NOTICE TO COMMERCE COMMISSION FOR ACCELERATED DEPRECIATION ADJUSTMENT FACTOR

CREATING A NEW ENERGY FUTURE

Vector®

CONTENTS

INTRODUCTION

1. This is Vector's Notice (Notice) for a depreciation adjustment factor to be applied at the reset on 1 April 2020. Vector requests the Commerce Commission (Commission) apply a 0.85 adjustment permitted by clause 4.2.2(4) of the Electricity Distribution Business (EDB) Input Methodologies (IMs). This Notice describes the steps undertaken by Vector to comply with clause 4.2.2(5) of the IMs which sets out the criteria for a valid Notice. This Notice:

   a) Provides a review of the Commission's reasoning for the inclusion of the depreciation adjustment factor within the IMs, namely: heightened uncertainty, addressing investor confidence and mitigating sustained price increases;

   b) Demonstrates the consistency of our Notice with the Commission's reasoning and shows how the use of the adjustment lever can mitigate intergenerational inequity and social deprivation;

   c) Addresses the Commission's preference for a modest and partial solution and note the limitations to the assumptions for reaching this preference;

   d) Demonstrates the consistency of our Notice with section 52A of the Commerce Act (the Act);

   e) Describes Vector's customer technology scenario modelling which has been reviewed and peer reviewed as providing a forecast of customer behaviour and take-up of new energy technologies and a forecast of expected price changes expected to occur over a 30-year horizon;

   f) Summarises our engagement with our Auckland customers to discuss this topic and obtain their feedback on our intention to submit a Notice for the DPP3 reset and our customer analytics on energy use; and

   g) Considers recent learnings from Queensland (QLD) and New South Wales (NSW) where regulatory settings and realised technology risk have contributed to sustained price increases and public debate for partial capital recovery.

2. The contact person for matters in relation to this Notice is:

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EXECUTIVE SUMMARY

3. Vector is submitting this Notice to the Commission which recommends the Commission adopt a 0.85 depreciation adjustment factor for Vector when setting the Electricity Default Price Path (DPP) for 1 April 2020. Vector considered the reasoning provided by the Commission when it adopted this regulatory lever, namely: heightened uncertainty; addressing investor confidence; and sustained price increases.

4. We are submitting this Notice as we consider our evidence supports the concerns of the Commission. Our review found the adoption of the lever will address the expected impacts from technology changes, will re-establish intergenerational equity between current and future customers and, more importantly, will limit the deprivation between new technology users and customers not able access technology options thus resulting in a fairer cost recovery.

5. As part of the 2016 IM Review the Commission introduced a range of amendments to the IMs including a depreciation adjustment factor for EDB DPPs. The depreciation adjustment factor amendment to the DPP IMs allow an EDB to submit a Notice requesting for an adjustment to be applied to their depreciation forecast for setting revenues over a DPP period.

6. The lever was provided on the basis that new energy technologies posed an uncertainty to the financial recovery of network investments. This is because the asset cost recovery profiles defined in the IMs reflect the physical properties of network assets. The depreciation adjustment factor allows for a "one off" depreciation adjustment of up to 15 percent to occur at the setting of a DPP.

7. The Commission has recognised that technology risk may compromise its ability to administer Part 4 of the Act consistent with the principles of net present value (NPV) equals zero (NPV=0) and financial capital maintenance (FCM). These concepts have been fundamental to both ensuring customers are receiving prices exclusive of monopoly rents and for investors to have confidence of recovering their investment and receiving a normal return over the asset's lifetime.

8. A departure from these key Part 4 principles has the potential to unsettle the fabric of economic regulation. Accordingly, Vector considers it important that tools such as the depreciation adjustment factor are appropriately adopted and utilised to minimise the risk of Part 4 being compromised.

9. We demonstrate the impact new technology has already had on the sector by unsettling trends with electricity demand and volumes which had been relied upon by

the sector since mass-market electrification. Our customer analysis of recent trends with new energy technology found a bifurcation of customers between those able to access new energy technologies and those without the means to access. If technology adoption continues along the trends of the last 10 years then users without new technology will be disproportionately contributing to network asset recovery. We also show how using the depreciation adjustment lever can reduce deprivation over the long-run.

10. Vector has incorporated modelling of new technology adoption and customer behaviour through our customer technology scenario model to inform our asset management plan (AMP) under increasing uncertainty. We have departed from aggregate high-level trends for electricity load management and volume forecasting and use more granular bottom-up analysis.

11. This change was necessary as even the early impacts of new technologies have obviated traditional relationships for electricity usage which, up until very recently, had enduring properties. We have used technology scenario customer modelling over a 30-year horizon to measure a range of credible alternatives for new key technology adoption and changing customer behaviour to determine the effects on network load growth, usage and our network response for the Auckland region.

12. We had these scenarios reviewed by Castalia and peer-reviewed by Deloitte to determine their credibility for technology adoption and customer response. We also asked whether any of the scenarios would give rise to the concerns raised by the Commission during the IM review, namely whether future price changes would result in sustained price increases. Castalia developed a simplified building block allowable revenue (BBAR) model with similar characteristics to the Commission's DPP financial model. The Castalia BBAR model assessed the forecast tariff change levels for the different scenarios over a thirty year horizon. Castalia found more than one scenario where intergenerational inequity would occur. Such scenarios are likely to have far greater levels of disparity between highly deprived customers unable to access new technologies and customers able to access new technology options thus increasing the deprivation we are already starting to see within our customer base.

13. Vector also engaged Deloitte to peer-review Vector's scenarios to ensure the Castalia findings were in fact reasonable. Deloitte also reviewed the assumptions and simplifications in the Castalia revenue modelling for their reasonableness to ensure they did not significantly depart from the BBAR approach. Deloitte also independently tested the Castalia model by developing parallel calculations for certain aspects of the Castalia analysis based on the same assumptions to confirm the assumed tariff levels

from Castalia were consistent with Castalia's stated methodology. Given our analysis of energy consumption across customers on the Vector network, we already see deprivation occurring and this analysis by Castalia shows if current energy technology trends continue then greater levels of disparity between customers unable to access new technologies and those able to access new technology options will occur.

14. The forecast price increases from some scenarios are in line with recent experience of technology risk in other jurisdictions. The forecast price changes for some scenarios have similar characteristics to the price increases experienced by customers in QLD and NSW over the 2006-2015 period. The impact of these changes has been a sudden and significant year-on-year increase in electricity prices for customers on these networks. The networks in those jurisdictions significantly increased their regulated asset bases (RABs) for reasons including more stringent quality regulations imposed by their jurisdictional regulations and failing to recognise the change in customer technology and behaviour occurring on their networks.

15. Indeed, in this Notice we show the volume of energy transported over Ausgrid's network (the distribution network for Sydney and surrounding regions) underwent a significant decline over a period of one year and has not recovered the volume since. The resulting price shock was a reason for the Australian Competition and Consumer Commission (ACCC) to review the causes of electricity price increases. The ACCC made the unprecedented recommendation for Ausgrid and other similarly placed distribution and transmission networks to write down (without recovery) the value of their assets. [1] This step would depart from the principles of NPV=0 and FCM which the ACCC had previously settled on when it had responsibility for transmission regulation[2] in the Australian National Electricity Market (NEM) and, more recently, when setting fixed line telecommunications regulation.[3]

16. Given technology risk has increased, Vector considers the adoption of the accelerated depreciation adjustment lever as the first test of the Commission's commitment to NPV=0 and FCM. This will reassure the market that it will continue to adhere to these principles for the foreseeable investment horizon. The 15 percent adjustment was designed as a precautionary intervention expected to have a limited effect but provides

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[1] ACCC, *Restoring electricity affordability and Australia's competitive advantage: Retail electricity pricing inquiry* (June 2018), p. 171

[2] ACCC, *Statement of Principles for the Regulation of Electricity Transmission Revenues* (8 December 2004), p.4

[3] ACCC, *Review of the 1997 Guide to Telecommunications Access Pricing Principles for Fixed Line Services Discussion Paper*, December 2009

an important signal that the regulatory framework will ensure appropriate decisions are adopted to continue to support the expectations of NPV=0 and FCM. This will ensure the underlying principles are not compromised or departed from without serious regard to the consequences of doing so.

17. The inclusion of the depreciation adjustment factor within the DPP IMs was an explicit decision by the Commission to show a commitment of early intervention with an evidential burden commensurate with the "low cost" nature of DPP regulation.

18. In considering the impact of applying the depreciation adjustment lever we first considered our data analytics for our customers to discover whether there was benefit in applying the adjustment. When we considered the issue of deprivation within the Auckland region we found there was indeed a trend over time between energy technology adoption and deprivation. Using the trends for energy technology adoption we found using the accelerated depreciation lever will help limit long-run deprivation in the Auckland region[4]. We also directly engaged with our customers on the issue of technology risk and adoption. Our direct engagement found customers recognised the risk new energy technologies pose for network investment and 68 percent were willing to pay more now to ensure greater intergenerational equity.

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[4] As discussed later in this document.

THE COMMISSION'S REASONING FOR AN ADJUSTMENT FACTOR

19. Vector's Notice for applying a depreciation adjustment factor under clause 4.2.2(5) of the EDB IMs has been guided by the Commission's problem definition and solution for partial capital recovery discussion in the 2016 IM Review.

20. The inclusion of this lever in the regulatory tool kit was driven by a concern about the economic stranding of network investment. Economic stranding was distinguished from physical stranding of assets – i.e. where parts of the distribution system are no longer needed to convey electricity.

21. Our review of the material provided on the depreciation adjustment factor found three guiding considerations for its inclusion in the IMs: heightened uncertainty; addressing investor confidence; and sustained price increases.

22. We address each of the considerations in this Notice and demonstrate why the Notice is consistent with them.

Heightened uncertainty

23. The Commission defined the issue of partial capital recovery in the following terms:

> *The problem: increasing deployment of emerging technologies potentially changes the risk to EDBs' ability to fully recover their invested capital, under existing physical asset lives assumptions set out in the IMs.*[5]

24. Accordingly, the Commission's problem definition recognises there is less certainty around future electricity volume. The take-up of new energy technology enables customers to avoid contributing to distribution system charges either by bypassing the system or mitigating their use of the distribution service.

25. The Commission noted:

> *It is not clear what critical mass of consumer disconnections may need to be to cause economic stranding of networks. It is likely to be different for different networks, and depend on factors like the economic availability of substitutes,*

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[5] Commerce Commission, *Input methodologies review decisions - Topic paper 3: The future impact of emerging technologies in the energy sector* (20 December 2016) at 70

size of the sunk capital base relative to the number of consumers, and local political sensitivity to energy prices.[6]

26. This statement recognises there is no precise point when economic stranding occurs. Instead economic stranding will take effect over time. However, the Commission acknowledges there are circumstances where political sensitivity to energy prices can cause the capital recovery principle of Part 4 to be compromised at a point in time.

Economic stranding is not limited to physical disconnection

27. It is important to recognise that economic stranding is not limited to physical disconnection from the network. Rather, strategies which enable customers to limit their dependence for supply will contribute to economic stranding so long as consumption is the basis of cost recovery i.e. kilowatt hours (kWh).

28. The relationship between electricity usage and customer bills was acknowledged in recent inquiries into electricity prices by the Competition Markets Authority (CMA) in the United Kingdom and the ACCC Inquiry into electricity prices in Australia. Indeed, a key aspect of each of these inquiries was to discover the cause of the price changes for a given level of kWh. For example, the CMA report compared prices per kWh between EU jurisdictions.[7]

29. As evidenced by example in this document, the relationship between technology adoption, consumption, peak-demand and prices will result in intergenerational inequity and contribute to greater deprivation. Such trends may occur without significant levels of disconnection. Applying the accelerated depreciation is one way to limit the effects of intergenerational inequity and deprivation since it ensures a greater proportion of recovery from the widest potential usage and customers. When greater levels of new technology are adopted by customers as being experienced today and forecasted to increase (as shown in our modelling) such disparities are expected to increase. Not using the lever risks concentrating the burden of asset recovery across the customer groups with the highest levels of deprivation, as discussed further in this Notice.

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[6] Ibid, at 77

[7] For example, see Competition and Markets Authority, *Energy Market Investigation: Final Report* (24 June 2016) figures 2.12 (comparing prices across the EU 15 p/kWh) and 2.14 (Domestic electricity supply unit revenue breakdown £/MWh); and Australian Competition and Consumer Commission, *Retail Electricity Pricing Inquiry—Final Report* (June 2018), Figure B (comparing the change in average residential customer effective prices (c/kWh))

Measuring uncertainty for New Zealand

30. During the 2016 IM review the Commission suggested:

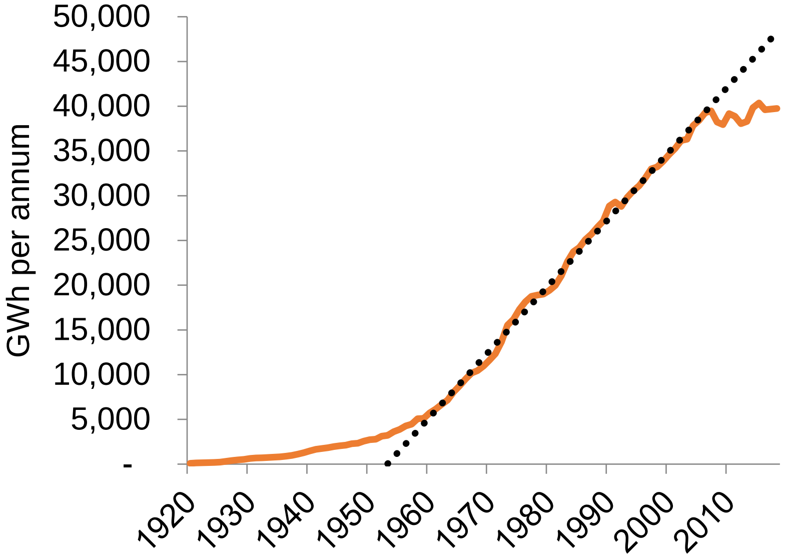
> *The available evidence is inconclusive on whether the risk of partial capital recovery for EDBs' regulated business has increased and, if so, by how much.*[8]

31. We demonstrate there is evidence of increasing risk. There are leading indicators demonstrating the heightened uncertainty caused by technology change for asset management. Indeed, the current environment for asset managers is much more uncertain then when micro-economic reforms were introduced into the electricity sector to corporatize and split vertically integrated power boards.

32. Network asset management had traditionally relied on a stable growing demand for electricity and investment planning and cost recovery has reflected this. Historically, the stability of this trend meant asset planners were not concerned about the risk of asset stranding.

33. Accordingly, discussion about capital programs has typically revolved around the deferral benefit. Indeed, deferral tends to quantify the ability to delay investment to ensure today's customers are not contributing more for investments with greater value for future customers. **Graph 1** below shows annual electricity usage in gigawatt hours for the period of 1920-2018 for New Zealand.

Graph 1: NZ Electricity Gigawatt hours 1920-2018



Source: MBIE Energy in New Zealand and Whiteboard Energy

[8] Ibid at 80

34. The key observation from **Graph 1** is the notable recent deviation from the trend line. Momentary deviations from the trend could be explained by significant shifts in economic performance where aggregate output declines for cyclical reasons such as the global financial crisis. However, the continued deviation in demand from the trend line for the current decade does not coincide with New Zealand's economic output.

35. The adoption of new technology options ranging from LED lights, home insulation, heat pumps to solar, batteries, in-home automation and discretionary switching to alternative energy options has increased uncertainty as the traditional relationship of growing demand and volume can no longer be depended upon. Accordingly, forecasting electricity load and volume is becoming more uncertain and with greater risk for investment planning. Today asset managers cannot depend on growing volume to fund potential augmentation investment. Accordingly, the change to the risk level for investment recovery can be measured by the extent to which electricity volume has deviated in recent years from previously settled relationships.

Addressing investor confidence

36. A key driver for the Commission to allow EDBs to nominate a depreciation adjustment factor was to demonstrate commitment to FCM and NPV=0 for EDB investors.

37. FCM provides an expectation that investment in the regulated service will, *over the life of the asset*, deliver a normal rate of return. Where this expectation is broken an investor cannot be confident an investment in the regulated service is, at least, equivalent to alternative uses for financial capital.

38. Given the increasing technology risk to demand forecasting there is greater risk of network assets being no longer needed or required, to the same extent, as they were in the past.

39. EDB investment covers a range of physical assets to ensure renewals, replacements and system security needs of the system are met to ensure quality is maintained. For example, Vector invests approximately $30 million on concrete poles in any given year. Concrete poles are a core investment of the overhead circuits of the network and ensure that quality meets reliability standards and public safety rules. EDB assets have their physical life defined in Schedule A of the EDB IMs. Schedule A of the EDB IMs deems a concrete pole asset to have a 60-year physical life and a recovery profile reflecting the physical properties of the asset.

40. Where there are concerns that Part 4 regulation will not be set for an expected NPV=0 return then EDB ability to invest to meet the quality specifications of the distribution

system are compromised. In this case, investors cannot be confident their financial capital is expected to be preserved over the life of the investment – given the type of investment necessary has a long-life profile.

41. The ability to apply for accelerated depreciation is described by the Commission as:

> *Allowing EDBs the option of a more rapid time profile of capital recovery is a precautionary measure to address increasing uncertainty regarding the risk of capital recovery.*[9]

42. The lever provides confidence for investors that the expectation of NPV=0 will be adhered to and appropriate steps will be taken to ensure the expectations are maintained for necessary non-discretionary investment. The alternative of breaching the NPV=0 principle was considered by Australia's Chief Scientist Dr Alan Finkel's *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future (the Finkel Review)*. The Finkel Review noted:

> *Compulsory write-downs are problematic. Writing down the asset values would increase creditors' perceptions of risk, resulting in a higher weighted average cost of capital for future projects or refinancing, leading to potentially higher costs for consumers over all.*[10]

43. A working paper from the Centre for Competition and Regulatory Policy at City University London summarised the current prevailing view on economic regulation:

- *There is a general agreement that RABs are an effective commitment device for natural monopoly network elements of infrastructure companies - provided that regulators keep to the spirit as well as wording of the rules;*
- *RABs have maintained a low cost of capital for privately financed infrastructure investment in the areas which they cover - typically much lower than would be paid under project finance contracts (e.g. 5-7% rather than 15% or more);*
- *The key to RAB success is that it provides effective protection against asset stranding…*[11]

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[9] Ibid, Table X1: Summary of changes in relation to this topic

[10] Dr Alan Finkel et al, *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future* (June 2017), p.136

[11] John Stern, Centre for Competition and Regulatory Policy City University London, *The role of the regulatory asset base as an instrument of regulatory commitment (*March 2013), p.10

44. The ACCC also discussed the role of the RAB when transitioning fixed line telecommunications services to a building block methodology for setting access prices. The ACCC noted:

> *The RAB is a mechanism for ensuring the access provider is not over-or-under compensated over the long run. It is essentially an 'amount', which is increased each regulatory period by the amount of any new investment and decreased by the amount of depreciation. Any path of depreciation which sums to the total capital expenditure of the access provider corresponds to a path of earning with a net present value of zero.*[12]

45. Breaching FCM would have significant consequences undermining the integrity of the Part 4 framework and ultimately fail the long-term benefit of consumers test. This is discussed further at para 73 (et seq), where the Notice sets out consistency with section 52A of the Act.

Managing price increases - intergenerational equity and fairness between customers

46. The decision to include a depreciation adjustment factor in the DPP is to have a lever that can mitigate the impact of intergenerational inequity in the form of sustained year-on-year price increases. The Commission noted:

> *In that sense, this is a precautionary measure consistent with the nature of the problem – one of increased uncertainty.*

47. We agree the focus for adjusting depreciation is to ensure intergenerational equity can be maintained between network user across generations as well as between different electricity customers. If the next generation of electricity customers experience sustained price increases they will question the equity for their increased contributions to legacy network assets that are needed less than historically. This will be particularly important for highly deprived customers without the means of accessing new technology options. Such customers will experience the greatest impact from generational price increases. The recent *Electricity Price Review Options Paper* described the issue of energy hardship in the following terms:

[12] ACCC. *Review of 1997 Guide to Telecommunications Access Pricing Principles for Fixed Line Services Discussion Paper December 2009*, p. 23

This problem of energy hardship is serious. Such householders may cut back on their heating, resulting in unacceptable living conditions and significant health costs.

48. The use of the accelerated depreciation adjustment lever is especially relevant where legacy capital recovery risks becoming a significant contributor to higher tariff levels. This will impact highly deprived customers the most. Accordingly, the successful use of the depreciation adjustment factor is to ensure price rebalancing eliminates, or at least reduces, the impact of inequity between users across time and technology adopters.

Energy usage and deprivation

49. Vector has advanced customer technology modelling which enables us to gain insight into the relationship new technology has with deprivation in the Auckland region. In undertaking this modelling, we have divided our residential customers into 10 deciles of deprivation (with one being the least and 10 the highest – which we refer to as our deprivation index).

50. We use a definition of deprivation[13] by ranking several factors such as employment, household income, crime rate, housing benefit, health benefit, education levels and access to public service. Using this concept and our advanced analytics tools we link specific technology registers, New Zealand census and Auckland City Council dwelling information to ascertain trends for energy usage with deprivation.

51. Our analysis of information for the last 10 years found a strong relationship with energy technology adoption and deprivation. Energy volume efficiency improvements for customers with low deprivation has been significant with average energy efficiency improvements of greater than 1.5% per annum. However, customers at the highest levels of deprivation experienced energy efficiency improvements which were much more modest. Accordingly, energy technology adoption is not equal among customers and has created "winners" and "losers".

52. Indeed, our analysis of energy per square metre found dwellings in areas of low deprivation use much less energy per square metre than relatively highly deprived areas of Auckland. **Graph 2** shows the consumption by floor area for all Auckland residential users classified into our index of deprivation.

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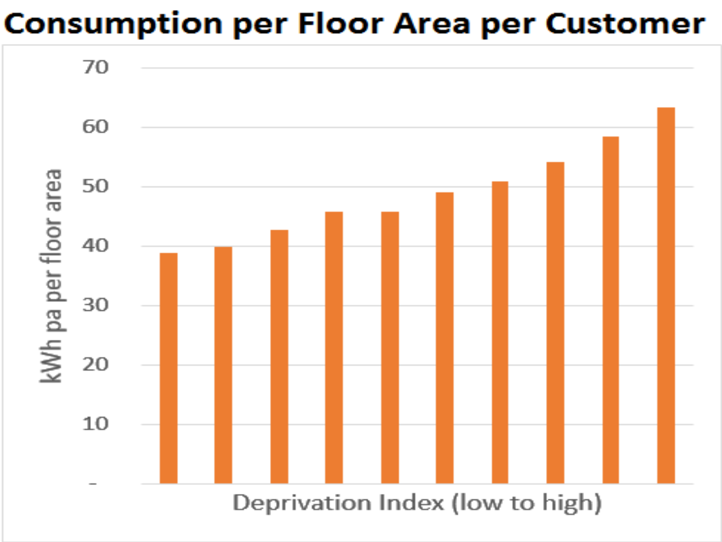
[13] *The University of Auckland: Index of Multiple Deprivation developed by Exeter et al 2017 and licensed by The University of Auckland for re-use under the Creative Commons Attribution 3.0 New Zealand licence.*

Graph 2: Auckland residential energy per floor area by level of deprivation



Source: Vector Customer Model

53. The above **Graph 2** shows energy consumption by floor area for high wealth (low deprivation) areas is 50 percent less than customers with the highest levels of deprivation. This is a significant saving for the adopters of new technology.

54. The 10-year trend for energy efficiency is significant and is the dominant energy trend for the time. The use of the depreciation adjustment lever will reduce the impact of bifurcation of energy users to limit the extent to which deprivation is becoming a feature of revenue recovery. Whilst this trend is discussed in terms of customer usage but it is equally relevant for technology enabling customer network disconnection.

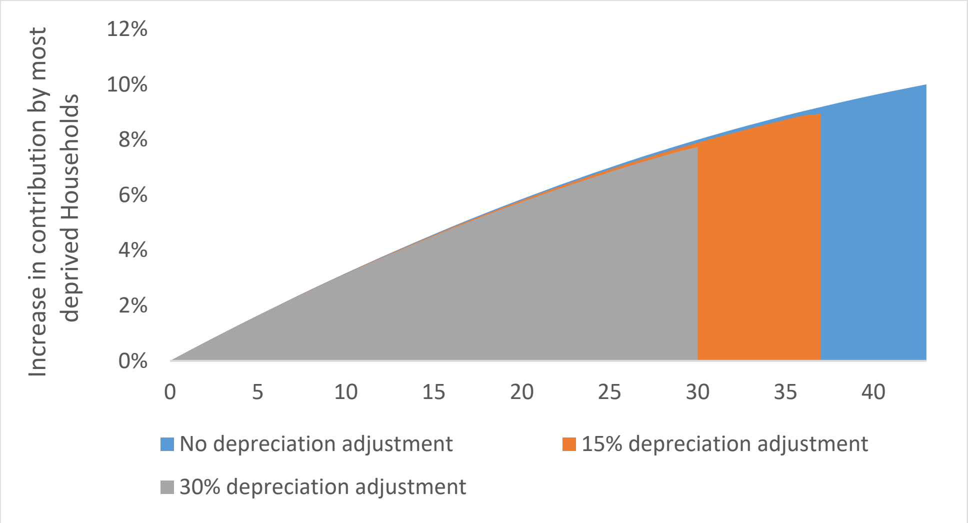
55. We have modelled the impact of using the depreciation adjustment lever at 15 percent or 30 percent for the most deprived Auckland customers (highest percentile of deprivation) versus a scenario where no adjustment is made.

56. In the following example, we use a 10-million-dollar asset and apply the three different recovery profiles. We have assumed the energy efficiency of the highest deprived decile continues at the current rate for Vector's customers and assume an average energy efficiency improvement continues across the other nine deciles.

57. The below graph shows adjusting depreciation will moderate the burden for the lowest users over maintaining the status quo for recovering revenue over the life of the asset.

Graph 3 shows the net present value (NPV) increase to the contribution by the most deprived percentile of customers for the three alternative depreciation profiles. The first profile is based on a standard life of 44 years, the second profile applies an adjustment to this life by 15 percent and the third profile applies a more significant adjustment of 30 percent.

Graph 3: Cumulative year-on-year changes to net present value share of revenue by highest decile of deprived customers based on $10M asset



58. **Graph 3** shows under the standard life of 44 years for the asset the cumulative NPV increase to the share contributed by the most deprived customers (highest decile of deprivation in Auckland) increases to 10 percent over the asset's life. This group's contribution is moderated in the 15 percent depreciation adjustment where their relative increase is just under 9 percent and further moderated by 7.75 percent where a 30 percent adjustment is applied. Accordingly, adopting the last 10 years of consumption information shows adjusting depreciation will modestly limit the future disparity between the adopters of new technology and the parts of the population least able to access new technologies.

Modest and partial solution

59. Managing intergenerational equity was the policy consideration for including the appreciation adjustment in the regulatory tool kit. However, the IMs cap the adjustment factor to 0.85 and limit the application to a "one-off". The Commission note these design features are intended to make the solution purposely modest and partial.

60. This limitation to the tool, apparently designed to limit any immediate price increase, also serves to limit the ability to provide for any significant intergenerational rebalancing.

61. We consider the reasons for adopting a modest and partial solution requires further examination. Indeed, recent history from overseas illustrates the extent to which network regulation forces capital programs to meet non-discretionary regulations around network quality. We discuss this below.

Constraints regulation imposes on investment

62. The Commission opted for a partial and modest solution on the basis that EDBs are best placed to manage the risk of stranding.

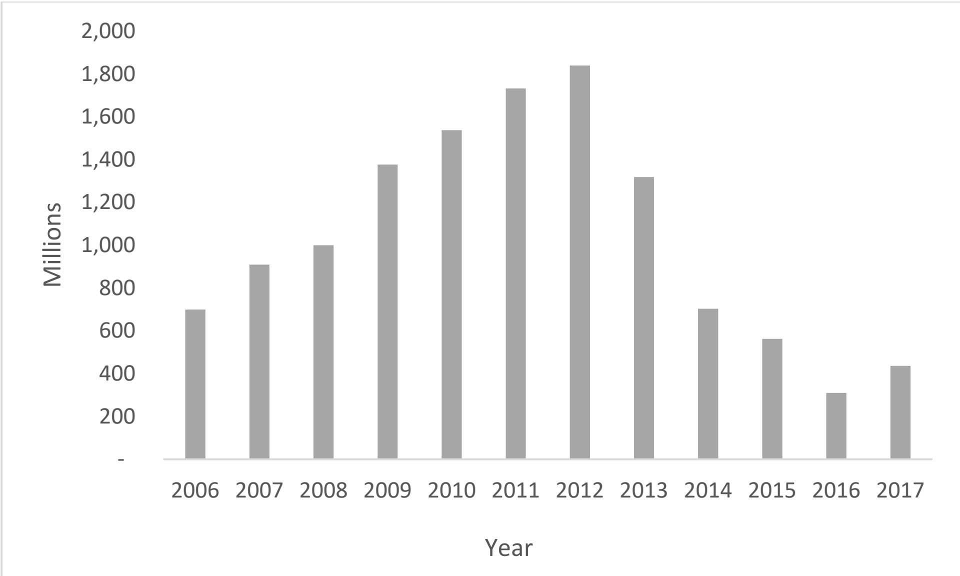
63. We agree EDBs have the responsibility of investing in their network in the manner they consider best discharges their responsibilities for maintaining supply quality and mitigating the risk of asset stranding. However, an important consideration is the specified quality outputs defined by the regulator – currently defined in terms of reliability limits. It is equally important that community expectations around quality are appropriately reflected in DPPs. The need to comply with quality regulations is a significant driver for EDB capital programs. Therefore, incorrectly specified quality regulations will drive capital programs and potentially magnify the risk of asset stranding as tariff levels are adjusted to provide for the higher RAB recovery.

64. If technology demands a departure from the current quality of supply expectations, then regulation should reflect this at the correct time. Failing to modify quality standards when community expectations have changed has the same effect as unnecessarily enhancing quality requirements to exaggerate the community's expectations around quality. This is a key parameter that EDBs cannot control for and is dependent on a responsive regulatory framework.

65. Recent history of EDB regulation in QLD and NSW has shown the consequences of quality standards that were incorrectly specified and did not reflect consumer expectations.

66. In QLD and NSW, more stringent quality standards resulted in capex programs by distribution network service providers (DNSPs) significantly increasing, in part, to meet new reliability criteria. **Graph 4** below shows the capex program for Ausgrid (the distribution network for Sydney and surrounding regions) to meet enhanced reliability settings introduced in 2005.

Graph 4 – Ausgrid capex program 2006-2017



Source: AER Regulatory Information Notice

67. **Graph 4** shows year-on-year increases to Ausgrid's capex program which peaked in 2012 at a level of almost three times the investment undertaken in 2006 The subsequent repeal of the quality regulations by the State government coincided with a significant moderation of capex spending.

68. The Grattan Institute, an independent public policy institution, noted the following impact changes to reliability standards had for EDBs in those jurisdictions:

> *In the mid-2000s, state governments in NSW and Queensland, concerned about potential under-investment in distribution networks, imposed reliability standards on these networks. The standards required network businesses to make significant additional capital investments in the following years. The standards were inefficient and not in the long-term interests of consumers.*[14]

69. In this respect, where quality standards are out-of-step with community expectations then EDBs are subject to either being penalised by the regulatory regime or risk having to commit to investments that may subsequently be deemed unnecessary. This risk has not been modelled but we anticipate it to increase as greater customer technology adoption occurs and should be a consideration for the Commission when applying the adjustment factor. This over-investment is likely to be borne by the customers least able to limit their dependence on the network.

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[14] Grattan Institute, *Down to the wire: A sustainable electricity network for Australia* (March 2018) p.26

REQUIREMENTS OF THE INPUT METHODOLOGIES FOR APPLYING FOR AN ADJUSTMENT FACTOR

70. Clause 4.2.2(5) of the IMs sets out the conditions an EDB must meet for the Commission to apply an adjustment factor.

71. Per clause 4.2.2(5)(a), the EDB's Notice must:

    i. Propose an adjustment factor to be applied by the Commission of not lower than 0.85, nor higher than 1;

    ii. Explain why applying for an adjust factor of the level proposed is consistent with section 52A of the Act; and

    iii. Describe any consultation it has undertaken with interested persons on the proposed adjustment factor and, if relevant, explain how it has considered any issues raised.

72. For completeness, 4.2.2(5)(b) prohibits the Commission from applying an adjustment factor if it has previously applied an adjustment factor to that EDB under clause 4.2.2(4).

Consistency with section 52A

73. To address the criteria specified in clause 4.2.2(5)(a)(ii) of the IMs, this section of the Notice explains why applying the adjustment factor is consistent with s52A of the Act.

74. In summary:

    - The expectation of NPV=0 and FCM delivers prices exclusive of monopoly rents and ensures efficient investment over time.
    - However, there is increasing technology risk as customers adopt new technologies which poses a new risk for EDBs to make efficient non-discretionary investment in long-life physical assets.
    - Applying the adjustment factor will provide confidence to investors that the regulatory framework will, over time, still adhere to the principles of NPV=0 and FCM for such investment to continue to efficiently occur.

75. The evidence in this Notice illustrates the growing technology risk will create inter-generational equity and fairness problems between users which will create the circumstances where commitment to FCM will be tested.

76. The important role NPV=0 and FCM principles in Part 4 regulation has been discussed extensively by the Commission and the High Court.

77. The High Court noted in *Wellington International Airport et al v Commerce Commission*:

> *Central to the Commission's approach to Part 4 regulation and to regulatory control of natural monopolies more generally are the related concepts of Net Present Value (NPV) = 0 (NPV=0) and financial capital maintenance (FCM).* [15]

78. The Commission has defined FCM in the following terms:

> *Over the lifetime of its assets, a typically efficient firm in a workably competitive market would expect ex-ante to earn at least a normal rate of return (i.e. its risk-adjusted cost of capital).*[16]

79. The High Court noted:

> *FCM is seen as an outcome consistent with the making of a normal but not excessive profits and is therefore an outcome that will also efficiently promote the purpose of, and outcomes sought by, s 52A(1).*[17]

80. Through the NPV=0 and FCM principles investors expect they will recover their investment over the life of the asset (i.e. the RAB). Indeed, the responsibility of managing physical assets to specific quality standards means the network investment for EDBs is a non-discretionary capital commitment. NPV=0 and FCM has ensured the costs of financing physical network needs is reasonably economical.

81. There is a need to provide greater certainty that FCM will continue to be targeted by regulation even where volume decline or network disconnections are occurring. Otherwise, the stability provided by Part 4 regulation will be undermined. This feature of regulation relying on the of RAB beyond regulatory control periods also reflects the international use of the concept for delivering certainty with the economic regulation of networks. The following passage describes the UK's experience in network regulation:

> *There is no mention of RABs in UK primary legislation. The current British RABs evolved following the privatisation of the UK network infrastructure*

[15] [2013] NZHC 3289 at [256]

[16] Commerce Commission, *EDBs-GPBs Reasons Paper* at 2.6.28

[17] [2013] NZHC 3289 at [263]

industries as a regulatory device to reassure investors – and hence to keep down the cost of capital. They are primarily intended as protection against actions by regulators or governments that could lead to asset stranding. However, precisely because they have no explicit legislative support, their reliability as a commitment device depend crucially on regulators keeping to the spirit as well as the letter of RAB commitments.[18]

82. The Commission recently itself indicated it cannot provide an enduring commitment to FCM and NPV=0 for Part 4 regulation. It noted:

> *We acknowledge that there may come a time when, due to the development of emerging technologies and other circumstances, the key economic principles no longer assist us in promoting the s52A purpose and the application of these principles is no longer sustainable.*[19]

83. Vector's scenario modelling illustrates the rate at which this technology risk is increasing and has moved significantly from historical expectations (as demonstrated by Graph 1). The modelling shows multiple scenarios where partial capital recovery is likely. Accordingly, there is cause for the Commission to re-affirm its commitment to NPV=0 and FCM by applying the 0.85 adjustment factor.

84. Accordingly, Vector considers our Notice is in the long-term benefit of end-users as it meets the limbs of section 52A of the Act, namely:

a) Have incentives to innovate and to invest, including in replacement, upgraded and new assets

- As discussed above, applying the depreciation adjustment lever will provide confidence for EDB investors to make investments in long-life physical assets with the expectation that NPV=0 and FCM will be adhered to. Otherwise replacing long-life physical structures cannot be financed economically if this expectation does not hold. This is especially important where greater technology adoption is anticipated to compromise capital recovery.

b) Have incentives to improve efficiency and provide services at a quality that reflects consumer demands

[18] Jon Stern, *Role of the Regulatory Asset Base as an Instrument of Regulatory Commitment*, March 2013

[19] Commerce Commission, *Input methodologies review decisions: Framework for the IM review* (20 December 2016) at 152

- The Notice notes a significant driver for capital programs is the prescribed regulatory quality standards applied onto EDBs. Accordingly, it is important for these standards to reflect customer expectations and for investment to ensure standards are indeed a fair reflection of customer expectations. EDBs are at risk of quality regulations becoming out-of-step with customer expectations especially in an era of energy technology change. Therefore, investing to meet quality regulations does increase the risk for EDBs, as has been shown from quality regulations applied in NSW and QLD, discussed later in this notice, where reliability standards were found to be out-of-step with customer expectations.

c) Share with consumers the benefits of efficiency gains in the supply of the regulated goods or service, including through lower prices

- The use of the depreciation adjustment lever is NPV neutral, however we demonstrate in this Notice the application of the lever will deliver intergenerational equity for customers at a time when technology adoption may cause price increase for customers and so will moderate any price increase from technology scenarios where this occurs. The use of the lever will also deliver greater fairness between customers as deprivation from new technology adoption where current technology trends continue is expected to exacerbate over time. Therefore, the lever will moderate the extent of any bifurcation between technology adopters and customers unable to access the new options.

d) Are limited in their ability to extract excessive profits

- As noted above, the use of the depreciation adjustment lever is still consistent with the Part 4 concept of NPV=0 which ensures EDBs can earn no more than a normal return on their investment. Rather the use of the lever will ensure greater inter-generational equity and fairness across customers to moderate the impact technology change is expected to have on network cost recovery.

Level of evidence for assessment

85. At the time of making the decision for the adjustment factor, the Commission opined on the level of evidence it would require for assessing an application to shorten asset lives. The 15 percent limitation was a relevant consideration for the evidentiary burden for assessing the validity of a Notice. The Commission noted:

The level of evidence that we will likely require to assess an application to shorten assets by significantly more than 15 percent will be higher.[20]

86. In this respect, the Commission considered an uncapped Notice undermined the "low cost" nature of DPPs. Further, the Commission indicated an uncapped notice could be considered within a customised price path (CPP) which offers the opportunity for an alternative depreciation profile. The Commission described applying for a CPP to mitigate asset stranding risk as the "more encompassing" option.[21]

87. Accordingly, the threshold for determining the validity of an adjustment factor Notice is within the same low-cost lens for decisions relevant to setting the DPP.

Vector customer technology scenario model

88. In this Notice, we have considered the issues raised in the Commission's Final IMs Reasons Paper and have sought to forecast the impact of the technology risk and how such risk will impact prices over time for customers and groups of customers and the resultant risk of increasing deprivation.

89. Given the technology influences impacting the energy sector, Vector has departed from energy and load forecasting approaches that relied on previously steady aggregate forecasts of electricity demand.

90. Vector considers responsible asset management needs to consider these influences on load and volume as part of the investment planning process. To this end, Vector has undertaken a significant shift in our asset planning to use multiple scenario planning as a basis for estimating changes to load growth and usage.

Energy demand and volume scenario planning

91. Vector has developed five main technology scenarios which are used extensively in our business and form an integral part of our AMP testing. All scenarios are plausible depictions of future developments and as a group represent the range of future uncertainty. The scenarios forecast the adoption of key technology trends and customer behaviour of these technologies, namely:

    a) Energy efficiency: capturing a range of technology efficiency overtime such as more efficient technology (at a residential level household appliances), light

[20] Commerce Commission, *Input Methodologies review decisions - Topic paper 3: The future impact of emerging technologies* (20 December 2016) at 94.1

[21] Ibid at 95

emitting diode (LED) lighting, thermal efficiency including insulation and building materials, and commercial and industrial process improvements (including fuel switching);

b) Distributed generation (DG): such as capturing the growth in solar photo-voltaic (PV) adoption;

c) Storage: capturing the growth in local battery storage such as lithium-ion;

d) Electric vehicle (EV) penetration of the vehicle fleet; and

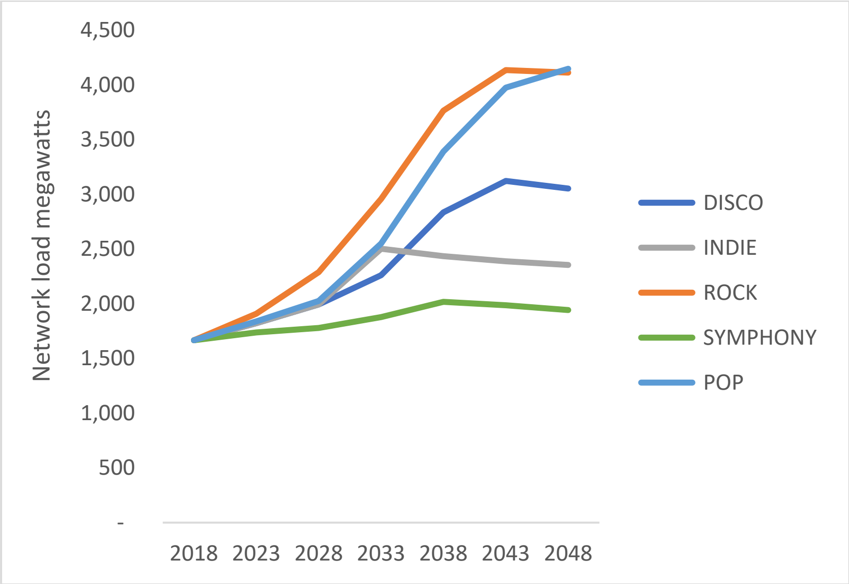
e) Disconnections including step changes to connections growth.

92. These technology scenarios endeavour to capture the likely possible trends for Auckland electricity users. The five scenarios of “Rock”, “Pop”, “Symphony”, “Indie” and “Disco” show impacts on the network and customer behavioural trends resulting from technology adoption and usage. The scenarios also capture different network responses to manage the technology change. The network response is also relevant for managing future load growth and influential for encouraging further technology adoption.

93. In devising our five technology scenarios Vector has used inputs from a range of sources and trends. These include manufacturer forecasts, materials costs, population statistics, international comparisons and consumer trends. Whilst providing a spread of possible technology and network response paths, the scenarios do not consider extremities – i.e. more speculative technologies.

94. The scenario planning output is a range of load and usage forecasts over time. The scenarios are mapped across Vector’s network and show different possible volume and peak demand at a local and total network level over a 30-year period. **Graph 5** below provides a thirty year forecast of total network load growth expected over the different scenarios.

Graph 5: Forecast total Vector network maximum demand change across five technology scenarios



Source: Vector Customer Technology Scenario Modelling

Vector's 2019 AMP Scenario

95. Vector considers the "Symphony" scenario as our preferred circumstances for the future. We consider this scenario aligns with our ambition of being able to coordinate and manage the technology resources on the network using developing techniques and technology for active demand management. The "Symphony" scenario will allow the network to coordinate and manage issues such as growth and voltage management by seamlessly using customer technology to help address such network needs and avoid growing peak demand.

96. This scenario will give rise to very moderate price increases over the modelled time-frame. The scenario depends on our right to undertake active management not being fettered. Accordingly, the risks for a "Symphony'" future are real and apparent. The other scenarios of "Rock", "Indie" and "Disco" all have valid traits and must be considered potential future scenarios and do give rise to greater price increases and where capital recovery could be compromised.

Review of Vector technology scenarios and forecasting price-shocks

97. We have had our scenarios reviewed by Castalia to consider their reasonableness. The review considered the logic underpinning the Vector scenarios to determine whether they are supported by available information on inputs and have internally consistent assumptions.

98. The review also considered whether the unfolding of the scenarios over the forecast period is anticipated to result in significant year on year price changes for customers. A simplified price path BBAR financial model mirroring the Commission's DPP model with some simplified assumptions was used to ascertain changes to the price-level. The inputs to the model included expenditure forecasts from Vector's 2018 AMP with high level assumptions adopted to project forecasts over the 30-year period. For each scenario, an imputed megawatt hour rate (MWh) for price for each year over the 30-year period was calculated to forecast the year-on-year price change.

99. The review found that three scenarios produced significant year-on-year price increases for customers. The price rebalancing by accelerating depreciation would provide some reprieve to the sustained price increases expected by customers in some scenarios.

100. In these scenarios, the price increases have parallels to the price increases experienced in QLD and NSW (discussed later in this submission). The QLD and NSW sustained year-on-year significant price increases from assets commissioned to meet over-specified quality regulations and unforeseen changes in consumption.

101. Importantly, the review found the magnitude of the expected sustained price will not be adequately rebalanced by the depreciation adjustment factor capped at a maximum of 15 percent.

Peer-review

102. Vector also engaged Deloitte to peer-review of Vector's technology scenarios to validate whether the original opinion of the forecasts was in fact reasonable. The peer-review also considered Vector's approach and inputs and found the forecasts to be consistent with other technology scenarios undertaken to forecast load and volume growth.

103. The peer-review also considered whether the forecast prices for the technology adoption scenarios were reasonable based on Vector's 2018 AMP expenditure forecasts. Deloitte also reviewed the assumptions and simplifications in the Castalia revenue modelling for their reasonableness to ensure they did not significantly depart from the BBAR approach. Deloitte also independently tested the Castalia model by developing parallel calculations for certain aspects of the Castalia analysis based on the same assumption set to confirm the assumed tariff levels from Castalia were consistent with Castalia's stated methodology.

Customer consultation

104. To address the criteria specified in clause 4.2.2(5)(a)(iii) of the IMs, this section describes consultation on the adjustment factor undertaken by Vector.

105. Vector has discussed the issue of network investment and technology stranding risk with customers. This is because end-users contribute to the recovery of network assets over time (either with forward or back-ended recovery). However, the topic of asset stranding risk is not a simple concept to discuss with customers and solicit feedback on.

106. Vector has a standing customer advisory board (CAB) which we created in early 2016 to provide a customer "voice" and feedback on initiatives being undertaken by the business. Examples of major projects Vector has discussed with our CAB include our AMPs for our reticulated gas network and electricity networks, storm response reviews and pricing changes. The CAB is purposely diverse in its membership so a range of views from the Auckland community are represented.[22] On 21 March 2018, we raised the topic of the Commission's depreciation adjustment factor with the CAB and discussed the reasonableness of Vector submitting a Notice in accordance with the IMs. The CAB recognised the merits of the technology risk to capital recovery and acknowledged the Vector case for lodging a Notice.

107. Vector also undertook direct customer engagement via customer survey. This work sought to obtain customer feedback on key propositions underpinning the Commission's decision for applying a depreciation adjustment factor. We consulted with our customers to determine their view on whether:

    a) New technology was creating more uncertainty for future demand for networks and if they agreed this was increasing the risk for network investment; and

    b) They would be prepared to pay more for their electricity network now to support the intergenerational equity for networks.

108. We designed a 10-15-minute online feedback survey and used interactive tools to explain the difficult concepts of technology risk, asset stranding and intergenerational equity. We received over five hundred responses to the survey from a range of customers with varying compositions of electricity bill size comparable to customers on Vector's network. We sought to ensure responses to the survey reflected a cross-

[22] Our CAB membership includes manufacturers association, local board representatives, an electricity retailer, a university lecturer, a property developer and electrical trade business operators

section of views across demographics of residential users to ensure the feedback was indicative of the Auckland population.

109. Our survey focussed on the residential customer segment as this group is by far the largest demographic on Vector's network representing over 85 percent of ICPs. The results of our survey found that 66 percent of respondents agreed that investing in networks is now riskier than before. Most importantly, 68 percent of respondents were prepared to pay more for the network today to avoid greater intergenerational inequity

110. As discussed above, given the complexity of this concept, we rely much more on our data analytics function to provide key insights into behavioural trends of customers and a robust foundation upon which to forecast technology change and impact. Our analysis of customer deprivation shows there is a real risk of deprived customers disproportionately contributing to network costs over future years in the absence of the rebalancing enabled by the depreciation adjustment lever.

RECENT LEARNINGS FROM EXCESSIVE REGULATORY SETTINGS AND REALISED TECHNOLOGY RISK AND SUSTAINED PRICE INCREASES

111. The recent significant departures from settled assumptions in New Zealand energy consumption have also occurred in the Australian national electricity market (NEM). The Finkel Report discussed the inability of Australian electricity forecasters such as the Australian Energy Market Operator (AEMO) to predict the recent change in direction for electricity demand. The Finkel Report noted:

> *Electricity forecasters did not anticipate the structural shift in electricity demand that would occur as a result of increased penetration of rooftop solar photovoltaic, changing industrial consumption, consumers' responses to rising electricity prices, energy efficiency initiatives, and changes to the economic environment. Further, it took several years to recognise that the changes in actual demand were part of a structural shift.*[23]

112. For example, AEMO's 2004 electricity statement of opportunities (ESOO) supposed electricity usage in the NEM would exceed 200 terawatt hours (TWh) by 2010. Eight years after the forecast date, the volume of electricity in the NEM has not reached this

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[23] Dr Alan Finkel et al, *Independent Review into the Future Security of the National Electricity Market: Blueprint for the Future* (June 2017), p.134

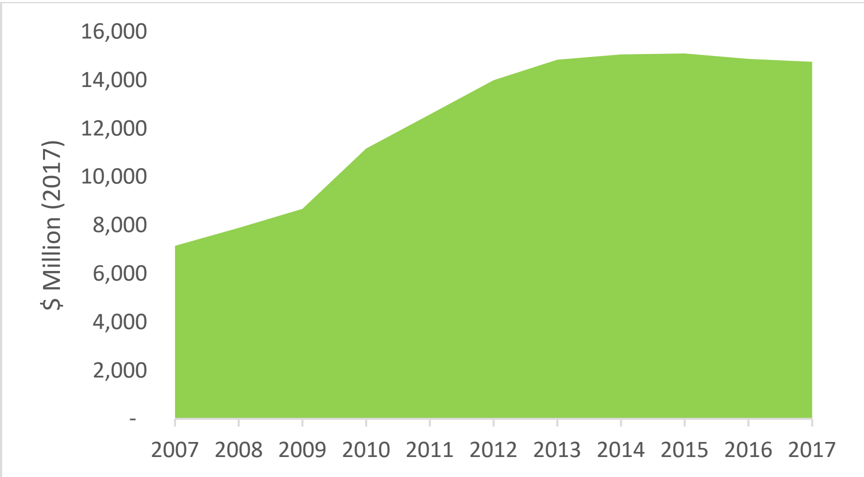
level. Rather, in subsequent years TWh energy in the NEM has declined and failed to reach the TWh recorded in 2004.

The consequences of forecasting errors and imprecise reliability settings - Ausgrid

113. As discussed earlier, changes to quality settings required Ausgrid to significantly increase its capital program to meet new quality requirements set by their jurisdictional regulator. The other key aspect of Ausgrid's capital program was its forecast of maximum demand to exceed 6,700 MW during its 2009-14 regulatory period. History shows demand failing to meet this peak demand by some margin (maximum demand failed to exceed 5,500 MW).

114. Nonetheless, the Australian Energy Regulator (AER) regulatory determination[24] approved an augmentation for the new anticipated maximum demand level. The more rigorous quality requirements and inaccurate maximum demand forecasts were responsible for Ausgrid's significant capex program shown in Graph 2 (on page 15 of this submission). Ausgrid's capex program has significantly increased the value of Ausgid's RAB. **Graph 6** shows the changes in Ausgrid's RAB over a 10-year period.

Graph 6: Ausgrid NSW Distribution Network Service Provider RAB



Source: AER Regulatory Investment Notices (RINS) 2017

115. **Graph 6** above shows Ausgrid's RAB more than doubling in value from approximately $6.4 billion in value in 2007 to $14.7 billion in 2017. The cost recovery of the legacy investment program has been recognised by the ACCC Price Inquiry as a significant contributing factor to recent electricity price increases for Ausgrid's 1.7 million customers.

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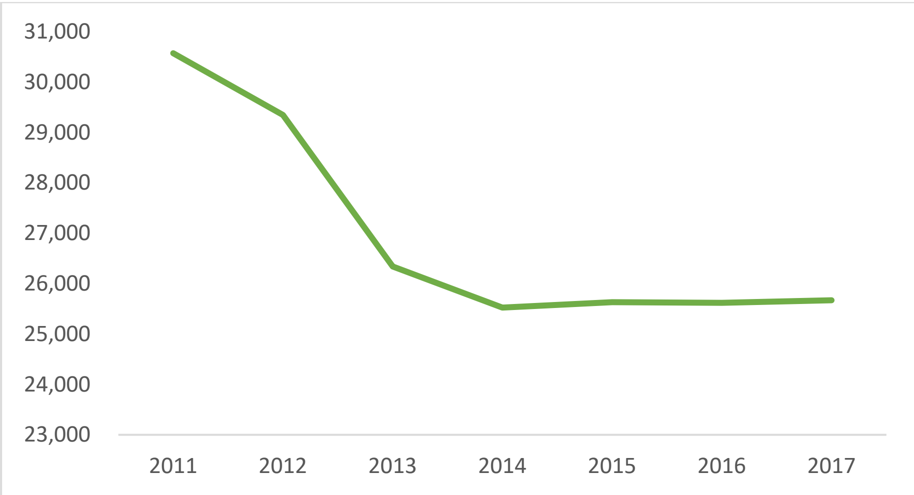
[24] Australian Energy Regulation, *Energy Australia (NSW) Determination 2009-10 to 2013-14* (28 April 2009)

116. More importantly, Ausgrid's investment program occurred at a time when electricity consumption in Sydney and its surrounding regions suddenly and significantly declined which exacerbated the consequences of the growing RAB. Indeed, had usage continued to grow as forecasted by AEMO and others, then the magnitude of the Ausgrid investment program would have been less significant on customers. **Graph 7** shows the change in energy delivered for Ausgrid's network for the period of 2011-2017.

Graph 7: Annual energy delivered GWh Ausgrid network 2011-2017



Source: AER RINS 2017

117. **Graph 7** shows the sudden and significant structural change to energy delivered volumes on the Ausgrid network occurring over a compressed timeframe. The cumulative change from 2011 to 2013 was a 17 percent decline in usage over three years. The one year energy delivered between 2012 and 2013 was a 10 percent decline. Energy delivered over the Ausgrid network has remained at this lower level ever since.

118. The magnitude of the Ausgrid forecast errors for both load growth and structural change in volumes over a 10-year period has led to the ACCC taking the unprecedented step of recommending a violation of the NPV=0 and FCM principles.

NOTICE SUMMARY

119. Our customer data analytics shows how customer technology adoption can exacerbate deprivation between the technology adopters and customers unable to access new technologies. Adjusting depreciation assists with reducing the impact of

the bifurcation of customers by ensuring the widest group of customers and usage contributes to revenue recovery.

120. In addition, our demand forecast modelling provides a reasonable foundation to measure technology risk and how this can contribute to partial capital recovery through sustained price increases for customers. More importantly, the intergenerational impact of sustained price increases will affect highly deprived customers the most.

121. The customer technology scenarios are rigorously developed and are used extensively within Vector's asset planning program at a granular level for substation load planning. Indeed, Vector's AMPs now explicitly rely on our technology scenarios to inform our network investment programs.

122. The Vector technology scenarios have been reviewed and peer-reviewed to determine the robustness of the forecasts and input assumptions. The review and peer-review of the scenarios found the forecasts to be reasonable and in line with other industry forecasts of technology impacts. The review also found the assumed changes to price levels in some of the scenarios would result in sustained price increases for customers giving rise to partial capital recovery. This is especially the case where Vector's preference for managing peak demand and long-term prices involves enhancing capability for active demand management. We note there are regulatory challenges for our preferred future to take effect so the other future scenarios where sustained price increases occur must be seriously contemplated.

123. Our technology and price level analysis do not directly consider the impact miss-specified quality standards may contribute to unnecessary sustained price increases. We note this to be an emerging problem from technology risk. There will be a point in time where customer expectations for network reliability and resilience will change. Given network quality regulations are a significant driver for investment, any incorrectly defined specification will exacerbate the risk of asset stranding. This is evident from the recent history of QLD and NSW networks where enhanced quality specifications contributed to significant investment programs that are now retrospectively considered excessive and out-of-step with customer expectations. This risk will be amplified as technology risk grows and cannot be controlled by EDBs. We cannot model regulatory quality standards. However, we have shown where incorrectly specified quality standards have contributed to sustained price increases for customers.

124. In line with the requirements of a valid Notice, Vector has engaged with our customers on this technical topic and sought to reflect their constructive insights into the technology risk impacting the sector. Our engagement with customers found they

recognised technology risk to network investment is increasing and supported the principle of delivering intergenerational equity. These issues are directly relevant for application of the depreciation adjustment lever.

125. Applying an adjustment factor is consistent with s52A of the Act, as it will provide confidence that the regulatory framework still adheres to the principles of NPV=0 and FCM. This is necessary for EDBs to have incentives to invest efficiently (in line with s52A(1)(a) and (b)) thereby promoting the long-term benefit of consumers as per s52A.

126. Accordingly, based on this material we request the Commission apply the 0.85 depreciation adjustment factor for Vector when determining DPP revenues for the DPP3 reset. The material submitted in this Notice discharges the requirements for the Commission to decide within the “low cost” principles of the DPP and the precautionary design of the tool.