on the application of Aurora's governance framework</u> To support its Draft Decision, the Commission did not specifically ask Strata to review the Verifier's comments relating to Aurora's policies, standards, and procedures. However, we did review parts of the Verifier report to identify information that would be relevant to our review. The Verifier provided a high-level review of Aurora's governance framework: *In our view, Aurora Energy's governance framework and proposed project management approach appear appropriate based on the information we have seen. If these are applied through the CPP and review periods, then they should provide reasonable cost control.*[97] The above comment indicates that the Verifier's review was limited to Aurora's description of its governance framework. It also indicates that the Verifier did not undertake a detailed review of the application of that framework relevant to the specific asset categories reviewed by Strata. The Verifier also noted, only if Aurora had applied its governance framework would cost control be reasonable. We note that the Verifier report provided a few references to aspects of Aurora's application of its governance framework. [98] These related to the committees Aurora established when forming its project cost forecasts and as such, were not relevant to the Commission's question on Policy, standards and procedures. The Verifier went on to say that: *With respect to capex programs, we have reviewed key documents such as the AMP 2018-2028 and the associated portfolio overview documents (PODs) in lieu of specially developed asset class plans or business cases in the case of growth projects.*

[97] Farrierswier and GHD - Final Aurora CPP Verification Report, page 129
[98] For example see Farrierswier and GHD - Final Aurora CPP Verification Report, page 253, 254 and 315

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			Our general observation is that Aurora Energy is still in a very early stage of transferring legacy documents from the predecessor organisation and building a document management system that would be considered to be in a mature state. The focus has been on transferring operational procedures first and then secondly overarching guidelines to provide overall direction. As a simple measure, the number of guidelines is relatively low at this stage compared to more mature management systems in place by other organisations.[99] The Verifier's comments support our opinion that the information provided to the Commission with the CPP proposal was insufficient to support a conclusion that Aurora had mature policies, standards and procedures. In our opinion, this raises doubts regarding the appropriateness of the CPP expenditure forecasts. On the maturity of Aurora's policies and standards the Verifier stated: *Aurora Energy's policies and standards are currently at a low level of maturity and hence by their nature and quality they may not have been able to be relied upon in the full extent to meet the Expenditure Objective.* [100] This statement is aligned with Strata's view that Aurora's implied claim that the overhaul of its governance framework included its policies, standards and procedures. <u>Aurora's claim of evidence of lack of information reviewed is not supported</u> We consider Aurora's claim, through points made in line B1.4 of its submission indicating that its *CPP proposal was not adequately considered by Strata*[101]*,* is not supported. During our review, we searched the CPP documentation for evidence of the application of post model adjustments, we found none. In response to the Commission's information requests, Aurora supplied

[99] Farrierswier and GHD - Final Aurora CPP Verification Report, page 58
[100] Farrierswier and GHD - Final Aurora CPP Verification Report, page 60
[100] Ibid
[101] B1.4, page 111

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			POD documents; we understand that these documents had not been provided to the Verifier, nor submitted with the CPP application. We read and considered the information in the PODs, which is similar to that included in Aurora's 2020 ÅMP. Accordingly, the deliverability adjustment was taken into account during our consideration of the capex forecast. <u>We have not changed our original conclusion</u> We have reviewed our original assessment set out in Section 3.3 of our Draft Briefing Report 2 and consider that Aurora has failed to provide any evidence that its policies, standards and procedures are not in a work in progress situation.
1.03	B1.6 page 112	Post-model adjustments for a number of renewals programmes Aurora considers that Strata contradicted its statement that; no post-model adjustments made by Aurora to asset replacement programme forecasts, when it subsequently referred to post model adjustments that Aurora had made.	<u>The issue raised by Aurora is one of interpretation not contradiction</u> As an example of its issue, Aurora referred[102] to the following chart which identified a smoothing adjustment that was contained in Aurora's forecasting model MOD21.  Source: Strata chart using MOD21 data

[102] B5.17

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		Aurora identified the following asset category reviews where it considered inconsistencies are apparent: – distribution cables – pole mounted distribution transformers – pole mounted fuses – pole mounted switches – ancillary distribution substation – DC systems – remote terminal units.	Aurora considers that the above chart is an example of post-model adjustments claiming that the deferral of transformers past the CPP period seems to have been ignored by Strata. Strata's assessment is that, rather than demonstrating Aurora's claim of lack of top-down challenge and review of Strata's Briefing Report, the issue is one of boundary definition. The smoothing adjustments are contained within the various asset category models listed by Aurora. Because of this, Strata considered that they are fundamentally part of the modelled forecast. Aurora considers the delivery adjustments to be a post-model adjustment. In its POD21, Aurora recognises that it is facing an historical "bow wave" of transformer replacements and states that: *in developing our forecast of pole mounted distribution transformer renewals, we have considered available resources and overall service provider capability to deliver our overhead lines and distribution substation work.* We observed that the deliverability adjustment had been included in the construction of the model rather than as an additional 'post-model' adjustment (e.g., applied during a management challenge). <u>Our primary concern was the lack of evidence of risk assessment</u> A key point that we made in relation to the deliverability adjustment was that POD21 did not include any discussion and/or quantification of the change in risk due to the deferral of replacements. We consider that this is by far the most important issue relating to the deliverability adjustment. In its submission, Aurora did not discuss or challenge Strata's comment on the absence of appropriate risk assessments. In addition, Aurora did not take the opportunity in its submission to provide documents and other information demonstrating that such risk assessments had been undertaken. <u>Aurora's criticisms are not supported</u> Aligned with the explanation we have provided above, we consider that Aurora's claim that our statements are contradictory is not supported. Aurora's conflation of this point with its various claims of internal inconsistencies in our briefing papers, and the suggestion that it is indicative of a lack of internal review and quality assurance is also inappropriate.

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			In making its claims, Aurora appears to have missed, or chosen to ignore the fact that our briefing papers were provided to support our discussions with the Commission. In many of these discussions, the positions taken by Strata were reviewed and challenged. In the specific case Aurora refers to in B1.6, Strata fully discussed the application of the deliverability adjustment that Aurora had applied within its model. Accordingly, we considered Aurora's concern that the Commission, when reviewing this material, did not point out these material errors. In our view, the concern that this points to inadequacies in the Commission's process is invalid. <u>We have not changed our original assessment</u> There is nothing in Aurora's submission that we consider warrants revisions to be made to our draft briefing paper. <u>Additional information the Commission may consider seeking from Aurora</u> No further information is needed on Aurora's substantive point. The Commission may consider providing Aurora with a further opportunity to supply evidence of the risk assessments that it undertook when adjusting its replacement programmes for the relevant asset fleets. Our view is that Aurora has had more than sufficient opportunity to provide these and has not done so. This gives a strong indication that the risk assessments are unlikely to have been undertaken.
1.04	B1.7 page 112-113	In reviewing Aurora's replacement models Aurora considers that Strata should have, but did not: 1. review and take into consideration the Verifiers (sic) review of the	The scope of Strata's review was limited by the Commission to: the following asset categories to be consistent with the verification requirements but not to a level of assurance required of a verification report 1. Sub-transmission cable; 2. Distribution cable; 3. Low voltage cable; 4. Pole mounted transformers; and 5. Ground mounted transformers.

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		relevant models; and 2. that Strata did not have a sufficient level of understanding on which to form its views.	And, the following asset categories to work at a 'proportionate' level of scrutiny: Pole mounted fuses; Pole mounted switches; Ancillary distribution substation equipment; DC systems; Remote terminal units; and Facilities. As our review progressed, we made continual cross checks with the Commission to ensure that our review was meeting its requirements. <u>The asset categories reviewed by Strata had not been subjected to verification</u> Importantly, we understand that the asset categories that the Commission asked Strata to review, had not been subjected to Verification. However, the Verifier did provide the following comments on the age-based models: *Age-based models – used age as the key determinant for asset replacement. This was implemented both as a deterministic approach and as the basis for modelling asset performance. These are generally not considered GEIP but are acceptable when no other data is available, and consideration is given to historical trends. Typically, this occurs for high-volume low-cost assets when they are first entering a phase of age-related failures, which currently is typical for many network businesses. Aurora Energy is using this approach for most of its renewal program*[103] The Verifier noted[104] that Aurora had used:

[103] Farrierswier and GHD - Final Aurora CPP Verification Report, page 74
[104] Ibid

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			a) age-based models for; crossarms, HV and LV conductors, LV enclosures, indoor switchboards and outdoor circuit breakers; b) probabilistic models for its pole renewal programme; and c) condition-based models for its power transformer zone substation transformers. We agreed with the Verifier's assessment that age-based models are not generally aligned with GEIP but that data limitations obstructed Aurora's capabilities; we understood why Aurora had to use them for most of its asset class forecasts. In section 3.3 of Briefing Report 2 and in section 4.3 of Briefing Report 3, we discussed the models Aurora used to generate the forecasts and justify the expenditure programme. All replacement forecasts for the asset categories that the Commission asked Strata to review were developed using age-based models, except for Ancillary distribution substation equipment which used a cost vs volume only calculation, and Facilities which used an adjusted historical average approach. <u>Strata has more than a decade of experience in assessing capex forecasts</u> When forming our views, we compared Aurora's modelling approach against our experience and knowledge of the application and use of forecasting models adopted by other electricity network businesses in New Zealand and Australia. Our experience of asset replacements models has developed over several years through expenditure proposal assessment we have undertaken for energy regulators, primarily the Australian Energy Regulator (AER) and the Commerce Commission. We have also undertaken reviews of utility expenditure proposals in Singapore and Malaysia. As part of such reviews, we assess the application of network repex models when forming expenditure forecasts. The models we have reviewed range from basic age-based spreadsheet calculations to advanced CBRM risk monetisation models. In the last three years, we have reviewed and assessed repex models used by Australian distributors in NSW, Queensland and Victoria. These models were significantly more advanced than those developed and used by Aurora.

			<u>Strata studied the relevant models and its descriptions of them were accurate</u> In its CPP proposal Aurora described its use of models: *Our methodology uses a normal distribution based on life expectancy. We have used a Repex methodology instead of a survivor curve approach as we do not presently have a large enough sample of condition data to inform a survivor curve reliably*[105] For the asset classes the Commission asked Strata to review, the models were all age-based and included no asset condition data. Consistent with Aurora's statement above, these are what Aurora refers to as its repex methodology and/or repex model. In Briefing Paper 2 Strata described its understanding of Aurora's aged-based models as follows: *Whilst Aurora says that it does not use a survivor curve approach, in effect its repex model derives a survivor curve from a life expectancy distribution. For assets that it chooses not to apply a Weibull distribution curve to, Aurora uses a standard distribution with the standard deviation set at the square root of the expected life of the asset. This is used to produce an assumed failure rate for transformers at each age.* Using pole mounted distribution transformers as an example, we explained that Aurora set the expected life for all transformers at 60 years. We found that the relevant model MOD21 assumed that all transformer types have the same life expectancy and probability of failure (i.e., ≤50 kVA is the same as >200 kVA; Central Otago is the same as Dunedin, coastal is the same as highland, etc.). MOD21 also applied the same 7.75 standard deviation to all transformer types and locations. MOD21 applies the above input assumptions to determine a cumulative failure distribution and produces a survivor curve from the reciprocal of the cumulative failure distribution. The model then calculates a failure rate from the cumulative failure rate distribution. In its submission Aurora states: *We use the repex model approach for pole mount distribution transformers. In our standard repex model, it contains a calculation to convert the normal distribution to a corresponding survival rate purely for information purposes.*[106]

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			The above point is exactly what Strata described in its Briefing Report; however, we described the calculation used to convert the normal distribution of equipment failure to a survival rate and from this an asset replacement forecast. We have again reviewed our understanding of Aurora's asset replacement models and found that our understanding is aligned with the actual functions of the relevant models. Aurora's criticisms are not supported The Verifier's review of the models for the asset classes which Strata was asked to review was limited to general comments on the model types. We took the Verifier's comments into consideration when forming our views. Aurora's second opinion on the level of Strata's knowledge is not supported by our track record with the Commission, other regulators and utility clients. Aurora's comment on Strata's experience of repex models is somewhat surprising given its self-assessment of a low level of maturity in this area. Aurora's assertion that Strata has insufficient knowledge of its asset replacement models is clearly incorrect and unsupported by evidence.
1.05	B1.8 page 113-114	Aurora considers that Strata's sensitivity adjustment of expected asset lives for some asset categories is inappropriate because: That the Verifier did not consider that sensitivity	Strata's view is that sensitivity testing is a valuable tool to apply when forecasts are made exclusively on a bottom-up basis. Sensitivity analysis is commonly used in business cases supporting capital investment approval decisions. Accordingly, our view remains that Aurora should have, but did not apply sensitivity analysis and a rigorous top-down review to its models and the outputs derived from them. We found no evidence that it had done so, and the discussion provided in its submission reinforces this conclusion. Aurora used bottom-up models for the assets categories we reviewed As we identified in Item 1.04, for all categories Aurora used a basic age-based model, which the Verifier noted were generally not considered GEIP but are acceptable when no other data is available,

[105] Aurora Energy, 12 June 2020, Customised price-quality path application, page 126
[106] Aurora submission B5.12, page 128

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		testing of model outputs was necessary.	and consideration is given to historical trends. In Draft Briefing Report 11 we stated our opinion that input assumptions must be tested against failure rates being experienced along with engineering knowledge of the general condition of the fleet. We did not see any evidence that Aurora had done this. The Verification report reinforced our view that Aurora had nor undertaken sensitivity analysis. <u>The Verifier also applied sensitivity testing</u> In its submission, Aurora states that it agrees with the following quotation from the verification report to support its view that sensitivity analysis is inappropriate: *Aurora Energy did not complete any sensitivity analysis for the assumptions in the input data. However, given the input data, assumptions, and methodology adopted by Aurora Energy we do not consider that sensitivity analysis is necessary. Sensitivity analysis of the model output to changes in input variables (i.e. age profile and expected age) results in an equal chance of being over/under presently modelled forecast.* However, the reference for this quotation is related to crossarms. For other asset categories the Verifier's views on sensitivity analysis were different. We understand that the Verifier did not verify any of the asset categories the Commission required Strata to review. Whilst the Verifier did not review those asset categories, its review of other age-based modelled categories did include descriptions of sensitivity analysis the Verifier had applied. For example, in its verification of LV enclosures the Verifier: 1. did not agree with the *age-based modelling approach adopted by Aurora Energy for its renewal program forecast without some degree of validation of an initial 40 year expected life chosen for above ground enclosures;*[107]

[107] Farrierswier and GHD - Final Aurora CPP Verification Report, page 74

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			6. considered that the forecast replacement expenditure was inconsistent with the issues and hazards found on review of the inspections completed;[108] and 7. agreed that all the underground link boxes require replacement by RY26 but did not agree that all of the P160/P260 type required replacement by RY26.[109] The Verification report states that: *Aurora Energy acknowledged the findings and adjusted the expected life input parameter in MOD18 (23 April 2020) to 47.5 years, which produced a revised replacement volume more closely aligned the inspection data findings.*[110] A further example of the Verifier's application of sensitivity analysis is for protection renewals.[111] For this asset category, the Verifier applied sensitivity adjustments to asset age and input data. This produced potential reductions of between 3% and 4.5% for electro-mechanical relays, and between 0% and 16% for microprocessor and numerical relays. The Verifier confirmed that: *Aurora Energy has adjusted the expected life input parameter in the MOD18 (23 April 2020) to 47.5 years to produce revised replacement volume aligned to the above adjustments to then forecast expenditure of the review period.*[112] <u>Aurora's criticisms are not supported</u> On the application of sensitivity analysis, Aurora agreed with the Verifier's use, but disagreed with Strata's use of this technique. Our opinion remains that sensitivity analysis is important to apply were basic age-based techniques are used to produce asset replacement volumes and replacement expenditure forecasts.

[108] Ibid
[109] Farrierswier and GHD - Final Aurora CPP Verification Report, page 75
[110] Farrierswier and GHD - Final Aurora CPP Verification Report, page 75
[111] Farrierswier and GHD - Final Aurora CPP Verification Report, page 419
[112] Farrierswier and GHD - Final Aurora CPP Verification Report, page 412

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			On the asset categories we reviewed, Aurora had not done this and accordingly, we considered if an adjustment was appropriate. Where relevant, we discuss sensitivity adjustments we applied in response to Aurora's submission points related to specific asset categories.
1.06	B1.9	Aurora asks for references to Strata's comment regarding potential benefits from the adoption of CBRM asset management practices.	In a footnote, Strata made the following comment in Briefing Report 2: *EA Technology found up to 20% reductions when utilities apply its CBRM methodology as a replacement for age-based replacement asset management* The source of Strata's footnote was EA Technology's Case-studies-and-supporting-documents-brochure, subtitled Consultancy services and software implementation for asset renewal and investment prioritisation. The brochure is available on EA Technology's website: https://www.eatechnology.com/wp-content/uploads/2020/01/Case-studies-and-supporting-documents-brochure.pdf The case studies include one for Australian electricity distributor Energex, the case study states: *CBRM model predicts 20% fewer replacements than the age-based approach would give; and* *A CBRM software package for improved asset management (20% fewer replacements recommended).* Strata has been involved in reviews of Energex's repex for the AER and has knowledge supporting that the level of savings identified by EA Technology are achievable in practice. EA Technology details other case studies indicating benefits available from the utility adoption of CBRM over existing age-based practices.
1.07	B1.10 and B1.11	Aurora disagrees with Strata's opinion that it is good electricity industry practice to consider the forecast at the portfolio	<u>Portfolio level reviews are good industry practice</u> Based on Aurora's level of its asset management maturity, related points made by the Verifier. Particularly relevant to asset replacements is the Verifier's comment that *Aurora Energy is at an early*

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
		level and apply an adjustment for over-investment bias. Aurora claims that Strata has not justified its opinion by referencing examples. Aurora disagrees that (sic) Strata that its forecasts are formed by the combined outputs from the models, suggesting that a portfolio level review has not yet been completed. Disagrees with Strata on the portfolio deliverability.	*stage of its asset management maturity journey.*[113] The Verifier's points aligned with the conclusion we formed when reviewing the documents relevant to the scope of our review. It is likely that Aurora's claim that portfolio level consideration is not good industry practice is a consequence of the immaturity of its asset management practices. It is common practice for businesses to subject expenditure forecasts, formed on bottom-up building block methods, to rigorous top-down challenges. Such challenges generally focus on asset portfolios and the overall portfolio forecasts. The Commission has applied similar adjustments when determining Transpower's first Individual Price Paths (IPP) capital expenditure forecasts. The portfolio level adjustments included factors such as the consideration of probability of expenditure roll-overs. Transpower subsequently applied this portfolio level adjustments in its RCP forecasts. <u>AER's reviews of electricity network businesses commonly include portfolio level assessments of proposed expenditure forecasts.</u> The National Electricity Rules (NER)[114] explicitly require the AER to form a view on total capex and total opex, not individual projects or programs. In its expenditure reviews, AER applies portfolio level adjustments to NSP capex forecasts and expects to see evidence that the NSP has undertaken portfolio level reviews in deriving its expenditure forecasts. The AER states that: *'We typically analyse a distributor's total capex forecast from a top-down perspective. This top-down review forms the starting point of our capex assessment to determine whether further detailed analysis is required, but is also used throughout our review process to test the results of our bottom-up assessment. We apply both top-down and bottom-up reviews so that our decision is fully informed….A top down analysis focusses on overall trends and adjustments*

[113] For example, Farrierswier and GHD - Final Aurora CPP Verification Report, page 61
[114] NER, clauses 6.5.6(c), 6.5.7(c), 6.12.1(3)(i), 6.12.1(4)(i); AEMC, Rule determination, 29 November 2012, p. 113

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			rather than a bottom-up analysis which focusses on aggregating category specific drivers'[115] Australian electricity distributors apply portfolio level adjustments It has become good industry practice for Australian electricity distributors to apply portfolio level assessments and adjustments to both capex and opex expenditure forecasts. Examples include: • the application of adjustments across a portfolio of projects, rather than specific projects;[116] • deliverability efficiencies across the overall capex portfolio;[117] • ensuring delivery and scope efficiencies are reflected in total forecast expenditure;[118]and • assessing if projects could be better prioritised or delivered more efficiently in order to optimise value for customers.[119] We have provided to the Commission further information on Australian electricity distributor's application of portfolio reviews in a separate advice note. Aurora claims to have applied challenge and moderation to its forecasts In its submission, Aurora described information that it shared with the Verifier on its Board and Executive challenge and moderation process. Aurora states that this included consideration of deliverability. Aurora's submission also noted its view that any moderation to the forecasts needs to be in the context of a renewal backlog situation where reductions in the forecast expenditure will further extend the period of elevated risk on the network. Aurora provided no further information on the changes and adjustments that were made to its forecasts following the Board and Executive challenge and moderation process. We found that the outputs from the relevant repex models had been applied directly to the CPP proposal renewals expenditure forecast. Because of this, it is difficult to accept that the Board and

[115] AER, Attachment 5: Capital Expenditure Draft Decision - Jemena 2021-25, Sep 2020, pp 8-9
[116] AusNet Services Pty Ltd, Electricity Distribution Price Review 2022-26, Part III, January 2020, pages 61 and 67
[117] Ibid
[118] Jemena, 2021–26 Regulatory proposal – attachment 05-01 – forecast capital expenditure, Jan 2020, p. B-3
[119] SA Power Networks, 2020-25 Revised Regulatory Proposal, Attachment 5 Capital Expenditure, December 2019, section 5.2.5, p13

Strata Reference	Aurora Reference	Aurora submission point	Strata response and proposed recommendation (if any)
			Executive challenge and moderation process resulted in any adjustments to outputs from the repex models. Whilst Aurora has claimed that deliverability adjustments were made to some asset categories, these adjustments were made in the models and we have seen no evidence that they resulted from a top-down portfolio level review. <u>Aurora's criticisms are not supported</u> In its submission, Aurora claims that Strata's opinions on portfolio level adjustments evidence that Strata did not adequately review our proposal or the Verifier's report. However, Strata did consider the relevant comments made by the Verifier but concluded that for the asset categories the Commission asked Strata to review, there was no evidence that a top-down challenge and portfolio level assessment had been completed. Strata's view is supported by the last modified date of the models being July and August, and that for all asset categories reviewed, unmodified repex model outputs had been used to form the expenditure forecast.

2. Subtransmission Cables

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
2.01	B2.2 to B2.6	B2.2 Assessing single year decline in faults is not statistically significant. B2.6 The consequence of failure will not reduce, it will in fact increase over time due to higher load.	<u>Reasons for Strata's draft recommendation</u> In Briefing Report 2, Strata provided its opinion that there was a lack of risk and criticality assessments available through which Aurora determined the priority order and optimal replacement timing. In 2019, the faults on Aurora's cables and the duration of repairs reduced significantly. However, Aurora provided no information of any assessment it had completed on this. In the absence of information regarding the decline in faults in 2019, we consider that the timing of the Kaikorai Valley and Corstorphine cable replacements were not adequately supported. We recommended an adjustment based on the Kaikorai Valley and Corstorphine cable replacements being moved back by 1 year. In making this recommendation, we noted that Aurora has brought the Corstorphine replacement forward due to deliverability reasons (i.e., manage the deliverability issue and defer replacement). The deferrals resulted in a -35% adjustment to Aurora's forecast over the 5-year CPP. <u>Points made in Aurora's response to RFI Q082</u> Aurora asserts that it has never stated that sub-transmission cable faults are increasing or that 2019 was an unusual year. It points out that such faults occur stochastically over many years. Looking at a single year in isolation of other years in the range is not good practice or reasonable. Aurora restated its view that both failure rates per km and outage days per fault are relevant factors. The charts Aurora provided include fault frequency and duration data relating to faults that caused supply interruptions.

			Strata has considered Aurora's additional information and points We agree with Aurora that the relevant subtransmission cables demonstrate a relatively high failure rate over 7 years of data. Also, the reported failures are those that caused supply interruptions, which is a subset of total cable faults. We have given additional consideration to the following specific features of the subtransmission cables: 1. days to repair oil, gas and PILC cable faults are not insignificant and, at least for oil cable faults, show an increasing trend (i.e., across the years 2016, 2017 and 2018); 2. obtaining oil and gas cable jointers has become increasingly difficult as this workforce ages and retires; 3. one of the Kaikorai Valley circuits has 8 joints along one 286 metre section; the other has 10 joints in 337 metres. Joints themselves are potential points of future failure, that is, repairing the damage can invariably create a weak spot in the circuit; and 4. sheath integrity testing on the Corstophine cables indicates potential sheath failure, which is known to lead to moisture ingress and a materially reduced cable life. Such sheath defects are difficult or impossible to locate. The above points lead to an overall impression of a necessary and prudent replacement programme of oil, gas and PILC cables. Aurora's Dunedin network has many such cables and deliverability is likely to be most efficiently achieved within a rolling programme progressively implemented over many years. This position is consistent with the draft advice we provided to the Commission. However, given the additional information and the importance of these cable for maintaining reliable supplies to consumers, we have reconsidered our original recommendation to defer the subtransmission programme by one year. We have concluded that, even though Aurora has not sufficiently demonstrated the basis of the proposed timing of the individual replacements, the likely condition and performance of the cables is signalling early replacement. Accordingly, we reverse our recommendation that Kaikorai Valley and Corstorphine cable replacements be moved back by 1 year.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			That said, we maintain our view (see our advice regarding the Smith St to Willowbank inter-tie project within the growth and security capex portfolio) that Aurora has not adequately stated the case necessary to support transformation of its radial architecture Dunedin network into a meshed network ($35m+ over >10 years). A comprehensive business case and cost benefit analysis would provide confidence in the architecture transformation decision. This affects the Halfway Bush to Willowbank cable replacement decision.

3. Distribution cables

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
3.01	B3.1 page 122).	Aurora disagrees with Strata that its AMP and POD07, do not provided linkages to higher level policies and strategies.	In B3.1, Aurora considers that the asset fleets Strata reviewed have differing levels of linkage to overall, higher-level strategies, some of which are explicitly set out in the AMP and respective PODs. To support this point, Aurora provides example that it appears to be claiming is a linkage to a higher-level policy or strategy. However, there is no reference to any policy and/or strategy document and Aurora did not provide any relevant documents in its CPP proposal information nor with its submission. In our opinion, the statement *Meeting our portfolio objectives – safety first* is insufficient to POD discussions. In our view, the PODs should reference and quote specific policy and strategy documents. <u>We have not changed our original assessment</u> The absence of any references to policies, standards and procedures in the POD documents, together with the lack of any documents provided in response to the Commission's information requests, indicates that our conclusions are reasonable.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			We consider that Aurora's submission has not provided reasons for Strata to amend its original conclusion that Aurora's capex forecast, for the asset renewals categories it reviewed, does not meet the Expenditure Objective. <u>Aurora's criticisms are not supported</u> In its submission, Aurora gives an example in support of its view that Strata has not adequately reviewed the material included in its CPP proposal, and that this calls its recommendations into question. However, Aurora has not provided references to any specific documents that it considers Strata should have, but has not, reviewed. Strata's response to items 1.01 and 1.02 references our discussion on the efforts made to identify and gain further information from Aurora on its policies, standards and procedures. Accordingly, we consider that Aurora's submission point is invalid; the inference that Strata has not reviewed available information is unwarranted.
3.02	B3.2 page 122-123 Paragraphs 273 to 278	Aurora claims that Strata has a lack of understanding of repex models. Aurora considers that its repex modelling approach has been endorsed by the AER. Aurora refers to quotes from the Commission's Draft Decision stating what repex modelling is and the reasonableness of approach.	Refer to Strata reference 1.04 above for our response to Aurora's repeated claims regarding Strata's fifteen years' experience of reviewing capital expenditure proposals and repex models. In its submission,[120] Aurora describes its use of age and expected lives as a proxy for condition, with expected lives modelled using a normal distribution. The calculated replacement rate represents the proportion of cables to be replaced by a particular age. Also: *A standard repex model contains a calculation to convert the normal distribution to a corresponding survival rate purely for information purposes.*

[120] Aurora - 20201218 Aurora CPP Draft Decision - Submission(3983676.1), page 273

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
		Aurora is critical of Strata's statement that it had not explained how it determined the failure distribution used in its model, nor how these aligned with Aurora's experience of cable failures.	In its Briefing Paper 2, Strata described Aurora's modelled approach to distribution conductors as follows: *Aurora's model describes its use of age and expected lives as a proxy for condition, with expected lives modelled using a normal distribution. The calculated replacement rate represents the proportion of cables to be replaced by a particular age.* *Critical to this model are the assumptions on expected life and the shape of the normal distribution.*[121] We consider that our description is consistent with Aurora's. <u>Aurora did not address Strata's point related to expected failure rates</u> In our briefing paper we stated that: *Aurora has not explained how it determined the failure distribution used in the models, nor how these aligned with Aurora's experience of cable failures.*[122] We also included a chart of the failure rates that resulted from the data in Aurora's model. In MOD07, the replacement expenditure forecast is driven by a cumulative failure distribution that is formed against a normal distribution. The normal distribution is derived from asset age data, assumed expected asset life and standard deviation set at the square root of the expected asset life. We did not identify an explanation for the use of the square root of assumed asset life to form the distributions, not the expected asset lives themselves.

[121] 2020-11-26 Consolidated Briefing Reports v1.0, page 40
[122] Ibid

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			Whilst we accept that Aurora has limited condition data for these underground assets, we would have expected some review of the assumptions and outputs against actual failure rates and the age of assets that were experiencing failure. Aurora did not address this point in its submission. <u>Aurora is incorrect regarding Australian practices</u> In its submission, Aurora incorrectly implies that its modelling approach has been endorsed by the Australian Energy Regulator (AER). The AER does not endorse utility repex models, it has however encouraged their development and use. The AER uses a repex model when it assesses electricity distributors' capex proposals.[123] The AER recognises that its repex model is limited by the availability of data that it obtains from distributor disclosures. Whilst some electricity distributors initially adopted the AER's model, most have replaced it with much improved models that meet the AER's attest requirements set out in its Industry Practice Application Note relating to asset replacement planning.[124] We consider that the AER's Practice Application Note is a more valid model for Aurora to compare itself against. Recently, we appraised several repex models in our reviews of Australian electricity distributor capital expenditure proposals. Based on this current experience, we consider that the Aurora models we have reviewed are not at the same standard. This confirms the Verifier's view that they are not aligned with GEIP. <u>Aurora's claim that the Verifier concluded its models were reasonable is inaccurate</u> Our discussion in reference 1.04 is related to Aurora's point made in B3.2 that its modelling approach for distribution cables *is identical to those reviewed by the Verifier, who concluded they were reasonable.* In 1.04, we note our agreement with the Verifier's

[123] https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/repex-model-outline-for-electricity-distribution-determinations
[124] https://www.aer.gov.au/system/files/D19-2978%20-%20AER%20-Industry%20practice%20application%20note%20Asset%20replacement%20planning%20-%2025%20January%202019.pdf

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			assessment that age-based models, as Aurora used for distribution cables, are not generally aligned with GEIP; however, we understood the need to use them for most asset class forecasts given Aurora's capabilities and data limitations. We have not changed our original assessment We consider that Aurora's submission has not provided reasons for Strata to amend its original conclusion that Aurora's capex forecast, for the asset renewals categories it reviewed, does not meet the Expenditure Objective.
3.03	B3.3 page 123	Aurora agrees that modelled work volumes had been smoothed and that this contradicts Strata's claim that no post modelling adjustments had been made by Aurora.	We have addressed this point in reference 1.03. Strata's opinion is that the smoothing identified by Aurora was a component of its model. Whilst the model applied the smoothing after it had created an initial replacement forecast, it was still applied within the model. Discussion in the POD07 also indicates that the smoothing was a component of the model and was not applied later as a top-down management review. The key point that we made in our Briefing Report is that the outputs from the model are used to form the expenditure forecast. This means that no further adjustment was made to the forecast as a result of management and Board challenges. We have not changed our original assessment The points made by Aurora in its submission have not changed our original assessment.
3.04	B3.4 page 123	Aurora states that cable work volumes being modified were about prioritising cast iron pothead replacements and not under delivery of its forecasted cable replacements.	In our opinion, having to prioritise because of resource shortages is a cause of under-delivery. The shifting of resources to prioritise cast iron potheads does not alter the fact that cable replacements were deferred. Aurora's suggestion that Strata's observation on under-delivery of cable replacements supports Aurora's view that Strata did not adequately review its CPP application material is not supported.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			We have not changed our original assessment The points made by Aurora in its submission have not changed our original assessment.
3.05	B3.5 page 123	Aurora state that "replacement volumes are calculated from the failure rate not cumulative failure rates."	As we discussed in Strata reference 1.04, Aurora's model applies assumptions on expected asset life and standard deviation to determine a cumulative failure distribution from which it produces a survivor curve using the reciprocal of the cumulative failure distribution. The model then calculates a failure rate from the cumulative failure rate distribution. Whilst Aurora is correct in saying that replacement volumes are calculated from the failure rates, because failure rates are derived from cumulative failure rates, it is not appropriate to claim that they are not derived from cumulative failure rates . This is because failure rates are determined in Aurora's repex models using the following Excel function: =IF([@Age]=1,0, IF([@[Survivor Curve]]=0,1,1-[@[Survivor Curve]]/E33)) Therefore, if an asset is new, the model records a zero-failure rate for all other values; the failure rate is drawn from the survivor curve, which is, in turn, drawn from the cumulative failure distribution. We have not changed our original assessment The points made by Aurora in its submission have not changed our position on this point.
3.06	B3.7 page 124).	Asks why CC agreed with this statement; "We have identified no material issues with the distribution cables replacement forecast other than reducing the RY20 to RY24 volumes to remove	In its B3.7 submission comment, Aurora raises a concern that the Commission is applying a 5% portfolio level adjustment to a replacement forecast that Strata has determined to be reasonable. In B3.7 Aurora states: *We struggle to understand why "reasonable forecasts" with appropriate unit rates that have been adjusted for deliverability should have a 5% reduction that purportedly aims to address the lack of these.*

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
		the unsupported 'smoothing' adjustment." Asks why CC agreed with the statement "we have identified no material issues with the distribution cables replacement forecast other than reducing the RY20 to RY24 volumes to remove the unsupported 'smoothing' adjustment."	In this submission point, Aurora has not challenged Strata's recommendation on reducing the RY20 to RY24 volumes to remove the unsupported 'smoothing' adjustment. In Strata reference 1.07, we discuss the reasons for the application of a portfolio level adjustment. Such an adjustment is applied to address issues relating to bottom-up forecasts when viewed from a whole portfolio perspective. We understand that Aurora is struggling with the concept that a rigorous top-down challenge should have been applied to its bottom-up constructed forecast. The absence of evidence that Aurora applied such a challenge review supports our conclusion that the Commission should apply an adjustment to the total portfolio forecast. As we have previously noted, in its draft decision the Commission applied a -5% adjustment for different reasons to the portfolio level review and adjustment discussed above. We have not changed our original assessment The points made by Aurora in its submission have not changed our position on this point.

4. Low Voltage cables

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
4.01	B4.1 to B4.3	Strata's conclusion about failure rate curve. State they are concerned about Strata's lack of understanding of basic reliability engineering. Issues	In Briefing Report 2 section 3.7 Strata sets out its advice to the Commission on Aurora's low voltage distribution cables. The section relevant to Aurora's submission point is reproduced below. Key drivers of expenditure for LV cable renewal and refurbishment are:

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
		raised about inconsistencies in Strata Report.	1. **type/age** Aurora proposes to replace PILC cables that have exceeded their expected life of 100 years and opportunistically replace cable lengths when replacing other assets, such as ground mounted distribution transformers, LV enclosures and/or poles; and 2. **reactive replacements** distribution cables are replaced reactively when failures or third-party damage occurs (mainly due to cable strikes). Aurora's replacement strategy for its proposed LV cable replacements is to reactively replace: • on failure; or • when damaged by third-party action (e.g., from construction related ground movement). Aurora submitted that: 1. the 100 year is a modelling trigger used to predict likely future volumes. Replacing assets based on age is a proactive approach. Our submission is clear that we use a reactive strategy;[125] 2. Strata's statements are contradictory; and 3. there are two incorrect footnote references. Aurora claims that these issues combined are examples of internal inconsistencies, contradictory statements and represent consistent errors in the material suggesting a lack of care in preparation and internal review. Aurora also considers that it is unclear how Strata has arrived at the conclusion that PILC cables are replaced proactively from a cumulative failure distribution curve. [126]

[125] B4.1, page 124
[126] B4.4, page 125

			<u>Aurora's submission points refer to and identify issues with its own documents</u> Aurora's POD08 LV Distribution Cables[127] contain the following statement: **Key Drivers** Key drivers of expenditure for LV cable renewal and refurbishment are: – **Type/Age:** we replace PILC cables that have exceeded their expected life and opportunistically replace cable lengths with other works replacing ground mount distribution transformers, LV enclosures and/or poles. – **Reactive replacements:** LV cables are replaced reactively when failures or third-party damage occurs. The latter are mainly caused by cabl construction or ground movement. POD08 also states that LV cable replacement is primarily reactive due to failures caused by third-party damage and observed crystallisation issues of the lead sheaths which can lead to cracking if the cable has force exerted on it. Aurora's LV cables repex model (MOD08) applies an expected life of the PILC cables at 100 years. Therefore, Aurora's comments relating to contradiction apply to its own POD08 and not to Strata's Briefing Paper. <u>We do consider that Aurora's submission contradicts its CPP proposal information</u> Unlike Aurora, we do not consider that statements in its POD08 are contradictory. In our view, it is quite clear that the drivers of the expenditure relate to both the forecast and actual expenditure drivers. We do consider that Aurora's submission contradicts the information provided in POD08 and MOD08 which clearly states that to Aurora, the expected life of its cables is a replacement driver. <u>Aurora's modelling approach is not aligned with its stated strategy.</u> Strata concluded that: 1. there are inconsistencies between Aurora's modelled replacement forecast and the description of its assets, and the need for the expenditure; and 2. a more reasonable basis for the replacement forecast is to apply the most recent actual expenditure, because this will be more reflective of the actual performance of the LV cables than the failure rates projected in the model.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			In confirming that it does not replace LV cables on an age basis, Aurora's submission comment has reinforced our original conclusions. This is because MOD08 applies age-based replacement to form the LV cable renewals expenditure forecast. When we replace the expected lives with much higher ones, the resulting expenditure forecast becomes negative. Our view remains that the LV cables renewals expenditure is more appropriate if it is formed on the basis of historical replacement numbers and costs. We have not changed our original assessment Aurora's submission has not provided sound reasons for Strata to amend its original conclusion that Aurora's capex forecast, for the asset renewals categories it reviewed, does not meet the Expenditure Objective. We have noted the incorrect footnotes in the Draft Briefing Report and will revise this in a final version.
4.02	B4.4	Aurora disputes Strata's conclusion that "PILC cables are replaced proactively from a cumulative failure distribution curve."	Aurora thinks that Strata's use of cumulative failure rate curves is unclear Aurora has found that Strata's Briefing Paper 2 is unclear on how it concluded that PILC cables are replaced proactively from a cumulative failure distribution curve. Aurora considers that this indicates Strata's lack of understanding of its models and basic reliability engineering. Strata did not state that Aurora was proactively replacing its LV cables In section 3.7 of its Briefing Paper 2 (which Aurora quoted), Strata referred to three charts showing the cumulative failure distributions for PILC, XPLE and PVC LV cables. The data for the charts was sourced directly from Aurora's MOD08 LV Cables (i.e., Aurora's LV cables repex model). Strata noted that the model's projection of failures indicated that onset of end of life related failures for the PILC LV cables would begin at 70 years old. The cumulative failure distribution also indicated that reactive replacements could be expected to occur between 70

[127] POD08 - LV Cables, page 4

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			and 90 years old. Beyond 90 years, the curve indicated that proactive replacements should have been completed unless the cables are considered to be low criticality. From its analysis of MOD08, Strata did not conclude that Aurora was currently replacing its PILC cables proactively; the analysis considered only the replacement levels that Aurora's repex model indicated. Aurora appears to have drawn the wrong conclusion and misunderstood the point Strata was making in its Briefing Paper. Aurora also draws an unreasonable and unsupportable conclusion that Strata's interpretation of the repex modal data reflects lack of engineering capability.
4.03	B4.5	Aurora disputes Strata's conclusion of "hybrid criticality-based bundling."	Aurora makes two points in its submission: 1. Strata's reference in its text to the 2018 AMP should have been to the 2020 AMP as indicated in Strata's footnote; and 2. Strata's reference to hybrid criticality-based bundling for LV cables is incorrect. <u>Aurora's points are correct</u> The two errors identified by Aurora are correct. The first is a typographical error, the second was a reference from the line above that reproduced in Aurora's submission from the 2020 AMP. The hybrid criticality-based bundling refers to distribution cables and for LV cables only hybrid is referred to. <u>We have not changed our original assessment</u> The two minor errors identified by Aurora in its submission are not relevant to Strata's conclusions for the LV cable asset expenditure forecast. Accordingly, we have not changed our position on this point. We will address the identified errors in the Draft Briefing Report in our final version. The sentence will be revised to:

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			In its 2020 AMP Aurora states that it established replacement expenditure for its distribution cable assets on a volumetric / repex basis. It delivers the forecast replacements through what it calls hybrid.
4.04	B4.6	Aurora asserts that because its unit cost estimate is 6% lower than Jacobs, the 5% top-down efficiency adjustment should not apply.	In its submission Aurora considered that because its unit cost for cables was 6% below the benchmark determined by Jacobs, the Commission should not apply a 5% portfolio level adjustment. The portfolio level adjustment covers broader efficiency aspects Aurora's point refers only to the unit cost component of its LV cable expenditure forecast. The portfolio level review assessment that we consider to be absent covers broader components and their interdependencies. The Commission's -5% portfolio level adjustment relates to much broader efficiency and other forecasting aspects. We note that the Commission's -5% portfolio adjustment appears to be consistent with Aurora's approximately -5% adjustment made in its forecast models and applied to crossarms and LV enclosures asset classes. It is not clear why Aurora should not accept a similar adjustment for other asset categories.

5. Pole mounted transformers (includes pole to ground conversions)

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
5.01	B5.4 page 126	Strata's statement that "the 60-year to 85-year age range is likely to be indicating the	Aurora's submission points to questions on how Strata can recommend adjustments to its proposed pole to ground mounted transformer replacement programme when Strata acknowledges there is a need to renew units past 60 years of age.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
		end of life failure profile that Aurora has experienced for these assets, with assets older than 60 years having a much higher risk of failure" contradicts the view that replacements can be deferred and indicates that there is a renewal need for units past 60 years of age.	<u>Strata listed eight concerns with Aurora's proposed expenditure</u> Strata's recommended adjustments to address the following eight concerns identified in Aurora's proposed pole mounted transformer replacement programme: 1. Aurora has not provided sufficient detail and information on the primary driver of the proposed expenditure; 2. the volumetric model should not have been used for the low volume, high value pole-to-ground seismic and clearance distance programme; 3. currently, there is insufficient information to justify the timing and expenditure profile for the $21.4m pole-to-ground programme; 4. the inclusion of some transformer replacements in the pole replacement forecast distorts the expenditure forecast and is unnecessary; 5. Aurora's claim that the programme is critically optimised is not supported by evidence; the proposed programme will deliver a relatively young asset fleet, but the cost-benefit analysis for this has not been supplied; 6. the deliverability smoothing is not optimised for criticality and will add risk; Aurora has not provided an explanation of how it has reached its conclusions on smoothing; 7. the new competitive contracting environment should be delivering lower unit costs than historical rates, particularly given the proposed pole-to-ground initiative; and 8. unit costs used in the CPP application are within the range of values we would expect for these assets. We consider that the above points are clear and are described in our Briefing Paper.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			<u>Aurora claims that there are safety concerns related to its proposed pole-to-ground mount conversions.</u> Aurora expresses concern that Strata is suggesting that it should increase safety risk on the network by deferring the conversions. Aurora clarifies that it will not adjust its plans in any way that would increase safety risk. <u>Strata's role was not to tell Aurora what assets it should replace</u> The Commission did not ask Strata to produce an alternative asset replacement programme for Aurora's transformers. Strata was asked to assess the reasonableness of Aurora's expenditure forecast, taking into account the requirement that it had to meet the Expenditure Objective. <u>Strata could not conclude that the expenditure forecast was reasonable</u> Because of the points listed above, we could not confirm that Aurora's expenditure forecast is reasonable, nor that it met the Expenditure Objective. The Commission asked that we provide recommendations on adjustments that we considered should be applied to compensate for the issues we had identified. We made recommendations on this basis. Our recommendations do not prevent Aurora from applying safety and critically prioritisation when establishing its actual replacement programmes.
5.02	B5.5 page 127	Aurora claims that there is an issue with Strata referencing the 2018 AMP material to help support Aurora's investment plans	At several places in its submission, Aurora questioned why Strata referenced its 2018 AMP. The reasons for this include: 1. to explain changes between actual and proposed expenditure; 2. to understand changes that Aurora had made to its asset management between 2018 and 2020; 3. to understand the implications of any changes in asset data such as condition; 4. to gain a view of changes in Aurora's asset management maturity and how it determines its self assessment; and

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			5. because the Verifier relied on the 2018 (2019 updated) AMP and not the 2020 AMP (see quote below). *With respect to capex programs, we have reviewed key documents such as the AMP 2018-2028 and the associated portfolio overview documents (PODs) in lieu of specially developed asset class plans or business cases in the case of growth projects.*[128] We consider that it is important to understand the past when forming views on future expenditure. We also noted that the Verifier relied on the 2018 AMP (2019 update) when undertaking its Verification because the 2020 AMP was not available at that time. The expenditure forecasting (including repex models, the verification, and presumably the drafting of the CPP proposal), were all undertaken prior to the 2020 AMP becoming available. Accordingly, if it is to be accepted the following comment from Aurora's submission should also be applied to the verification : *Forming judgements on material that is out-of-date and different from our proposal is not representative of good engineering practice by any objective standard and invalidates any conclusion drawn from that material.*[129] Our view remains that it was appropriate for the Verifier and Strata to consider the AMP that was applicable during the period when Aurora formed its CPP Proposal, this was the 2018 (2019 update) AMP. <u>Strata appropriately considered Aurora's 2018, 2019 and 2020 AMPs</u> We have reviewed our references to the relevant AMPs contained in our consolidated briefing reports. There are 34 references made to the 2020 AMP and 16 to the 2018 AMP. Our

[128] Farrierswier and GHD - Final Aurora CPP Verification Report, page 58
[129] Aurora - 20201218 Aurora CPP Draft Decision – Submission, page 128

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			references to the 2018 AMP are appropriate and provide valuable perspectives to inform our review.
5.03	B5.6 page 127	Aurora identified a potential issue with Strata's statement about safety risk.	In its Draft Briefing Paper Strata made the following comment concerning safety issues relating to pole mounted transformers: *Yet injuries from pole transformer failures are relatively rare and Aurora must have undertaken regular inspections and have good knowledge of any safety-related issues for transformers in high risk locations.* *Whilst we are not challenging the need for appropriate safety clearances, in our opinion, Aurora has not provided sufficient evidence to support a material increase in replacements to address this issue.*[130] Aurora responded in its submission stating: *Pole transformer failures are not rare and while injuries caused by such failures are fortunately rare, it does not mean an absence of safety risk. We have undertaken inspections and have identified low-mounted unsafe transformers and seismic compliance issues which are set out in our 2020 AMP*. <u>Aurora appears to agree with Strata</u> In its submission point, Aurora appears to agree with Strata that injuries from pole transformer failures are relatively rare. Aurora also provides confirmation that it does undertake inspections and identifies reliability and safety risk issues. Aurora's 2020 AMP states that:

[130] 2020-11-26 Consolidated Briefing Reports v1.0, pages 49 and 50

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			larger capacity pole mounted substations must be replaced with ground mounted substations (when renewal is warranted) to ensure seismic compliance[131] *and* *The key benefits of our planned renewal programme are mitigating the potential decline in associated reliability due to the forecast decline in asset health, and reduction in safety risk associated with larger pole mounted units.*[132] However, Aurora's expenditure forecast was based on an age-driven repex model and not on observed asset information through inspections. The forecast is therefore not aligned with the risk-based prioritisation that Aurora says it applies when scheduling its replacements. <u>Aurora's claim that Strata lacked understanding is unsupported</u> Aurora claims that Strata has demonstrated a lack of understanding and poor engineering judgement. As we discussed in Strata reference 5.01, it was not Strata's role to apply engineering judgement on the prioritisation that Aurora actually applies to its pole mounted transformer replacement programme. Strata's task was to advise the Commission on the reasonableness of the expenditure forecast against the Commission's Expenditure Objective based on the information Aurora provided. <u>Aurora has failed to address Strata's concerns</u> In its submission Aurora has not addressed any of the issues and concerns outlined in Strata's Draft Briefing Paper.

[131] Aurora-Energy-AMP-2020-Final-12-June-2020, page 318
[132] Aurora-Energy-AMP-2020-Final-12-June-2020, page 322

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			Aurora's submission has not provided sound reasons for Strata to amend its original conclusion that the pole mounted transformer renewals expenditure forecast does not meet the Expenditure Objective. We have not changed our original assessment Strata has not changed its initial conclusions.
5.04	B5.7 page 127	Aurora disputes Strata's conclusion that pole mounted transformers were replaced during accelerated pole replacement programme	In its Briefing Report, Strata stated an assumption that: *many of the higher risk transformers would have been replaced in the accelerated pole replacement programme because this was a risk prioritised programme.* It seemed logical to Strata that, if a pole mounted transformer were in poor condition, or had a high seismic/safety risk, Aurora would address the issue at the same time as the pole was replaced. In its submission, Aurora states that it did not take this action: *This assumption is incorrect. The accelerated pole programme concentrated on wooden poles, which we are still replacing. We also have many transformers on concrete poles which have not yet been replaced.* Aurora's practice is likely to be inefficient and suboptimal In our opinion, when replacing poles, reinstating transformers that are in poor health and/or a safety risk is not good practice. The result is likely to be inefficient and suboptimal from a risk perspective.
5.05	B5.8 page 127	Aurora asks why the 2018 AMP was used to discuss safety clearance compliance risk as this was discussed in 2020 AMP.	Strata reference 5.02 details its use of Aurora's 2018 AMP. Specific to this submission point, in the relevant section of our Draft Briefing Report, we discuss evidence of when the safety clearance compliance risk had been identified. We noted that WSP had not identified it, nor had Aurora in its 2018 AMP. The 2018 AMP was current at the time of the WSP review.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
5.06	B5.10	Aurora disputes Strata's conclusion that pro-active replacement approach was not supported by failure rates. Aurora suggests that this is driven by safety risk considerations.	Aurora states in its submission that: *A proactive approach is primarily justified on the basis of risk, taking into account (in this case) safety consequences.* Aurora did not support its position with any evidence or data. The 2020 AMP states that key benefits of its planned renewal programme are mitigating the potential decline in associated reliability due to the forecast decline in asset health, and reduction in safety risk associated with larger pole mounted units. Aurora did not provide any data or analysis to support its claimed justification of the safety risks, which its AMP primarily identified as a seismic related issue.
5.07	B5.12	Critique of Strata discussion on pole-mounted transformer repex modelling vs survivor curve modelling.	See Strata reference 1.04 which refutes Aurora's submission points on repex model issues.
5.08	B5.15 page 130	Aurora disputes Strata's conclusions about the pole-to-ground replacement programme.	<u>Aurora claims that its pole-to-ground conversion programme is business as usual</u> At point B5.15, Aurora states that it *will replace hundreds of pole-mounted transformers in the coming years meaning it meets our criteria for being a volumetric fleet / programme.* At B5.13, Aurora also questions why Strata references that $21.4m is a 10-year total for pole-to-ground mounted conversions. <u>Strata considered that the pole-to-ground programme was sufficient to justify a separate business case</u> In our Briefing Report we presented our view that $21.4m was sufficient to warrant a business case to support that level of expenditure. It is clear from the chart presented in our briefing paper that the expenditure forecast for pole-to-ground conversions is materially different and

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			significantly larger than other pole replacements. This is because the replacement programme focuses on renewals of relatively smaller numbers of larger capacity transformers. We do not agree with Aurora's assumption, that 'business as usual' expenditure does not require supporting a business case when the total cost is significant. This is particularly the case for low volume, high value items.
5.09	B5.18 page 130-131	Aurora disputes Strata's conclusion that deferred ≤ 15kVA units are likely to be under-delivery of forecast quantities in 2020 and 2021.	In its submission, Aurora stated that the reduced replacements did not represent an under-delivery but rather a proactive adjustment to prioritise higher risk renewals. Aurora did not provide evidence of references to information supporting its claim that proactive adjustments had been made. In its Briefing Report, Strata stated that: *Aurora's smoothing adjustment applied to its pole mounted transformers is due to deferral of 60 ≤15 kVA transformer replacements primarily in Central Otago and 24 >200 kVA transformer replacements on the Dunedin network. The deferred ≤15 kVA replacements are likely to be recovery from an under delivery of forecast quantities in 2020 and 2021, rather than a proactive adjustment to smooth future deliverability of the programme.* The adjustment that is made as part of MOD21 is labelled 'delivery adjustments'; however, Aurora's POD21[133] states: *Given the increase in planned expenditure in this portfolio, it is critical that we have sufficient field and internal resource available to deliver the works efficiently and prudently. We plan to phase the increase in renewal investment to ensure the programme is deliverable. This approach allows us time to increase our resources and service providers to adjust their work processes as they transition to this new work programme.*

[133] POD21, page 7

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			Accordingly, we assumed that the adjustment was due to constraints on delivery. However, we can also accept that this may include an element of reprioritisation within delivery constraints. Aurora's claim that, based on this issue, Strata did not adequately review its submission, is in our view unsupported. <u>We have not changed our original assessment</u> The points made by Aurora in its submission have not changed our original assessment.
5.10	B5.20 page 131 B5.23 B5.31	Aurora disputes Strata's statement about prudency and efficiency of deferral and how risk has been used in reaching this decision. Aurora disputes Strata's criticism that volumetric modelling should not be used for low volume high cost items. Aurora considers that any deferral simply increases safety risk and requests CC clarification as to why it has accepted a recommendation to increase safety risk.	In its Briefing Report, Strata stated: *the absence of detailed consideration of the risk undermines confidence in the reliability of the proposed volumes for the CPP period.* This comment related to Aurora's deliverability adjustment within its repex model. In its submission, Aurora considered that this statement conflicts with Strata's recommendation to defer 75% / 33% of PM to GM conversions in RY22/23 respectively. <u>Strata cannot confirm that the proposed expenditure meets the Expenditure Objective</u> Based on the information available, Strata could not conclude that the proposed expenditure met a reasonable and prudent standard. Primarily, this was because the forecast was based on a volumetric repex model and had insufficient assessment to support a risk optimised large pole-to-ground transformer replacement programme. Strata recommends that the forecast expenditure is adjusted to represent the time that Aurora will take to develop and implement an optimised and supported conversion programme. Aurora will still be expected to prioritise the replacement of its highest risk transformers as it undertakes its programme.
5.11	B5.21 page 131	Aurora states that Strata has misunderstood repex modelling.	See Strata reference 1.04 which discusses this issue.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
5.13	B5.24 page 132 B5.29 page 135)	Strata's statement that it could not understand how criticality assessment was made shows lack of full review of CPP material as the 2020 AMP sets this out. Aurora does not claim the programme is "critically optimised" and states that it is an example of Strata's lack of understanding and inadequate review.	At B.24 Aurora states that it prioritises pole mounted transformers based on safety criticality. At B.29 Aurora states that it never claimed the programme is "critically optimised". Strata's point related to a lack of information on how Aurora might have taken this prioritisation into account when forming its expenditure forecasts. Aurora's submission point has confirmed that the expenditure forecast is solely volume based and has not been prioritised nor optimised for criticality. We have not changed our original assessment The points made by Aurora in its submission have not changed our original assessment.
5.14	B5.25 page 133-134	Aurora disputes the use of the 2018 AMP conclusion that 50 units a year were to be replaced and the 2018 AMP replacement rate is inconsistent with the CPP replacement programme. Aurora questions the integrity of the Strata review.	Aurora's first point concerned the number of annual replacements In B5.25, Aurora states its view that Strata has incorrectly assumed that an equal number of replacements are made yearly resulting in large unit rate variance each year. Strata calculated an average and did not assumed an equal annual number Strata actually stated that Aurora should continue its strategy to replace on average 50 distribution transformers per year plus an increase to account for the higher numbers currently approaching 60 years. Aurora's second point concerned the effect of transformer types on total unit cost Aurora claimed that Strata made a second error by using total spend on the distribution transformers category which has multiple asset types. An example given by Aurora was that Strata had ignored renewal of more expensive ground mounted units.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			<u>Strata specifically discussed the unit costs variations for transformer types</u> Immediately following the table that Aurora reproduced in B5.25, Strata discussed the range of unit costs for distribution transformers: *One explanation for the difference is likely to be that the replacement programme has shifted towards increased replacement of smaller transformers i.e. </= 50 kVA. However, this is not identified or discussed in documents we have reviewed.*[134] Strata also reproduced the unit costs for the various transformer types that Aurora had applied in its repex model. <u>Aurora's criticism is unreasonable and unsupported</u> Aurora's claims that there are errors compromising the integrity of Strata's review, and poor engineering judgement, are unsupported. The errors claimed do not exist and Strata took account of the range of unit costs when forming its view that they were reasonable.
5.18	B5.20 page 131	Aurora disputes top-down adjustment because Strata states unit costs are reasonable.	See Strata reference 1.07 which discusses reasons for the application of the portfolio level adjustment.

[134] 2020-11-26 Consolidated Briefing Reports v1.0, page 56

Ground mounted transformers

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
6.01	B6.3	Strata does not understand Aurora's modelling and that model adjustments have been made by an understanding of asset condition and low failure rates. Demonstrates a "lack of understanding of our forecast models, use of poor analysis, and poor judgement when interpreting the results." Aurora asks why Strata used the 2018 data when the forecast model had more up to date data.	Strata used a comparison of data that Aurora submitted to the Commission in its 2019 Information Disclosures to form the view that by the end of 2024, approximately 111 ground mounted transformers will be at or beyond 60 years old. Strata then compared the average replacement volumes with the replacement volumes in Aurora's CPP proposal. In POD20 Aurora states that: *The key driver of expenditure for ground mounted distribution transformer renewal is condition. As a relatively young fleet, ground mounted transformers are only just beginning to reach their expected life of 70 years, and only a small number of renewals will be required each year due to condition.*[135] We considered that it was reasonable to attribute the reduced volumes, seen as outputs from the repex model, to Aurora's understanding of the condition of the assets and the low failure rates being experienced. Aurora points out in its submission that the reason for the difference is due to the forecast being produced through its volumetric repex model which applies a failure rate distribution to determine replacement volumes. The point made in Aurora's submission has confirmed that it has not applied any post model adjustments to its repex model volumetric forecasts. Aurora's submission point also supports the application of our proposed portfolio level adjustment.

[135] POD20, page 20

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
6.02	B6.4 page 137	Aurora disputes Strata's conclusions about the unit rates rising in 2023 and 2025.	Strata did not identify any material issues with Aurora's ground mounted transformers forecast. Strata observed a small potential inconsistency in the unit costs for this fleet. On review, we found that Aurora's submission is correct that that its repex model for this fleet applies a fixed unit cost of $54,400 to the volumetric forecasts derived in its repex model. This correction does not alter our conclusions and recommendations for the expenditure forecast related to this fleet.

Additional Renewals points

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
7.01	B1.6 page 112	Aurora disputes that no post-model adjustments were made in the distribution cables, pole mounted distribution transformers, pole mounted fuses, pole mounted switches, Ancillary distribution substation, DC systems, and Remote terminal units. Failure to address Strata's post-modelling adjustments comments indicates that the CC process is flawed.	See Strata submission reference 1.02. Repex models are used directly as inputs to Aurora's forecasts; the models included a deliverability adjustment for some asset categories. Aurora has not provided any evidence of adjustments made through a challenge or portfolio level reviews. Rather than providing evidence of challenge or portfolio level review adjustments, Aurora has chosen to criticise Strata for considering that the potential for such adjustments might exist. Strata discusses the reasons why portfolio level reviews are important in Strata reference 1.07.
7.02	Table B1.7 Table B1.7 - B7.2 and B1.7	Aurora disputes Strata's conclusion that "Aurora used failure rates, derived from a standard distribution See table B1.7 with a standard deviation formed from the square root of expected asset life, for all ranges of assets."	See Strata reference 1.04.
7.03	Table B1.8	Aurora disputes Strata's proposal to adjust the pole mounted fuses and switches asset lives. States that pole mounted fuse and switch asset	The Commission has asked Strata to comment on whether Aurora's disagreement affects conclusions made that supported the Draft Determination, particularly regarding the assumed expected asset lives for some asset classes.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
		lives are "materially older" than other EDBs. Strata recommendation at odds with IV conclusions. States "Strata has demonstrated a lack of understanding and poor engineering judgement when suggesting these arbitrary changes".	Aurora's repex models assume an expected asset life as a primary input used to determine the timing of asset replacements. Two examples of Aurora's approach described in the models are: • for pole mounted switches, an expected life of 55 years is assumed for fuses;[136] and • for ground mounted transformers, an expected life of 70 years is assumed for all transformers. [137] Discussion provided in the repex models state that Aurora assumes age and expected lives to be a reasonable proxy for failures. The assumed expected life value is therefore critical in determining the timing and replacement volumes for assets. The descriptions provided in the models provide no discussion on how Aurora derived its expected asset lives. POD15 for pole mounted fuses states that *the fleet consists of a range of makes and models and is relatively young with an average age of 24 years compared to an expected life of 55 years.*[138] However, POD15 also states that Aurora's replacement practice is to visually inspect its fuses together with poles and replace them based on condition. The POD provides no indication of the age at which Aurora is replacing its fuses. POD15 confirms that Aurora intends to continue the current renewal approach to manage the pole mounted fuse fleet. POD15 provides no information on how Aurora determined a 55-year age expectancy.

[136] MOD15
[137] MOD20,
[138] POD15, page 1

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			Despite the criticality of the assumed asset age to the proportion of its asset renewal expenditure forecast determined through repex models, Aurora's submission document provides no information on how these were determined. We searched Aurora's 2020 AMP to locate a description on how it formed its assumptions on asset life expectancy as used in its repex models and found none. In its report, the Verifier did not describe how Aurora had determined its expected asset lives for its fleets but benchmarked Aurora with industry peers and considered the assumed ages to not be unreasonable. Strata relied on the Verifier's benchmarking and on our knowledge and experience of asset lifecycle expectations as seen in other electricity distributors and in Information Disclosures. We determined that Aurora's expected asset life assumptions were not unusual. However, we considered that Aurora should have undertaken an assessment of the sensitivity of its models to variation in key input assumptions. The Verifier shared this view for several asset categories that it had reviewed: *Aurora Energy did not complete any sensitivity analysis for the input data assumptions. We consider sensitivity analysis is important based on the uncertainty around the key assumptions when actual data is unavailable. In this case the data available from the recent inspections can be used to validate the forecast replacement volumes.*[139] <u>Aurora did not identify any sensitivity analysis</u> In its submission, Aurora did not identify or refer to any information on how it had established its assumed asset lives nor any sensitivity testing that it had undertaken.

[139] Farrierswier and GHD - Final Aurora CPP Verification Report, for example page 411

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			<u>The test we undertook was to determine the sensitivity of the expenditure forecast to changes in expected asset age</u> The reason we undertook sensitivity modelling was to test the reasonableness of the expenditure forecast and not to set an alternative replacement programme (noting that, for pole fuses Aurora's practice is not to replace on expected age). For some asset classes we found that relatively small adjustments to the assumed expected asset life made a material adjustment to the expenditure forecast. In our view, Aurora should have considered this and undertaken further analysis on what expected lives it was achieving in practice. The Verifier found some issues with expected asset lives for some assets. For example, in its review of the Aurora's forecast expenditure for LV enclosures the Verifier noted that: *We did not agree with the age-based modelling approach adopted by Aurora Energy for its renewal program forecast without some degree of validation of an initial 40 year expected life chosen for above ground enclosures.*[140] *Aurora Energy acknowledged the findings and adjusted the expected life input parameter in MOD18 (23 April 2020) to 47.5 years, which produced a revised replacement volume more closely aligned the inspection data findings.*[141] Our view remains that it is not unreasonable to apply sensitivity testing to the basic age-based volumetric repex models. <u>We have not changed our original assessment</u> The points made by Aurora in its submission have not changed our original assessment that the proposed expenditure does not meet the Expenditure Objective.

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
7.04	B7.6 page 138	Aurora disputes Strata's recommendation that "Aurora should take the opportunity to replace one large and one small RTU in 2021 as part of its RTU repex expenditure" (B7.6 page 138). States that there are 3 months left in RY21 and that "we should change our already committed RY21 (pre-CPP) work programme" to be nonsensical.	The Commission asked Strata to confirm that its recommendation was for calendar year 2021 and not RY2201. We can confirm that it was RY2021. Given the timing of the CPP schedule, we agree that it would be unreasonable to move the replacements forward. However, Aurora's response indicates that this was an option that it could have considered earlier. We have revised our draft recommendation and now recommend acceptance of Aurora's RTU expenditure forecast but retain our view that a portfolio level adjustment should be applied.
7.05	B7.7 B7.8 page 139	Aurora states that there was double, even triple, counting of the expenditure for DC systems (B7.7). States there are errors in the Strata report as the strategy is to replace batteries every 6 years, not 5 years. Aurora states that this demonstrates that there are basic errors in the Strata report (B7.8 page 139).	Aurora's PO25 states: *This portfolio includes investments to undertake standalone replacements of DC systems assets located within zone substations. A proportion of DC system replacements will be undertaken as part of larger zone substation projects. The expenditure is included in the related zone substation portfolio. Recloser (field) batteries are replaced every four years; this low unit cost is expensed and excluded from this portfolio.*[142] In its Draft Briefing Report Strata made the observation that there was the potential for double or triple counting of the forecast expenditure for this asset category. Strata did not state that it had found evidence that this was the case.

[140] Farrierswier and GHD - Final Aurora CPP Verification Report, for example page 69
[141] Ibid, page 70
[142] POD25, page 2

Strata Reference	Aurora Submission Reference	Aurora point	Strata response and proposed recommendation (if any)
			Aurora is correct in its identification that Strata incorrectly stated the battery replacement as 5 years rather than 6 years as stated in POD25. This had no bearing on our recommendation which was to accept the expenditure forecast for DC systems.
7.06	B7.9	Aurora states that Strata's conclusion made about Facilities capex demonstrates the inconsistent decision making approach by Strata because there are other low value capex categories such as pole mounted fuses, switches and RTUs that Strata did adjust (B7.9).	Aurora's submission comment relates to consistency of applying adjustments to other relatively low value repex categories but not to Facilities capex. We did consider applying an adjustment to the Facilities forecast to reflect historical expenditure with the asset values and projected depreciation. However, we concluded that this was difficult due to lack of data and information. To address Aurora's point we propose the following revision to the final paragraph in the Facilities section of the Draft Briefing Report: *In the absence of information to support the proposed facilities expenditure, we are unable to conclude that the forecast is reasonable and prudent. The lack of information and data limits our ability to provide an adjustment based on* historical expenditure with the asset values and projected depreciation. We therefore recommend that Aurora's proposed expenditure forecast is accepted but is subject to the portfolio level adjustment.

Appendix B : Quality Unplanned Reliability –

Strata's response to the Commission's subsequent questions

Submitter	Location in sub (page number, para number, etc.)	Submission comments	Strata's response to the Commission's question
Aurora Energy – Submission on draft decision for Aurora's CPP – 18 December 2020	Section 7.1	"Consistent with the Commission's consultation feedback, we concluded that while consumers did not necessarily want to pay more for improved reliability, they also did not want to see it deteriorate further." "With the expenditure proposed in our CPP proposal, we forecast reliability to stabilise through the 3-year CPP period with a slight improvement likely in the 4-to-5-year timeframe. This is commensurate with what consumers told us they are willing to pay for, and positions the network for future reliability improvement if consumer preferences change in the future… We do not consider that 5-year averaging is an appropriate comparison to make in the context of a deteriorating trend, as	This covers an area that the Commission did not previously ask Strata to consider and was not therefore covered in the Briefing Reports. Specifically, linkages to Aurora's stakeholder consultation on consumer preferences. Aurora also implies that, rather than Aurora's network experiencing a deterioration in unplanned reliability in the last five years, the Commission 'believes' that there has been a small improvement. Aurora has formed this view on the basis that the Commission has set forward looking targets that are 2% lower than the preceding five year average. Strata's original advice to the Commission, set out in Briefing Report 11, was: based on our assessment of Aurora's model and its input assumptions, we have concluded that the forecast would be more likely to reflect the future position if: • a 4-year average of historical SAIFI was applied in the Group 2 and Group 3 models rather than a 3-year average;

Submitter	Location in sub (page number, para number, etc.)	Submission comments	Strata's response to the Commission's question
		it is not appropriate to compare RY22-26 performance with performance dating back to RY16…. In setting targets that are 2% lower than the preceding 5-year average indicates that the Commission believes that, instead of a deterioration in unplanned reliability performance in the last 5 years, there has been a small improvement . We do not subscribe to this view, as supported by our forecasting".	• an adjustment was made to reflect the bias due to use of age-based asset health index in the GLM Group 1 model; • an adjustment was made to reflect the reductions in interruption duration due to improved fault response and operational management; and • an adjustment was made to reflect the increased focus on preventive and corrective maintenance. The Commission did not ask Strata to compare the resulting post adjustment SAIDI and SAIFI forecasts with the DPP limits. On performance trends, we consider that it is not surprising that the adjusted forecasts indicate an expectation that network reliability will improve over the CPP period. We take this view because of Aurora's more recent network capex investments and the increases in opex related to reliability performance. We also consider that the increased capex and opex planned for the CPP period will improve reliability and not, as Aurora claim, only improve safety.
Aurora Energy – Submission on draft decision for Aurora's CPP – 18 December 2020	Para 309	"we have placed greater emphasis on capturing recent performance, as this is most relevant in a deteriorating trend. We note that Strata has observed a 'possible' cyclic trend, but has not statistically demonstrated or found a reasonable explanations (sic) for the trend, which renders the observation speculative and creates uncertainty	In our original assessment recorded in Briefing Report 11 we concluded that it was not appropriate for Aurora's unplanned reliability model to use the RY18 to RY20 3-year unplanned interruption performance because: • it had a bias towards over estimating the output prediction; and • it was not aligned with the historical profiles observed for both SAIDI and SAIFI. The second bullet point relates to the *'possible' cyclic trend* Aurora refers to in its submission point.

Submitter	Location in sub (page number, para number, etc.)	Submission comments	Strata's response to the Commission's question
		over its relevance… The selection of a 4-year average has not been justified as more appropriate than a 3-year average. In our view, a 3-year average better reflects recent asset performance and also current operational practice, which includes taking account of refinement to our auto-reclose disarming during fire season, extra HV isolation associated with restricting live operation of some LV fuses, line patrols before re-livening, etc."	The point Aurora makes to refute Strata's observed 4-year trend is that Strata did not undertake any analysis to explain the underlying causes of the 4-year trend. Aurora did not include any analysis for the observed cyclic trend in both SAIDI and SAIFI. Yet Aurora is best placed to have undertaken this analysis as it possesses the data and historical knowledge to do this. In the absence of a compelling rebuttal from Aurora, our view remains that an average of the most recent four years is the most appropriate to apply because: 1. it includes the period of most recent asset performance current operational practice (including auto-reclose disarming during fire season) and extra HV isolation; and 2. takes into account the four year cyclic trend (which Aurora has not disproved).
Aurora Energy – Submission on draft decision for Aurora's CPP – 18 December 2020	para. 310	Aurora considers that the Commission did not need to match the 4-year normalisation period with 4-year averaging period. Aurora's view is that the level of normalisation is likely to be more a function of weather than network performance and, statistically, the variability of the weather makes a short (4-year) period problematic. Also, Aurora noted that the underlying reliability performance is a function	In its Briefing Report, Strata sets out its understanding of how Aurora had determined and applied its normalisation scaling factor. *To normalise the outputs of its model, Aurora calculated the ratio of raw SAIFI and SAIDI to what the normalised SAIFI and SAIDI would have been under the DPP3 settings for 2011 through to 2020. Aurora then calculated the 10-year average, which it then used to create a scaling factor.* *The scaling factor (0.72 for SAIDI and 0.83 for SAIFI) was applied as a multiplier to the relevant composite model outputs to produce a normalised prediction of future reliability.* The Commission's original question asked us to consider if it is appropriate for Aurora's unplanned reliability model to be weighted to RY18 to RY20

Submitter	Location in sub (page number, para number, etc.)	Submission comments	Strata's response to the Commission's question
		of asset health and operational practices etc., which change over time, so a shorter averaging period is more appropriate.	performance rather than a longer period (e.g., RY14 to RY20, or the RY16 to RY20 DPP2 period), including: a) whether the choice of the RY18 - RY20 time period affects the relationship between the "pre-normalised" reliability forecasts and the normalised reliability forecasts in a way that materially differs from the relationship that would result from a longer historical period; and b) to review the technique and process Aurora used to normalise its unplanned interruptions and provide a view on the reasonableness of this approach and its consistency with DPP3 methodology. We concluded that: *…taking the modelling approach that it did, Aurora had to produce a DPP3 normalised output. Combining this with a 10-year average ratio will have eliminated some of the variability in the outputs of Aurora's composite model. Accordingly we consider that:* *1 Aurora's technique and process used to normalise its unplanned interruptions was reasonable given the structure of its composite model; and* *2 the scaling approach that Aurora has applied is consistent with the DPP3 methodology.* We agree with Aurora that the 10-year average ratio for normalisation will better address the variability of MED rather than use of a shorted averaging period. We also agree that there is no reason to link the normalisation

Submitter	Location in sub (page number, para number, etc.)	Submission comments	Strata's response to the Commission's question
			averaging period with the averaging period used for determining Group 2 and 3 SAIFI.