DRAFT DECISION

CitiPower
Distribution determination
2021 to 2026

Attachment 5
Capital expenditure

September 2020

AUSTRALIAN ENERGY REGULATOR

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Note

This attachment forms part of the AER's draft decision on the distribution determination that will apply to CitiPower for the 2021–26 regulatory control period. It should be read with all other parts of the draft decision.

The draft decision includes the following attachments:

Overview

Attachment 1 – Annual revenue requirement

Attachment 2 – Regulatory asset base

Attachment 3 – Rate of return

Attachment 4 – Regulatory depreciation

Attachment 5 – Capital expenditure

Attachment 6 – Operating expenditure

Attachment 7 – Corporate income tax

Attachment 8 – Efficiency benefit sharing scheme

Attachment 9 – Capital expenditure sharing scheme

Attachment 10 – Service target performance incentive scheme

Attachment 11 – Demand management incentive scheme and demand management innovation allowance mechanism

Attachment 12 – Not applicable for this distributor

Attachment 13 – Classification of services

Attachment 14 – Control mechanisms

Attachment 15 – Pass through events

Attachment 16 – Alternative control services

Attachment 17 – Negotiated services framework and criteria

Attachment 18 – Connection policy

Attachment 19 – Tariff structure statement

Attachment A – Victorian f-factor incentive scheme

Contents

5 Capital expenditure

Capital expenditure (capex) refers to the money required to build, maintain or improve the physical assets needed to provide standard control services (SCS). Generally, these assets have long lives and a distributor will recover capex from customers over several regulatory control periods. A distributor's capex forecast contributes to the return of and return on capital building blocks that form part of its total revenue requirement.

Under the regulatory framework, a distributor must include a total forecast capex that it considers is required to meet or manage expected demand, comply with all applicable regulations, and to maintain the safety, reliability, quality and security of its network (the capex objectives).[1]

We must decide whether or not we are satisfied that this forecast reasonably reflects prudent and efficient costs and a realistic expectation of future demand and cost inputs (the capex criteria).[2] We must make our decision in a manner that will, or is likely to, deliver efficient outcomes that benefit consumers in the long term (as required under the National Electricity Objective (NEO)).[3]

The *AER capital expenditure assessment outline* explains our and distributors' obligations under the National Electricity Law and Rules (NEL and NER) in more detail.[4] It also describes the techniques we use to assess a distributor's capex proposal against the capex criteria and objectives. Appendix A outlines further detailed analysis of our draft decision.

Total capex framework

We analyse and assess capex drivers, programs and projects to inform our view on a total capex forecast. However, we do not determine forecasts for individual capex drivers or determine which programs or projects a distributor should or should not undertake. This is consistent with our ex-ante incentive-based regulatory framework and is often referred to as the 'capex bucket'.

Once the ex-ante capex forecast is established, there is an incentive for distributors to provide services at the lowest possible cost, because the actual costs of providing services will determine their returns in the short term. If distributors reduce their costs, the savings are shared with consumers in future regulatory control periods. This incentive-based framework recognises that distributors should have the flexibility to prioritise their capex program given their circumstances and due to changes in information and technology.

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1 NER, cl. 6.5.7(a).
2 NER, cl. 6.5.7(c).
3 NEL, ss. 7, 16(1)(a).
4 AER, *Capex assessment outline for electricity distribution determinations,* February 2020.

Distributors may need to undertake programs or projects that they did not anticipate during the reset. Distributors also may not need to complete some of the programs or projects proposed if circumstances change. We consider a prudent and efficient distributor would consider the changing environment throughout the regulatory control period and make decisions accordingly.

Importantly, our decision on total capex does not limit a distributor's actual spending. We set the forecast at a level where the distributor has a reasonable opportunity to recover its efficient costs. As noted previously, distributors may spend more or less than our forecast in response to unanticipated changes.

5.1 Draft decision

We do not accept CitiPower's capex forecast of $799.7 million.[5] We are not satisfied that its total net capex forecast reasonably reflects the capex criteria. Our substitute estimate of $567.4 million is 29 per cent below CitiPower's initial proposal. We are satisfied that our substitute estimate reasonably reflects the capex criteria. Table 5.1 outlines our draft decision.

Table 5.1 Draft decision on CitiPower's total net capex forecast ($ million, 2020–21)

	2021–22	2022–23	2023–24	2024–25	2025–26	Total
CitiPower's initial proposal	178.4	169.2	184.0	171.7	143.7	847.0
Forecast assessed	168.7	159.7	174.6	162.3	134.5	799.7
AER draft decision	123.7	120.02	116.9	107.6	99.1	567.4
Difference ($)	-45.0	-39.7	-57.7	-54.7	-35.3	-232.3
Percentage difference (%)	-27	-25	-33	-34	-26	-29

Source: CitiPower's capex model,[6] subsequent information request responses and AER analysis.

Note: Numbers may not sum due to rounding.

5.2 CitiPower's initial proposal

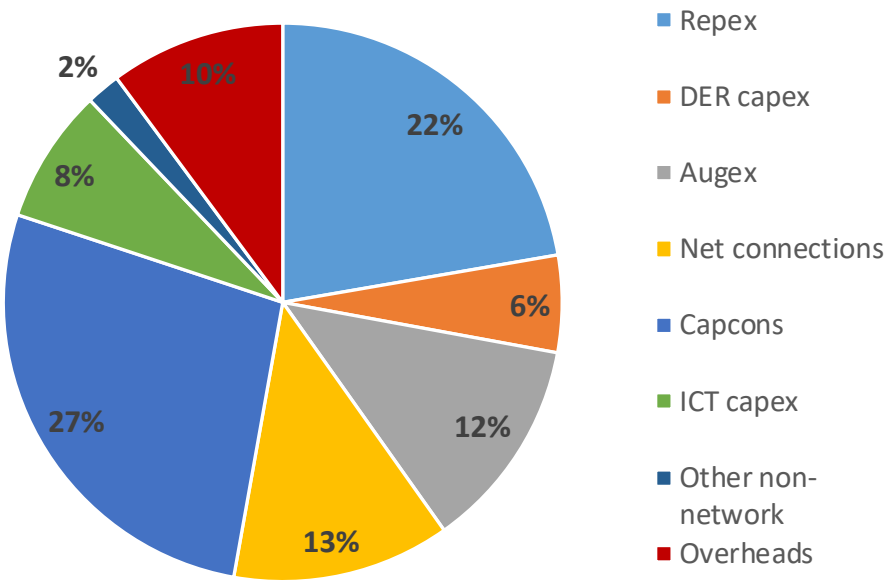
CitiPower's capex forecast for the 2021–26 regulatory control period is $799.7 million. This is 42 per cent higher than its actual capex of $563.7 million over the current

[5] The number is lower than initially proposed as it takes into account the impact of new information, such as withdrawal of environmental repex and the shift of some expenditure from operating expenditure (opex) to capex. All dollar amounts are presented in real $2020–21 unless otherwise stated.

[6] CitiPower initial capex model did not reconcile with its initial post-tax revenue model (PTRM). Our draft decision ensures that the capex outputs reconciles with the PTRM.

regulatory control period.[7] Figure 5.1 outlines its initial capex forecast by capex driver. Figure 5.2 outlines CitiPower's historical capex performance against its initial proposal.

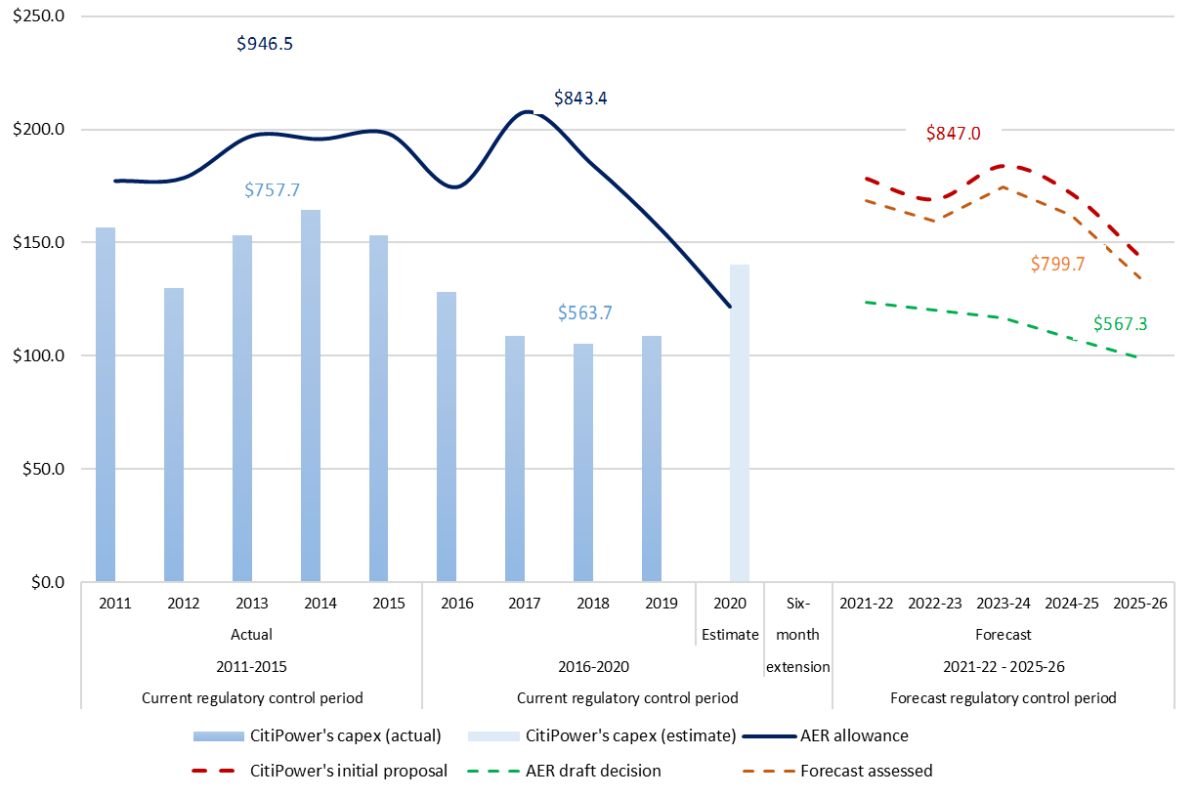
Figure 5.1 CitiPower's initial total gross capex forecast



Source: CitiPower's initial proposal and AER analysis.

[7] In this attachment we compare forecast capex with actual capex in the current regulatory control period; i.e. calendar year 2016 to 2019 pro-rated to five years. The impact of the COVID-19 pandemic and the derivation of calendar year 2020 estimate as the average of two financial year estimates creates uncertainty regarding the validity of the estimate.

Figure 5.2 CitiPower's historical vs forecast capex snapshot ($ million, 2020–21)



Source: CitiPower's initial proposal and AER analysis. The capex figures reported refer to five-year totals over a regulatory control period. The 2020 estimate has been included in this chart for indicative purposes. We have not used this estimate in our trend comparison. Forecast assessed takes into account CitiPower's updates to its capex forecast, as well as the shift of expenditure from opex to capex.

5.3 Reasons for draft decision

We are not satisfied that CitiPower's total capex forecast reasonably reflects the capex criteria. We are therefore required to set out a substitute estimate.[8] Our substitute estimate is in line with its current regulatory control period spend. We are satisfied that our substitute estimate represents a total capex forecast that reasonably reflects the capex criteria and forms part of an overall distribution determination that contributes to achieving the NEO to the greatest degree.

In coming to our draft decision, we asked CitiPower many questions across multiple information requests. CitiPower was very receptive to our questions and in most cases provided useful responses within the requested timeframes. We acknowledge that our questions are likely to have presented additional resourcing challenges, particularly due to COVID-19, and appreciate CitiPower's cooperation and assistance.

[8] NER, cl. 6.12.1(3)(ii).

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. In this case, we are not satisfied that CitiPower's forecast capex is prudent and efficient under both reviews.

From a top-down perspective, several metrics demonstrate that CitiPower's forecast is not prudent and efficient:

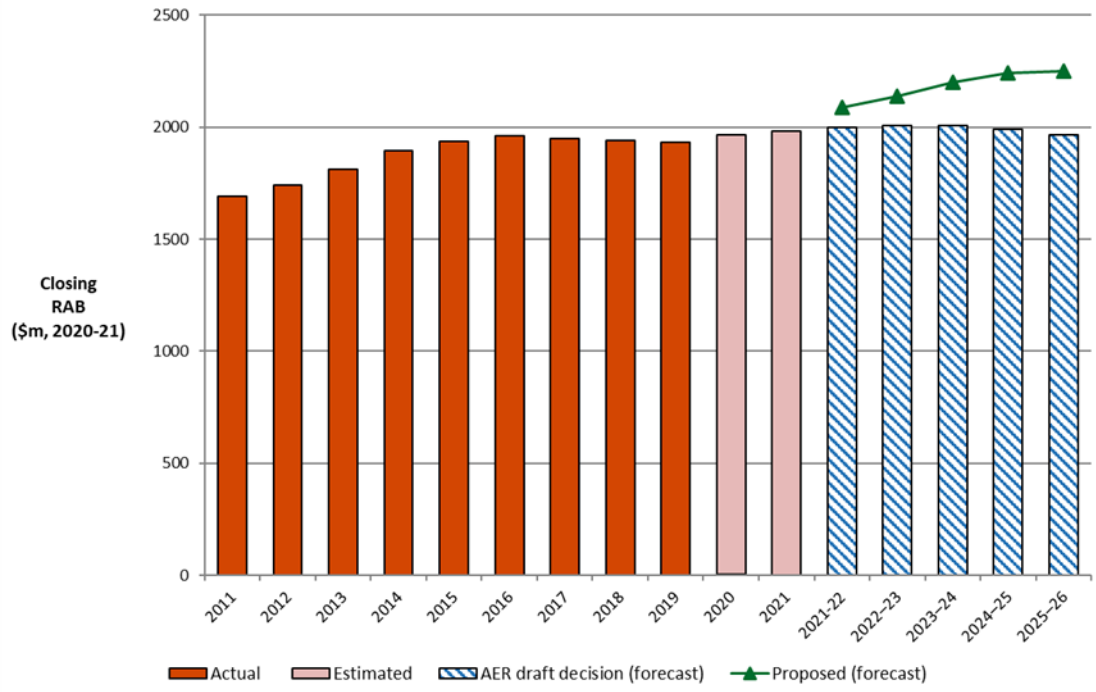
- The capital expenditure sharing scheme (CESS) applies in the current regulatory control period. We place significant weight on CitiPower's forecast capex being 41 per cent higher relative to its actuals over the current regulatory control period. This forecast is also 26 per cent higher relative to its actual spend over the longer term (10 year trend).
- CitiPower's materially higher forecast relative to its current regulatory control period capex is combined with an underspend of 31 per cent. We acknowledge the efficiencies CitiPower has achieved as reflected in its CESS reward of $63.8 million. This highlights that CitiPower has demonstrated in the current regulatory control period that it can manage and maintain its network at a more efficient level.
- We found, as did Energy Market Consulting associates (EMCa), that CitiPower's network performance is improving. CitiPower successfully outperformed both its system average interruption duration index (SAIDI) and system average interruption frequency index (SAIFI) targets over the first four years of the current regulatory control period (2016 to 2019), while underspending its capex forecast. Both indicators occurring simultaneously provide us confidence that CitiPower's current regulatory control period capex is a reasonable forecast to address its network requirements over the forecast regulatory control period. We are therefore satisfied that our substitute estimate, which is in line with current regulatory control period spend, will provide CitiPower with sufficient funding to meet its capex objectives under the NER.
- We observed little evidence of top-down challenges to its forecast. For instance, while CitiPower refers to top-down measures such as the repex model, it has not made any modifications or undertaken any sensitivity analysis to demonstrate how it has taken these top-down measures into account. Similarly, it appears that CitiPower did not consider the synergies between its replacement expenditure (repex) and augmentation expenditure (augex) forecasts, which would likely overstate its requirements moving forward. This is in contrast to other distributors such as Essential Energy, [9] Evoenergy[10] and AusNet Services[11], who applied top-down adjustments to take into account the synergies across the bottom-up

[9] AER, Draft Decision - *Essential Energy Distribution Determination 2019–24 - Capital Expenditure*, April 2019, p.47.
[10] AER, Final Decision - *Evoenergy Distribution Determination 2019–24 - Capital Expenditure*, April 2019, p.34.
[11] AER, Draft Decision - *AusNet Distribution Determination 2021–26 - Capital Expenditure*, September 2020.

builds. EMCa also highlighted that CitiPower did not provide any evidence of total capex prioritisation to address highest risk areas first, which is likely to have led to an overstated forecast.

- Maximum demand, which is the key driver of augex, has remained flat in Victoria over the last decade. CitiPower has overstated its demand forecasts to support its augex proposals. In the past, CitiPower has forecast strongly rising demand in its initial proposals for the previous and current regulatory control period forecasts, which did not eventuate. CitiPower's continued optimistic forecast of rising maximum demand is predicated on a return to a strong relationship between gross domestic product (GDP) and demand, and was made prior to COVID-19; key inputs have also been chosen or adjusted based on the consultants' judgement rather than a neutral, evidence based approach. We have applied the Australian Energy Market Operator's (AEMO) latest demand forecasts because AEMO's recent demand forecast accuracy has been closer to actual demand and is widely accepted by industry and understood by stakeholders.
- Energy Consumers Australia (ECA) and Victorian Community Organisations (VCO) submitted that reducing network charges must be prioritised to ensure the affordability of an essential service for all Victorians. It stated that continued regulatory asset base (RAB) growth should be avoided to reverse the ongoing trend of rising electricity prices. Figure 5-3 below outlines CitiPower's long term RAB trend and that our draft decision helps maintain CitiPower's RAB growth when compared to its initial proposal over the 2021–26 regulatory control period.

Figure 5.3 Value of CitiPower's RAB over time ($ million, $2020–21)



Source: AER analysis

To corroborate the outcomes of the top-down review, we thoroughly assessed the bottom-up material CitiPower provided to support its capex forecast. Our bottom-up review confirmed the findings of our top-down assessment. In particular, CitiPower did not provide convincing bottom-up evidence to support its forecast increase of 38 per cent compared with the current regulatory control period.

Table 5.3 summarises, and Appendix A outlines, our detailed bottom-up assessment by capex driver, including how we have applied our assessment techniques and how we came to our position. Our assessment highlighted that CitiPower's augex, repex, distributed energy resources (DER) capex, connections and information and communications technology (ICT) capex forecasts would not form a total capex forecast that reasonably reflect the capex criteria, taking into account the capex factors and the revenue and pricing principles. In summary, our bottom-up review identified the following and we invite CitiPower to address our concerns in its revised proposal:

- In several cases, CitiPower provided good models clearly setting out inputs and assumptions to support its forecast. However, we came to the same conclusions as EMCa that often the model assumptions and inputs were either not explained, untested,[12] or overstated.[13] For instance, while CitiPower provided some complex modelling in support of its forecast repex, we found that CitiPower did not adequately support some of its input parameters, such as its input costs.
- While CitiPower provided reasonable cost benefit analysis for some projects and programs, there was a lack of supporting cost benefit analysis, particularly options analysis, for other asset projects and programs in the regulatory proposal. For instance, CitiPower did not provide economic analysis in support of its forecast wood poles repex of $66 million, despite the 525 per cent step up from its current period spend.
- We acknowledge that CitiPower's underspend resulted from the significant cost savings it achieved due to its transformation program. However, these cost savings are not fully reflected in the forecast regulatory control period, and therefore not passed or shared with consumers. This issue was similarly raised by EMCa.
- In a number of instances, CitiPower did not provide quantitative evidence to demonstrate a change in network conditions that would require a forecast step up relative to the current regulatory control period. For example, CitiPower proposed a number of pro-active replacement programs in addition to business as usual repex but it did not provide any risk modelling nor cost benefit analysis to show that additional funds would be of net benefit to consumers, and therefore required over and beyond its existing expenditure.
- For CitiPower's DER integration capex, we are highly supportive of CitiPower facilitating solar photovoltaic (PV) growth on its network. However, its solar enablement program forecast overstates what is necessary to deliver the Victorian

[12] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 28.
[13] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 34.

Government's Solar Homes program. Specifically, its analysis includes investments that would be more prudent to undertake in subsequent regulatory control periods.

- In addition, many stakeholders highlighted concerns with how CitiPower valued solar PV exports in its modelling, suggesting the attributed value over the life of the investment did not consider there might be zero or negative benefits into the future and the proposal tended to overstate the value of solar export.[14] The final Value of DER (VaDER) study report, due in early October 2020, will help to address some of these stakeholder concerns.

The remainder of this section sets out the specific break-down of our capex forecast.

Table 5.2 outlines the capex amounts by driver that we have included in our substitute estimate of $567.4 million. Table 5.3 summarises, at a high-level, the reasons for our substitute estimate by capex driver. This reflects the way we have assessed CitiPower's total capex forecast. Our findings on each capex driver are part of our broader analysis and should not be considered in isolation. We do not approve an amount of forecast expenditure for each individual capex driver. However, we use our findings on the different capex drivers to assess a distributor's proposal as a whole and arrive at a substitute estimate for total capex where necessary.

Table 5.2 Capex driver assessment ($ million, 2020–21)

Driver	CitiPower's initial proposal	Forecast assessed	AER draft decision	Difference ($)	Difference (%)
Augex	131.5	131.5	103.5	-28.0	-21
DER capex	60.0	60.0	43.4	-16.7	-28
Connections	426.3	426.3	376.5	-49.8	-12
Repex[15]	308.1	260.7	125.4	-135.3	-52
Non-network - ICT	83.4	83.4	66.6	-16.8	-20
Non-network - Other	21.1	21.1	20.7	-0.4	-2
Overheads	110.3	110.3	90.2	-20.1	-18
Gross Capex	**1140.7**	**1093.3**	**826.2**	**-267.1**	**-24**
Less capital contributions	291.5	291.5	256.7	-34.8	-12
Less disposals	2.2	2.2	2.2	0.0	0
Net Capex	**847.0**	**799.7**	**567.3**	**-232.3**	**-29**

[14] DELWP, *Victorian Government submission on the electricity distribution price review 2021–26*, May 2020, p. 2; CCP17, *Advice to the AER on the Victorian electricity distributors' regulatory proposals,* June 2020, p. 106; EnergyAustralia, Submission to VIC DNSP proposals, June 2020, p. 1; and EUAA, EDPR submission, June 2020, p. 11.

[15] The repex forecast assessed is lower than initially proposed as CitiPower removed its environmental capex and we have reclassified minor repairs from opex to capex in our draft decision.

Source: CitiPower's capex model, subsequent information request responses and AER analysis.

Note: Numbers may not sum due to rounding. The draft decision column includes modelling adjustments, which relate to CitiPower's consumer price index (CPI) and real labour and contract labour price growth assumptions.

Table 5.3 Summary of our findings and reasons

Issue	Findings and reasons
Total capex	CitiPower has not provided sufficient information to demonstrate that its forecast capex is prudent and efficient. We have therefore provided a substitute estimate that better reflects the capex criteria. We invite CitiPower to address our concerns in its revised proposal.
Repex	CitiPower has not demonstrated that a 200 per cent increase in repex is required over the next regulatory control period. CitiPower has either not provided cost benefit analysis to support an increase, and when it did, either the cost, risk or benefit was overstated. We are satisfied that our substitute estimate, that is based on a bottom-up build, is sufficient for CitiPower's requirements as it is 60 per cent higher than it is actual repex over the 2016–2019. Our substitute estimate takes into account the lumpiness of repex for a small network such as CitiPower's.
DER capex	CitiPower has adequately supported most aspects of its DER integration capex proposal. However, it has overstated its solar enablement program by including investments that would be more prudent to undertake in subsequent regulatory control periods. In addition, its net present value (NPV) analysis is conducted over 30 years, which is longer than standard practice. We are supportive of CitiPower facilitating solar PV growth on its network. However, its forecast overstates what is necessary to deliver the Victorian Government's Solar Homes program.
Augex	CitiPower has not established that the timing of its 6.6kV upgrade projects is based on realistic probability and consequence of failure assumptions. We find the prudent timing for its Port Melbourne project is outside the forthcoming regulatory control period, so have excluded it from our substitute forecast.
Connections capex	CitiPower's forecasts were produced before COVID-19 affected connections volumes, but otherwise are reasonable. We have applied an approximate adjustment for COVID-19's effects on construction for both CitiPower's connections and capital contributions forecasts.
ICT capex	We have assessed recurrent ICT primarily through a top-down assessment. Top-down trend and benchmarking analysis reveals that CitiPower's recurrent ICT capex forecast is likely to be overstated. CitiPower has adequately supported most of its non-recurrent ICT capex forecast, except its customer enablement and intelligent engineering programs.
Other non-network capex	We accept CitiPower's proposed other non-network capex forecast. CitiPower's property capex forecast appears reasonable based on historical trend. In addition, its fleet forecast also appears reasonable based on its bottom-up fleet model and our benchmarking analysis. Lastly, its asset disposals forecast is reasonable.

Issue	Findings and reasons
Capitalised overheads	We have updated CitiPower's base and trend component of its capitalised overheads forecast. We have also adjusted capitalised overheads for a lower level of forecast direct capex.
Modelling adjustments	Modelling adjustments relate to CitiPower's CPI and real price escalation assumptions. We have updated CitiPower's labour price escalators to be consistent with our opex decision. In addition, consistent with our standard approach, we have assumed a contracts escalation, that is consistent with CPI only, over the forecast period.
Demand Forecasts	CitiPower's demand forecast is overstated, likely due to the way key variables have been applied as post-modelling adjustments rather than incorporated within its regression model. CitiPower's past forecasts have materially overstated demand, and its current forecasts do not adjust for the effects of COVID-19. In our draft decision, we have adopted AEMO's most recent demand forecasts for CitiPower's network, which have historically been more accurate. We anticipate CitiPower will also reconsider its demand forecasts in light of the economic effects of COVID-19.

A Capex driver assessment

This appendix outlines our detailed analysis of CitiPower's capex driver category forecasts for the 2021–26 regulatory control period. These categories are repex, DER integration capex, augex, connections capex, ICT capex, other non-network capex and capitalised overheads. All dollar amounts are presented in real $2020–21 unless otherwise stated.

We used various qualitative and quantitative techniques to assess the different elements of CitiPower's proposal to determine whether it reasonably reflects the capex criteria. More broadly, we seek to promote the NEO and take into account the revenue and pricing principles set out in the NEL.[16] In particular, we take into account whether our overall capex forecast will provide CitiPower with a reasonable opportunity to recover at least the efficient costs it incurs to:

- provide direct control network services
- comply with its regulatory obligations and requirements.[17]

When assessing capex forecasts, we also consider:

- The prudency and efficiency criteria in the NER are complementary. Prudent and efficient expenditure reflects the lowest long-term cost to consumers to achieve the expenditure objectives.[18]
- Past expenditure was sufficient for the distributor to manage and operate its network in previous periods, in a manner that achieved the capex objectives.[19]
- The capex required to provide for a prudent and efficient distributor's circumstances to maintain performance at the targets set out in the service target performance incentive scheme (STPIS).[20]
- The annual benchmarking report, which includes total cost and overall capex efficiency measures, and considers a distributor's inputs, outputs and its operating environment.
- The interrelationships between the total capex forecast and other constituent components of the determination, such as forecast opex and STPIS interactions.[21]

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16 NEL, ss. 7, 7A and 16(1)-(2).

17 NEL, s. 7A.

18 AER, *Better regulation: Expenditure forecast assessment guideline for electricity distribution*, November 2013, pp. 8–9.

19 AER, *Better regulation: Expenditure forecast assessment guideline for electricity distribution*, November 2013, p. 9.

20 The STPIS provides incentives for distributors to further improve the reliability of supply only where customers are willing to pay for these improvements.

21 NEL, s. 16(1)(c).

A.1 Repex

Repex must be set at a level that allows a distributor to meet the capex criteria. Replacement can occur for a variety of reasons, including when:

- an asset fails while in service or presents a real risk of imminent failure
- a condition assessment determines that it is likely to fail soon or degrade in performance, such that it does not meet its service requirement and replacement is the most economic option[22]
- the asset does not meet the relevant jurisdictional safety regulations and can no longer be safely operated on the network
- the risk of using the asset exceeds the benefit of continuing to operate it on the network.

The majority of network assets will remain in efficient use for far longer than a single five-year regulatory control period (many network assets have economic lives of 50 years or more). As a result, a distributor will only need to replace a portion of its network assets in each regulatory control period.

A.1.1 Draft decision

We do not accept CitiPower's repex forecast of $260.7 million.[23] Our substitute estimate is $125.4 million, which is 52 per cent lower than CitiPower's repex forecast. We are satisfied that our substitute estimate forms part of a total capex forecast that meets the capex criteria.

A.1.2 CitiPower's initial proposal

CitiPower's initially proposed a forecast of $308 million. During the review process, CitiPower notified us of the withdrawal of its environmental repex and subsequently updated its repex forecast to be $238.1 million.[24] In our draft decision, we have assessed a higher repex of $260.7 million due to the shift of expenditure from opex to capex.

To forecast repex, CitiPower relied on different forecasting methodologies. It either relied on:

- historical defect-driven programs for high volume assets, such as pole top structures, service lines and conductors.

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22 A condition assessment may relate to assessment of a single asset or a population of similar assets. High-value/low-volume assets are more likely to be monitored on an individual basis, while low value/high volume assets are more likely to be considered from an asset category wide perspective.

23 CitiPower withdrew its environmental repex following the submission of its regulatory proposal. In our draft decision, the minor repairs base adjustments have been shifted from opex to capex.

24 CitiPower, *amendment to select step changes and capital programs in our 2021–26 regulatory proposal*, 15 May 2020, p.2.

- Condition Based Risk Management (CBRM) model to forecast some substation related elements, such as transformers, switchboards and protection relays.
- specific project level build up, which is supported by business cases and/or cost benefit analysis to forecast repex.
- historical trends in volume and unit rates for its network fault program.

In addition, CitiPower checked its repex forecast against the repex model threshold, albeit with different assumptions. We discuss our repex modelling approach, including engagement with CitiPower on its repex modelling in Appendix C.

A.1.3 Reasons for draft decision

We have applied several techniques to assess CitiPower's proposed repex forecast as well as considering stakeholder submissions. These techniques include:

- trend analysis
- repex modelling
- top-down and bottom-up assessments, including having regard to EMCa's technical review
- stakeholder submissions
- network health indicators

After having regard to these factors, CitiPower has not sufficiently justified that its forecast repex is prudent and efficient. Overall, CitiPower did not provide convincing evidence to demonstrate that a material step up of 200 per cent relative to the current regulatory control period was warranted, particularly in light of a 31 per cent underspend. We note the following issues with its forecasting approach:

- In a number of instances, we found over-forecasting bias. CitiPower forecast additional projects and programs that are likely to duplicate work already in CitiPower's business as usual or recurrent historical repex. CitiPower did not provide sufficient quantitative evidence to demonstrate a change in network conditions that would require a forecasted step-up relative to the current regulatory control period. EMCa also observed that the additional projects do not appear to have been considered within the prioritisation and optimisation processes of the governance and management framework.[25]
- For some asset groups, CitiPower provided good models in support of some of its forecast although this was not in the majority of cases. Its risk monetisation model is an example where these models are consistent with the AER's *Industry practice application note for asset replacement planning*.[26] However, we agree with EMCa that CitiPower appears to overstate some risk assumptions, and it did not support

[25] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 93.
[26] AER, *Industry practice application note for asset replacement planning*, January 2019.

some assumptions with evidence of historical failures and consequence costs.[27] Therefore, we are not convinced that CitiPower's forecast repex to mitigate these risks is prudent and efficient.

- CitiPower did not support several of its forecast programs and projects with business cases, cost-benefit analysis or other quantitative supporting evidence. This was particularly the case for its service lines and poles forecasts. Inputs and parameters included in supporting models were unsubstantiated, untested or overstated.
- While we acknowledge the cost savings achieved due to CitiPower's current period transformation program, which contributed to both capex and opex efficiencies, these cost savings are not fully reflected in CitiPower's repex forecast. This issue was similarly raised by EMCa.[28]
- A number of stakeholder, such as EnergyAustralia and VCO, questioned the increase in repex, particularly given the large underspend in the current period.[29] VCO indicated that, based on the historical trends, the proposed repex is likely to be higher than required and should be reduced. [30] For poles repex—the largest contributor of the increase—stakeholders questioned whether there is sufficient basis to forecast an increase to CitiPower's poles in line with Powercor's approach.[31]
- We are not convinced that CitiPower's forecast material step-up relative to the current period is required given CitiPower has successfully managed and maintained its network over the current regulatory control period. Figure A.1 below shows that CitiPower outperformed its SAIFI targets in the first four years of the current regulatory control period (2016 to 2019), while underspending its capex forecast. These result provides us confidence that CitiPower's revealed recurrent expenditure is likely to be reflective of its future repex requirements, unless CitiPower demonstrates otherwise.

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27 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p.62.

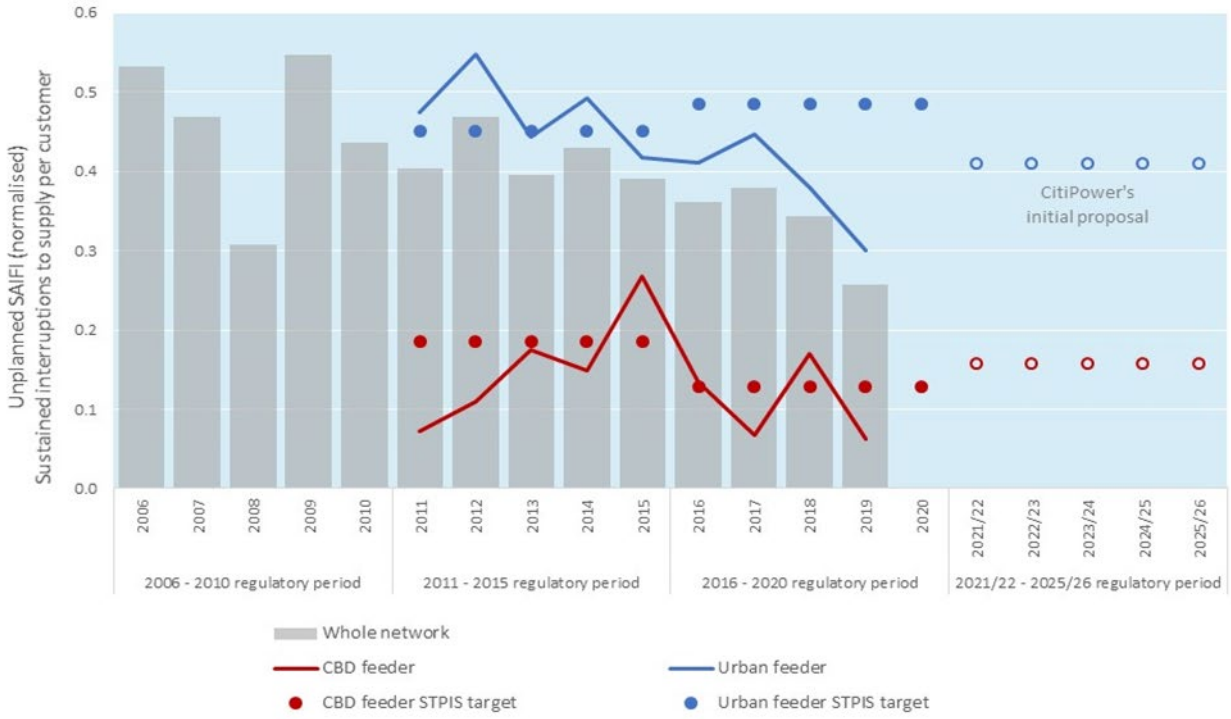
28 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p.31.

29 EnergyAustralia, *Victorian Electricity Distribution Determination 2021–26 - regulatory proposal*, 3 June 2020, p.9.

30 VCO, *Joint submission from Victorian community organisations - summary document*, May 2020, p.4.

31 CCP17, Spencer&Co (a report to the ECA) and VCO.

Figure A.1 CitiPower's historical and target SAIFI performance 2006 to 2026



Source: AER analysis.

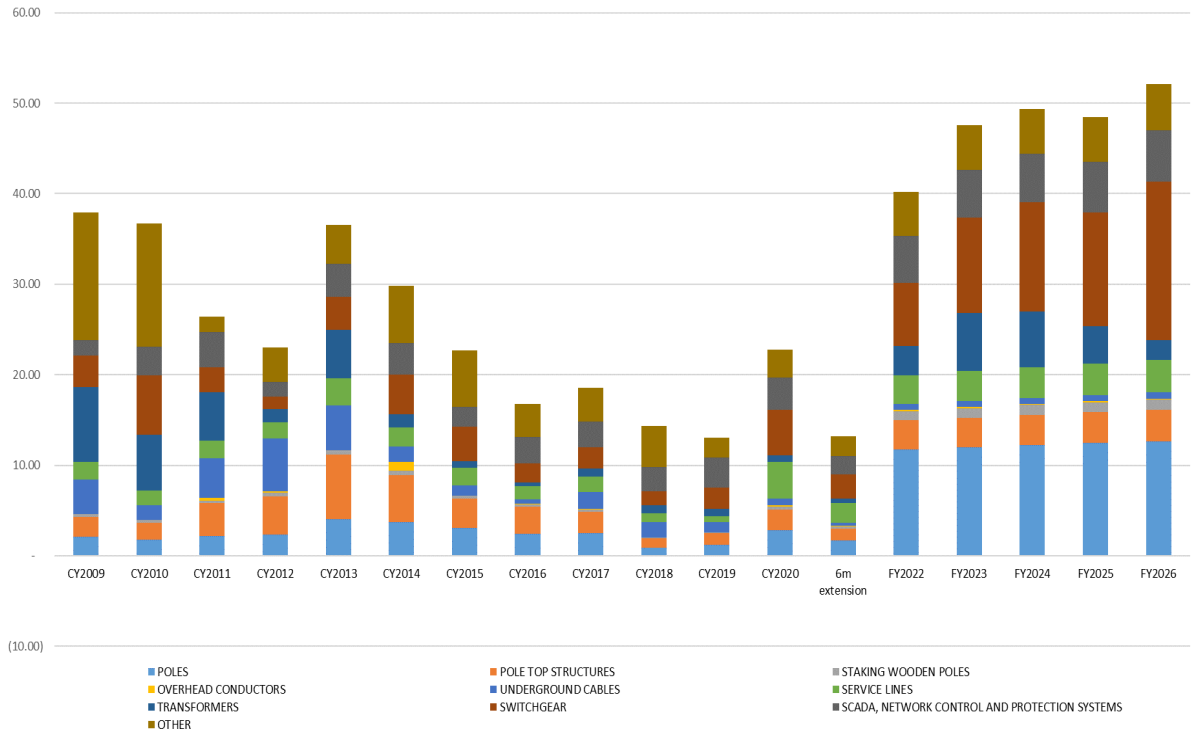
Given our overall concerns with CitiPower's proposed forecast, we have included a substitute estimate for repex into its overall capex forecast. Our substitute estimate is 60 per cent higher than CitiPower's current period expenditure.[32] We are satisfied that our substitute estimate is sufficient for it to meet its capex objectives consistent with s.6.5.7 of the NER as CitiPower successfully maintained the health of its network, including safety risk, based on its current levels of expenditure.

Trend analysis

CitiPower's forecast $260 million is approximately 200 per cent above its average historical repex over the 2016–19 regulatory control years, as shown in Figure A.2.

[32] Average of repex, over the 2016–2019 are pro-rated over five years is used to calculate the current regulatory control period repex.

Figure A.2 Long-term trend of repex from 2009 to 2026 ($ million, 2020–21)



Source: AER analysis.

Over the current regulatory control period, CitiPower has achieved material efficiencies. Its actual repex from 2016–2019 is $170 million lower than the regulatory forecast. The pattern is consistent with its performance over the previous regulatory control period (2011–2015), where its actual repex was 53 per cent below its initial capex forecast.

CitiPower refers to its 'World Class' transformation program, to explain its current period efficiencies. It submits that this program has provided it with the opportunity to apply technology innovations, renegotiate its contract arrangements, and establish a lean and efficient internal service delivery model.[33] We acknowledge that CitiPower is an efficient network. This is evident in its ability to operate its network with much lower repex than forecast whilst maintaining excellent network performance metrics such as low SAIFI and failure rates over time. The focus of our assessment has therefore been on better understanding CitiPower's evidence to support a forecast which is 200 per cent higher than current period spend. This forecast is also 90 per cent higher than the 10-year average.

33 CitiPower, *Response to Information Request #032 - EMCa questions following on-site*, 15 June 2020.

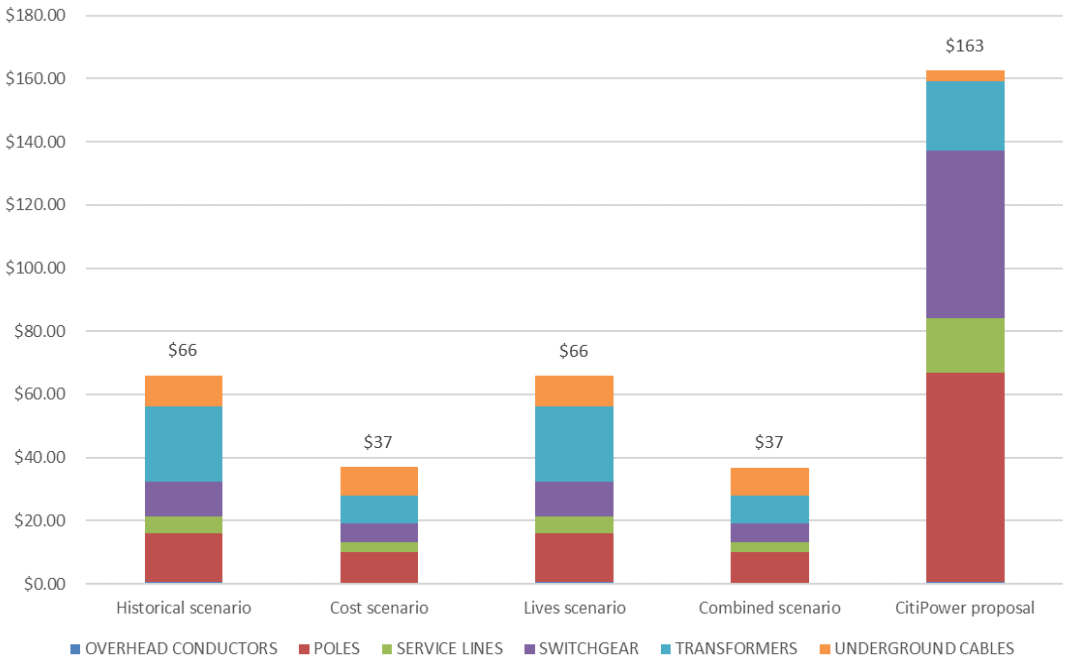
Repex modelling – top-down

Consistent with our standard approach, we have tested CitiPower's asset categories and compared its repex forecast against the following four scenarios:

- Historical scenario - historical unit costs and calibrated expected replacement lives
- Cost scenario - comparative unit costs and calibrated expected replacement lives
- Lives scenario - historical unit costs and comparative expected replacement lives
- Combined scenario - comparative unit costs and comparative expected replacement lives.

Figure A.3 below shows CitiPower's proposed modelled repex compared with the four scenarios. CitiPower's proposed $163 million is $97 million higher than the repex model threshold, which is the lives scenario.[34]

Figure A.3 Repex modelling results ($ million, 2020–21)



Source: AER analysis. See AER, Draft Decision - Repex Model, September 2020.

The results show that CitiPower's forecast for poles, service lines and switchgear are materially higher than what the model predicts. In reviewing these results, we have had regard to previous consultation processes as well as GHD's report, which was provided as part of CitiPower's regulatory proposal.[35] GHD noted that smaller networks, such as CitiPower, may have lumpy expenditure which may not be suitable

[34] The repex model threshold is the higher of the cost and lives scenario.

[35] CitiPower, *CP ATT097 - GHD - Repex modelling review*, December 2019, public.

for predictive modelling.[36] While we have run the results consistent with our standard approach, we acknowledge that the results above are primarily relying on the levels of repex over the current regulatory control period, which are the lowest levels of repex since 2009. The repex model would be trending forward that low level of repex into the future, which may be lower than CitiPower's requirements. In determining our view on prudent and efficient repex we have had regard to both the repex modelling results as a top-down measure, and on the bottom-up analysis and trend analysis (5 and 10-year trends).

Bottom-up considerations

In coming to a view of prudency and efficiency, we have assessed the projects and programs that are included in CitiPower's repex forecast. While we consider certain projects in determining our substitute estimate, we do not determine which programs or projects a distributor should or should not undertake. Once we set a forecast, it is up to CitiPower to prioritise its capex program within the total capex forecast given its circumstances, which is subject to change, over the course of the regulatory control period.

The level of supporting information provided varied. CitiPower provided 68 per cent of business cases to support its repex.[37] For other items, the level of detail provided in support of forecast repex was limited to a single line description in its supporting models. We discuss our assessments, findings and the basis of our substitute estimate for the programs/projects proposed. Our review has largely been categorised based on the Regulatory Information Notices (RIN) classification.[38]

Fault program

CitiPower proposed $11.0 million ($2020–21, excluding real cost escalation) for repex to address network faults across multiple repex asset groups.[39] The forecast included repex for poles, pole top structures, transformers, service lines and switchgear assets. The network faults program did not include any repex for overhead conductors and underground cables as CitiPower stated that faults for these assets contributed to its 'minor' repairs opex step-change.[40]

CitiPower included trended volumes for public lighting fault capex. When we questioned CitiPower about the inclusion of public lighting within SCS capex, CitiPower indicated that the works related to making its electricity supply safe following damage to public lighting assets (e.g. due to vehicles hitting a pole). CitiPower's response does not sufficiently explain why these works are included in SCS capex. Therefore, we have excluded public lighting expenditure from network faults.

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36 GHD, *2021–26 – Repex modelling review,* 18 December 2019, Public.

37 CitiPower, *Presentation to EMCa - CitiPower Regulatory Proposal*, 28 May 2020, p.24.

38 Specifically repex tab 2.2.

39 Poles, pole top structures, transformers, service lines and switchgear.

40 CitiPower, *MOD 4.11 - Network Faults*, January 2020, public.

In terms of the forecasting methodology, CitiPower relied on a trend-based approach for the forecast volumes, and an average approach for unit rates. For the volumes, CitiPower calculated the average increase or decrease in volumes from 2011–12 to 2017–18 for each asset category, and then added this to the 2017–18 volume and each subsequent year to maintain a linear trend, increase or decrease, in forecast volumes. CitiPower determined the forecast expenditure by multiplying these volumes by the average unit rate from 2014–15 to 2017–18 for each asset category—the unit rate is constant in the forecast.

EMCa queried the trended volume approach, but CitiPower's response did not sufficiently explain the rationale to support an increasing trend rather than a flat profile.[41] CitiPower's response also identified a relatively flat historical expenditure for network faults. Considering this, we agree with EMCa's finding that:[42]

> In the absence of better information, the level of expenditure associated with network faults is more likely to remain similar to historical levels, rather than an increasing trend as proposed.

We tested the available data, including updated 2018–19 actual volumes from CitiPower.[43] Based on our analysis, including EMCa's findings, we have derived a substitute approach to forecast network faults, which relies on the most recent actual volumes and unit rates, both from 2015–16 to 2018–19. Our substitute approach is more likely to reflect CitiPower's needs over the forecast regulatory control period, when compared to CitiPower's trended volumes.

Our substitute forecasting approach results in a substitute estimate for networks faults of $9.9 million (excluding real cost escalation). [44] It is a reduction of 10 per cent compared to CitiPower's proposed amount.

As the network faults program affects a number of asset groups, our substitute estimate on network faults flowed through to our analysis, including our substitute estimate for each of the affected asset groups.[45]

Poles – a modelled asset group

CitiPower forecast $66.5 million for poles repex. In response to an information request it subsequently revised its forecast to $58.8 million.[46] The revised forecast is $49.2 million, or 511 per cent, higher than actual repex in the current regulatory control period.

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41 CitiPower, *Information request 032 – Q8,* June 2020, pp. 10–11.

42 EMCa, Review of aspects of CitiPower's regulatory proposal 2021–26, September 2020, p. 43.

43 CitiPower, *Information request 040 – Q6,* June 2020.

44 The substitute estimate excludes the amount for underground cables and overhead conductors, which is discussed in the relevant sections.

45 Poles, pole top structures, transformers, service lines and switchgear.

46 CitiPower, *Information request 032 – Q11*. We have included real price escalation.

The largest component of CitiPower's poles forecast is its forecast for wood poles repex of $57.6 million. This is an increase of $48.3 million (519 per cent) compared with actual repex in the current regulatory control period. The driver of the increase is CitiPower's proposed changes to its asset management practices. These changes are the same as those proposed by Powercor.[47]

CitiPower's forecast consists of 2,316 interventions of unserviceable poles and an additional 2,617 'risk-driven' reinforcements of poles that CitiPower deems are higher risk.

CitiPower submitted that the identified need for the higher interventions volumes is:[48]

> …to ensure our wood pole replacement program complies with all our existing safety obligations; supports our commitment to maintaining our reliability performance; and addresses community expectations of a sustainable approach to asset management.

CitiPower has not satisfied us that it requires a substantial step-up in wood poles repex. We include $14.5 million for poles repex in our substitute estimate, which is 50 per cent higher than its poles repex over the current regulatory control period. It is in-line with the repex model's prediction for the poles, based on CitiPower's existing pole asset age profile.

CitiPower provided additional information on 7 August 2020, including updated failure rates. We are still reviewing this information, and note that CitiPower states that it is preparing cost-benefit analysis for its risk-driven volumes and updating its forecast to reflect outcomes of its enhanced pole calculator trial.

Trend Analysis of wood poles repex

Figure A.4 shows the magnitude of the increase in forecast wood poles repex relative to historical trends. Historically, wood poles repex peaked in 2013 and decreased to $0.9 million in 2018. The increase in 2019 actual and 2020 estimated repex reflects changes to CitiPower's asset management practices.

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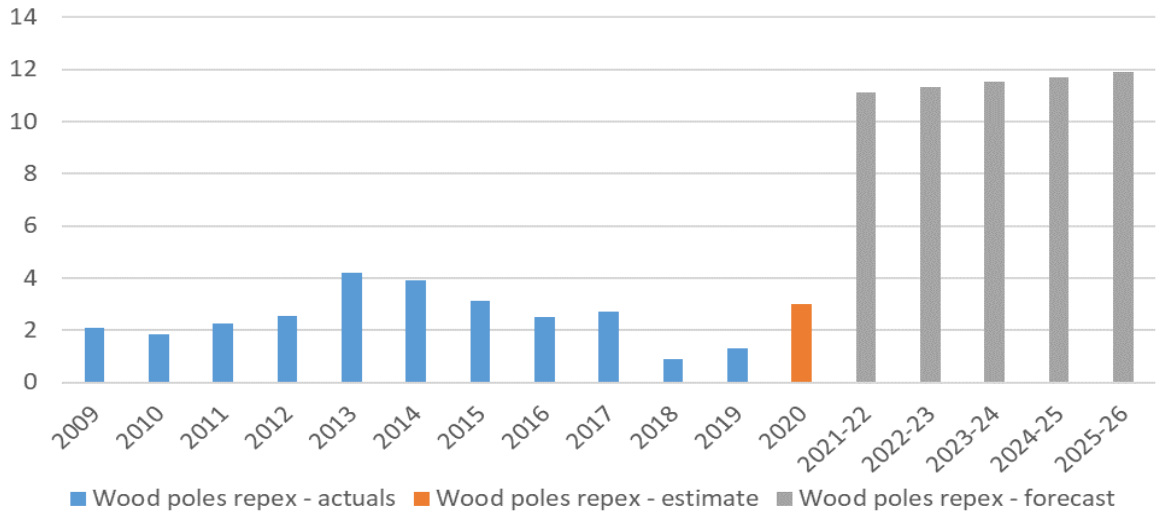
47 AER, *Draft Decision - Powercor 2021–26 regulatory determination*, September 2020.

48 CitiPower, *Wood pole replacement program*, January 2020, p. 8.

Figure A.4 CitiPower's historical and forecast wood poles repex and interventions ($ million, 2020–21)



Source: CitiPower's RIN data.

Note: Interventions means the sum of replacements and staking.

Assessment of CitiPower's wood pole forecast

CitiPower has not provided sufficient evidence to demonstrate that its forecast is prudent and efficient. The evidence before us does not justify why a step-up from its actual spend is required. In particular, we are not satisfied that there is likely to be a substantial escalation of risk over the forecast period requiring a four-fold increase in pole intervention volumes. In coming to our position, we note the following:

- CitiPower did not provide quantified cost-benefit analysis we typically receive from businesses in support of its forecasts. Therefore, it is not apparent what level of risk CitiPower is trying to mitigate, and what intervention volumes are required to achieve these targets.
- CitiPower's options analysis is inadequate. For example, CitiPower has or proposes to improve asset monitoring, training and auditing of inspectors, more frequent inspections and improvements to its inspection practices in response to the recommendations that Energy Safe Victoria (ESV) made to Powercor.[49] We expect these changes will lead to significant improvements to CitiPower's pole management. However, CitiPower does not discuss these changes in its options analysis, including their impact on required intervention volumes.

[49] ESV is the Victorian electricity safety regulator. Its role is to ensure ongoing compliance with Victorian safety legislation. It requires Victorian distributors to maintain documents that prescribe the business' approach to and governance of managing safety risk.

- We think it is appropriate that CitiPower should seek to improve its asset management practices to reflect ESV's recommendations to Powercor. However, we consider that any material increase in repex resulting from these improvements requires appropriate justification.
- CitiPower's risk-based interventions of serviceable poles is not justified and its risk-based program assumes a lower risk appetite than Powercor. CitiPower proposes to target lower-risk poles for intervention in the forecast period than Powercor. As noted by EMCa, CitiPower has included treatment of 3,380 poles in risk classification C4. In contrast, there are no poles included in Powercor's forecast for the risk classification of C4 and only a proportion of poles at the lower risk classification of C3.[50] This is because Powercor's forecast prioritises for hazardous bushfire risk areas, whereas CitiPower's network lies entirely in a low bushfire risk area. Therefore, pole failures in CitiPower's network are likely to result in a lower safety and environmental consequence.
- We have a number of concerns with CitiPower's forecasting methodology, including its use of a 'simulation' of its new enhanced pole calculator to forecast intervention volumes.[51] This is because the enhanced pole calculator algorithm is untested.
- EMCa also reviewed CitiPower's poles repex forecast and concluded that, based on the information provided by CitiPower, it did not consider that the forecast expenditure is representative of a prudent and efficient level. Its findings were in line with our concerns stated above.[52]

The increase in CitiPower's forecast wood poles repex reflects proposed changes to its asset management practices from July 2020, in particular the application of a new 'enhanced' version of its pole calculator inspection tool. In September 2020 we wrote to CitiPower regarding these changes.[53] We informed CitiPower that its proposed changes to its asset management practices would appear to be a distribution regulatory investment test (RIT-D) project within the meaning of the NER. We invited CitiPower to inform us about its proposed RIT-D process for these changes from July 2021.

Stakeholder submissions

The AER's Consumer Challenge Panel (CCP17) does not support CitiPower's proposal, noting that 'it is not valid to directly extrapolate the risks and historical events in the Powercor area as a justification for the significant increase in pole replacement

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50 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 49.

51 The pole calculator is the algorithm that CitiPower uses to assess pole condition. CitiPower proposed an "enhanced" calculator for the forecast period. The primary differences from the current version is the introduction of a wood fibre strength variable and tip load calculation in accordance with AS7000 Overhead line design.

52 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, pp. 43–54.

53 AER, letter of inquiry, *Re: Compliance with the Regulatory Investment Test for Distribution – change in pole replacement practice*, 21 September 2020.

rates in the urban area'.[54] Spencer&Co. (for ECA) submits that 'it is not clear what risks have increased for CitiPower that would prompt such a significant increase in pole replacement.'[55] VCO submitted that 'CitiPower provides little reasoning that similar issues [to Powercor's] apply to their wood poles'.[56]

ESV 'is generally supportive of the increased forecast pole interventions for all Victorian [distributors]'[57] while the Victorian Government says this must be 'at an acceptable cost to consumers'.[58]

Substitute estimate

Table A.1 Breakdown of our substitute estimate for poles repex ($ million, 2020–21)

Pole type	Draft Decision
Wood poles	13.4
Non-wood poles	1.2
Total	14.5

Source: AER analysis. Numbers may not add up due to rounding.

As shown in Table A.1, our substitute estimate for wood poles (i.e. excluding concrete and steel poles) is $13.4 million. The substitute estimate is 76 per cent lower than CitiPower's forecast. Our substitute estimate is based on average actual poles repex incurred by CitiPower over the 10 years to 2019. By using a longer time period than our usual four years, we account for short-term variation due to CitiPower's smaller poles population. This approach also accounts for the possibility that CitiPower has under-replaced poles in the current regulatory control period.

CitiPower has managed its poles assets successfully over the current regulatory control period, and we note that it has committed to making asset management improvements recommended to Powercor by ESV. For these reasons we are satisfied that our substitute estimate, which is in line with its historical poles repex, reasonably reflects the capex criteria.

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54 CCP17, *Advice to the AER on the Victorian Electricity Distributors' Regulatory Proposals for the Regulatory Determination 2021–26*, June 2020, p. 77.

55 Spencer&Co, Report to Energy Consumers Australia – A review of Victorian Distribution Networks Regulatory Proposals 2021–26, p. 20.

56 *2021–26 Victorian EDPR, Joint submission from Victorian community organisations – summary document*, May 2020, p. 44.

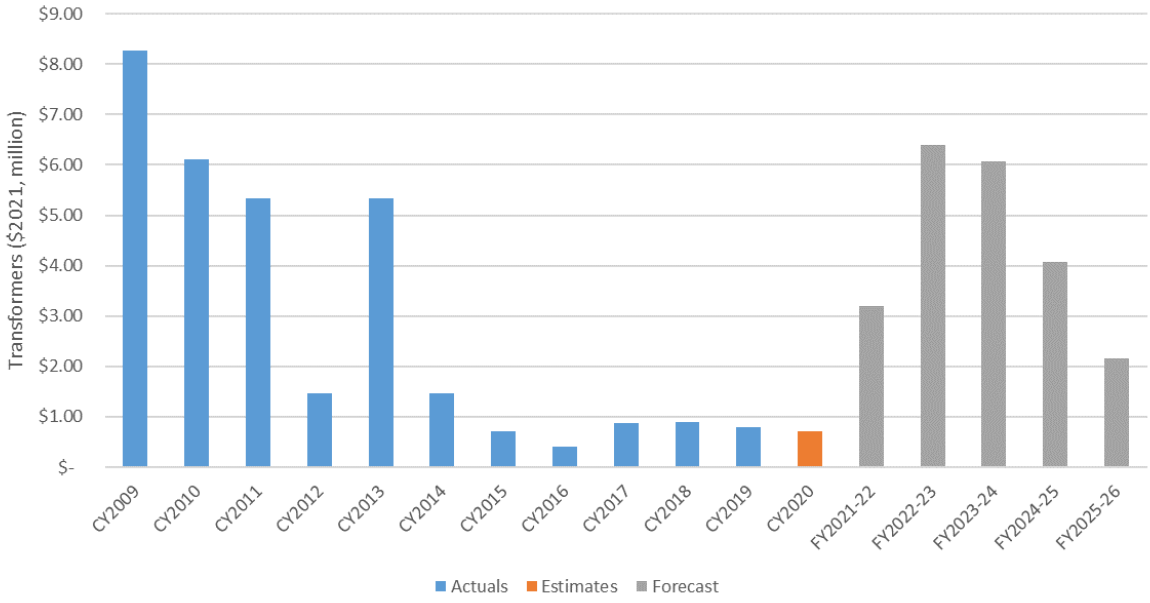
57 ESV, *Submission in response to AER issues paper – Victorian electricity distribution determination, 2021 to 2026*, May 2020, p. 3.

58 Department of Environment, Land, Water and Planning, *Victorian Government submission on the electricity distribution price review 2021–26*, May 2020, p. 5.

Transformers – a modelled asset group

CitiPower included $21.9 million ($2020–21, includes real cost escalation) for transformers repex over the forecast regulatory control period. The forecast is 487.9 per cent higher than its actual transformer repex over the current regulatory control period. Figure A.5 below shows the long term trend of CitiPower's transformers repex, which demonstrates an expenditure profile of a non-recurrent nature.

Figure A.5 Trend of forecast transformer repex from 2009 to 2026 ($ million, 2020–21)



Source: AER analysis of RINs.

CitiPower's forecast transformers repex is largely made up of a program of works to replace five of its zone substation transformer replacements,[59] which makes up approximately $20.3 million of the proposed amount.[60] The remainder of CitiPower's transformers repex relates to indoor and kiosk substation transformer replacements.[61]

For its zone substation transformer replacements, CitiPower submitted that its forecasting methodology relied on its a risk monetisation model, which takes into account a transformer's health index (HI) of the asset derived through the application of its CBRM.[62]

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59 Two transformers in North Richmond, two in Celestial Avenue and one in Victoria Market zone substation.

60 The value excludes real cost escalation.

61 CitiPower, *MOD4.09 - Plants and Stations*, January 2020, public.

62 CitiPower, *Regulatory proposal 2021–26*, January 2020, public, p.37.

After reviewing supporting material provided by CitiPower, we concur with EMCa's findings on CitiPower's forecasting methodology,[63] which include:

- **Lack of option analysis.** CitiPower does not appear to have sufficiently considered options in its analysis. CitiPower's risk monetisation does not test options, rather, it appears to assume that five transformers are candidates for replacement, but only tests the optimal timing. Therefore, there appears to be no evidence that considers lower cost interventions, namely how the options for refurbishment are undertaken and taken into account.
- **Overstated risk cost in its risk monetisation.** EMCa noted that a number of risk monetisation variables, such as likelihood of consequence, cost of generation and probability weighted demand forecast are overstated. The overstated assumptions are likely to result in an earlier timing of replacement than would otherwise be the case. EMCa added that:

  > We tested the robustness of CitiPower's risk monetisation models provided in support of its substation transformer expenditure. We found that the assumptions and parameters applied in its models lead to an overstatement of risk, and when corrected for reasonable assumptions, support deferral of a proportion of the proposed projects.[64]

- **Cost estimates are based on 'early stages' of project development**. EMCa noted that, as the project progresses, the cost estimates are likely to be refined and efficiencies will be realised. For instance, further efficiencies are likely to be identified in CitiPower's proposal to include two transformer replacements at each of two sites. EMCa further noted that it would expect to see some efficiencies in design and construction costs, which constitute a large proportion of the cost build-up.[65]

In addition to EMCa's concerns, we have identified that:

- CitiPower's unit costs appear higher than other distributors' costs. For example, CitiPower's forecast unit costs of $3.7 million per zone substation transformer is materially higher than other distributors' unit costs, including Ausgrid, United Energy, SA Power Networks and AusNet Services. It is also significantly higher than its assumed unit costs for transformer replacements in other projects within its network.[66]
- CitiPower is proposing to replace Victoria Market transformer 1 (VM1), even though its own CBRM output indicates the VM1 transformer has 10 years until it reaches the end of life, based on its current HI.[67] Given that EMCa has indicated a number

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63 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, pp. 65–73.

64 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 73.

65 It appears that labour costs make up around 50 per cent of its cost estimates.

66 CitiPower assumed a zone substation transformer replacement to be $1 million for its 6.6 kV conversion projects. See CitiPower, *CP-MOD 6.05 - Brunswick and Port Melbourne*, January 2020.

67 CitiPower, *Response to Information Request 019 - CBRM HI and POF summary - transformers*, May 2020, public.

of concerns with CitiPower's risk monetisation, CitiPower has not established that the risk cost of VM1, given its HI, is sufficient to necessitate its replacement over the forecast regulatory control period.

Based on the information before us, CitiPower has not demonstrated that its forecast transformer repex is prudent and efficient. We have therefore included a substitute estimate of $10.9 million for CitiPower's transformer repex.

Our substitute estimate applies lower unit rates for zone substation replacements, but allows the replacement of all five zone substation transformers. It relies on GHD's unit cost for CitiPower.[68] This unit cost was also proposed by CitiPower, itself, to use for zone substation transformers in the repex model.[69] Given our and EMCa's concerns around the need to replace all the proposed transformers within the 2021–26 regulatory control period, we also tested our substitute estimate using a substitute methodology, namely to rely on a higher unit rate for zone substation transformers (approximately $2 million)[70], while reducing the proposed transformer replacement volume to four zone substation transformers (to exclude VM1). Our substitute methodology supports our substitute estimate (it is within $200,000). We are therefore satisfied that our substitute estimate is sufficient and gives CitiPower the flexibility to maintain the quality, safety and reliability of its transformers asset population. It is also consistent with the approach to not prescribe projects and programs that a distributor undertakes.

Switchgear – a modelled asset group

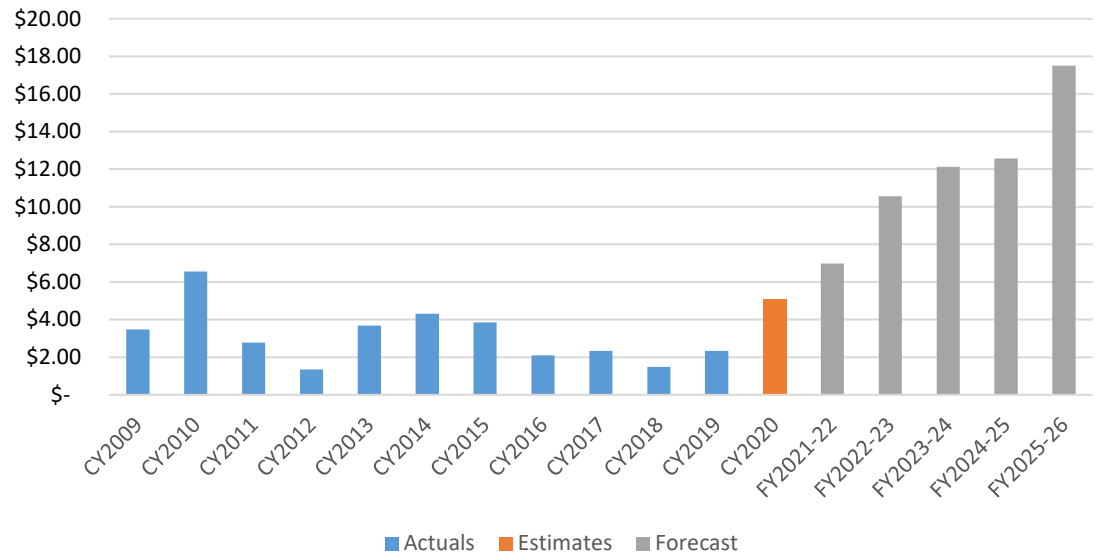
CitiPower forecasts $59.7 million ($2020–21, includes real cost escalation) for switchgear repex over the 2021–26 regulatory control period. The forecast is a 530 per cent step up from 2016–19 actual repex. Figure A-6 below shows the long term trend of switchgear repex over time.

[68] CitiPower, *CP ATT097 - GHD - Repex modelling review*, December 2019, p.16.

[69] CitiPower, *Questions in response to AER repex modelling: preliminary results*, 7 August 2020, p.1.

[70] This unit rate is the average of SA Power Networks, AusNet Services and United Energy's zone substation unit rates.

Figure A.6 Long term trend of switchgear repex from 2009 to 2026 ($ million, 2020–21)



Source: AER analysis of RINs.

The historical trend shows a more lumpy expenditure profile, which was similarly raised by ECA[71] in its submission where it noted that replacement programs for switchgear reflect the lumpy nature of large asset replacement. Spencer&Co (on behalf of ECA) [72] and the CCP17 indicated their support for CitiPower's proposed switchgear replacements in a phased prioritised manner.[73] While we agree that an increase in switchgear repex may be required over the next regulatory control period, CitiPower has not established that the full switchgear repex of $59.7 million is prudent and efficient. We have determined a substitute estimate of $40.9 million, based on our detailed review of three switchgear projects (discussed below). We have had regard to EMCa's findings in coming to our position, and we are satisfied that our substitute estimate is sufficient for CitiPower's requirements over the next regulatory control period.

Little Queen substation switchgear

CitiPower included a zone substation switchboard replacement program located at Little Queen, forecast at $19.5 million ($2020–21). CitiPower noted that the Little Queen switchgear replacement is driven by the increased risk of failure posed by its

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71 Energy Consumers Australia, *Victorian Electricity Distributors Regulatory Proposals 2021–26 –Submission – Attachment 1*, June 2020.

72 Energy Consumers Australia, *Victorian Electricity Distributors Regulatory Proposals 2021–26 –Submission – Attachment 1*, June 2020.

73 CCP17, *Advice to the AER on the Victorian Electricity Distributors' Regulatory Proposal for the Regulatory Determination 2021–26*, public, p.79.

deteriorating condition, and the higher risk of arcing given it is a compound-filled unit. CitiPower's preferred option is to replace the entire switchboard in the same building with the associated circuit-breakers. In an information request,[74] CitiPower provided a consultant monitoring report providing details of partial discharge activity within the entire switchboard.[75] The report did not recommend replacing the unit.

We have a number of concerns with this replacement program, namely:

- The input assumptions in the risk monetisation model are likely to overstate the risk cost. For example, CitiPower assumed a likelihood of consequence of 100 per cent for its significant and major failure modes.
- The cost estimate for the Little Queen switchboard is based on CitiPower's most recent switchboard replacement project, which was carried out at the Richmond zone substation in 2011.[76] CitiPower did not provide adequate detail nor evidence that the build-up in costs were efficient, particularly as it does not take into account the effect of the transformation program.

EMCa's review noted the following:

- CitiPower has considered reasonable options for the replacement of the Little Queen switchboard.
- The application of health indices for switchboards may be overstating the level of deterioration. EMCa noted the HI values for the switchboard sections range from 3.57 to 5.50, which may imply the onset of detectable deterioration, and it is likely that the deterioration will become more significant by the end of the next regulatory control period. However, the HI alone does not indicate that immediate action is justified.
- The risk monetisation model would still recommend replacement, even if the assets were new. EMCa undertook sensitivity testing of CitiPower's modelling, and it appears that the substitution of input assumptions with a new asset still results in an optimal timing within the next regulatory control period, which indicates that the modelling may bring replacement forward. [77]

Based on the information before us, CitiPower has neither demonstrated that the timing of the proposed repex is prudent nor that the cost is efficient. However, we do acknowledge EMCa's findings that it is likely that the deterioration of the switchboard will likely be significant by the end of the forecast period. Therefore, we have adopted EMCa's recommendation in coming to our substitute estimate of $8.6 million; that being, to defer the timing of replacement of Little Queen replacement by a single year into the 2026–31 regulatory control period.[78] Given our concerns with the unit costs,

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74 CitiPower, *Response to Information Request 007 – Repex and immediate expensing of capex*, 7 April 2020.
75 CitiPower, *Response to Information Request 007 - LQ partial discharge report*, 7 April 2020.
76 CitiPower, *Response to Information Request 049 - Repex: transformers, switchgear and service lines*, 9 July 2020.
77 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 80.
78 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 81.

our substitute estimate is sufficient for CitiPower's requirements over the next regulatory control period.

Collingwood zone substation switchgear

CitiPower included a second zone substation switchgear replacement program located at Collingwood, forecast at $8.4 million. CitiPower noted that the Collingwood switchgear replacement is driven by the increased risk of failure posed by the weakening integrity of the switchboard as a result of damage sustained in 2016,[79] and the reliability risk it poses as a compound-filled, non-arc fault contained unit. CitiPower's preferred option is to replace the existing switchboard in the same building and the associated J18 circuit breakers.[80]

In an information request,[81] CitiPower provided a consultant monitoring report outlining details of partial discharge activity within the entire switchboard. It made a single recommendation: to continue to remotely monitor data from the unit.

We and EMCa have the same concerns as outlined with the Little Queen switchboard replacement above. However, given the asset condition, particularly the demonstrated failure damage on the site,[82] we consider that, on balance, the proposed repex is likely to be required over the next regulatory control period. Therefore, we have included the proposed Collingwood replacement in our substitute estimate for capex.

J18/J22 circuit breakers

CitiPower included a new proactive program, which is the J18/J22 circuit breaker replacement program, in its repex forecast at $8.0 million. This program accounts for 13.4 per cent of CitiPower's total switchgear forecast.

CitiPower noted that in line with best industry practice and to minimise safety risks as far as reasonably practicable, it proposed a targeted program to replace 81 of 400 J18/J22 oil-filled circuit breakers at selected, high-consequence zone substations. CitiPower has referred to one instance where the failure of the one J18/J22 circuit breaker in the Collingwood zone substation resulted in a loss of supply to 1,200 customers and posed a safety risk to employees, with the resulting rise in pressure and subsequent explosion blowing open the doors in the switch room.[83] The metal cladding on the switchboard suffered extensive damage, requiring two circuit breakers (B23 and B24) to be decommissioned and their loads transferred to spare feeder positions.

While we acknowledge that there is a case that supports the replacement of these type of circuit breakers, however, we are not satisfied with the prudency and efficiency of the entire program of work, namely:

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79 CitiPower, *CP BUS 4.05 - B supply area,* January 2020, public.
80 CitiPower, *CP BUS 4.05 - B supply area,* January 2020, public, .23.
81 CitiPower, *Response to Information request 007– Repex and immediate expensing of capex*, 7 April 2020.
82 CitiPower, *CP BUS 4.05 - B supply area,* January 2020, public, p.7.
83 CitiPower, *CP BUS 4.07 - J18 and J22 - circuit breakers,* January 2020, p.9.

- CitiPower's proposal to replace J18/J22 circuit breakers at high consequence locations does not align with results of its CBRM model, which indicates these circuit breakers have between 10 and 17 years left until end of life.[84] This implies that its own modelling indicates that these circuit breakers are likely to continue to operate well into the future.
- Its likelihood of consequence is assumed to be 100 per cent in all cases, independent of the load and the time of failure, which is likely to overstate its risk cost.[85] EMCa made a similar observation and noted that when it substitutes more reasonable values for some of the assumptions used in the model, the efficient replacement time is deferred.[86]
- EMCa indicated that the information provided is insufficient to demonstrate that the forecast costs are efficient and prudent.

CCP17 agreed with CitiPower's circuit breaker assessment that failure risk and mode of failure presents an unacceptable safety and supply risk to consumers, and are supportive of the proposal (subject to the AER determining the efficiency).[87]

CitiPower has not provided sufficient evidence to demonstrate that its proposed volumes, in full, are prudent. We have arrived at a substitute estimate, which allows CitiPower to replace 27 J18/J22 circuit breakers. This volume includes the highest risk assets according to its HI modelling, particularly the circuit breakers, which will reach the end of life in the next 10 years. This results in a forecast of $2.2 million for its J18/22 circuit breaker replacement program, which we have included in our substitute estimate.

Service lines – a modelled asset group

CitiPower proposed $17 million for service lines repex over the 2021–26 regulatory control period, which is 181 per cent higher than its average service lines repex over the 2016–19 regulatory control years. It is also 220 per cent higher than what the repex model predicts for its existing service lines population.

In terms of forecasting methodology, CitiPower has built up its service lines replacement volumes based on four components. First, it used the historical trended approach, which includes historical volumes and unit rates. Second, it took into account the impact of service lines faults by including additional volumes for service lines fault repex. Third, it included a proactive program for a number of service lines issues that require pro-active replacement in addition to its historical trended approach. Fourth, it included a negative adjustment to take into account efficiencies of replacing

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84 CitiPower, *Response to Information Request #019 – EMCa questions - governance and repex – CBRM HI and POF summary – circuit breakers.xlsx*.

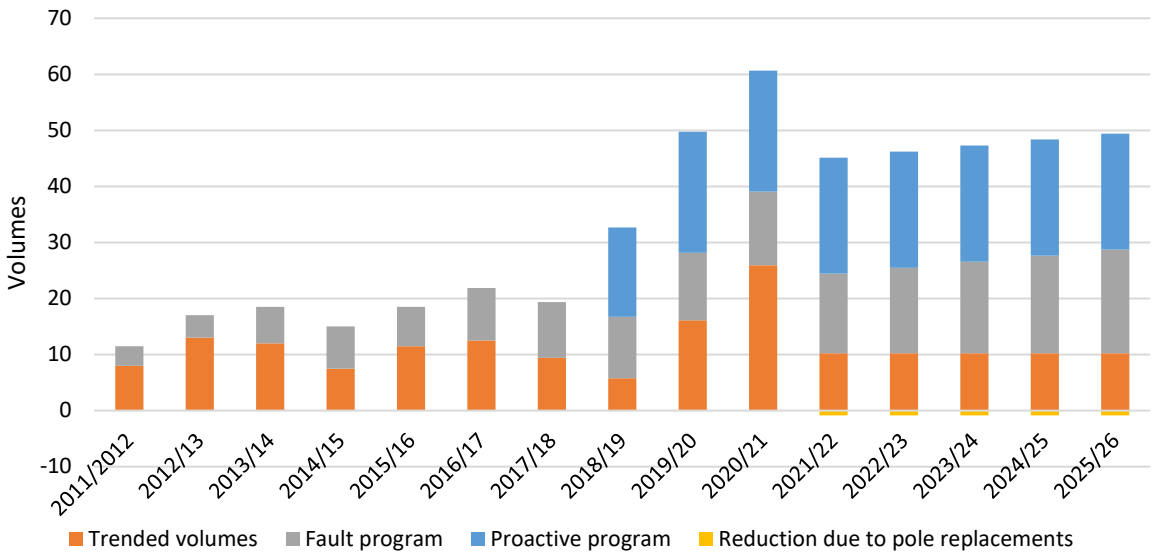
85 CitiPower, *CP MOD 4.19 – J18 FB*, January 2020.

86 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 83.

87 CCP17, *Advice to the AER on the Victorian electricity distributors' regulatory proposals*, June 2020, p. 78

its service lines along with increased replacement of pole volumes.[88] Figure A.7 shows the breakdown of CitiPower's forecast volumes and how they change over time.

Figure A.7 CitiPower's components of its service volumes and the variation over time



Source: AER analysis of CitiPower's supporting models. The years are in financial year consistent with the CP MOD 4.06 and CP MOD 4.11.

We have reviewed the programs, inputs and assumptions, particularly for the proactive component. Based on the information before us, CitiPower has not justified the increase in its service lines repex for the following reasons:

- We concur with EMCa that CitiPower has not provided any cost benefit analysis, or risk monetisation, to support its proactive component.[89] In the absence of this information, there is insufficient evidence that there is a need to undertake this replacement or that the benefit of a proactive program exceeds the risk costs.
- For one of its proactive programs, which makes up 63 per cent of the proactive program, there was no description of the need for the project in any of CitiPower's regulatory proposal documents. We requested this information in three different information requests.[90] In response, CitiPower provided a high-level description of the project and has indicated that it has not undertaken any cost benefit analysis,

88 AER analysis of the supporting models. CP MOD4.06 and CP MOD 4.11.

89 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 64.

90 AER Information request #006, AER Information Request 019 and AER Information Request 049.

which adds to the uncertainty as to whether there is a need to undertake this project at all.[91]

- There is no top-down adjustment to take account of synergies between the bottom-up estimates of its service line programs. For example, CitiPower is forecasting to replace a specific type of service line (PVC grey), a service line with a known defect, using a ratio of defect find rate as a percentage of the total population.[92] However, it has not taken into account its business as usual repex which already includes PVC grey replacements over the current regulatory control period. The two methodologies together, without taking into account the synergies, are likely to overstate the volume of replacements required over the forecast regulatory control period. This is consistent with the over-forecasting bias that is systemic in CitiPower's forecasting methodology.
- CitiPower forecast unit costs are 22 per cent higher than its historical unit costs, with insufficient reasoning. This indicates to us that the forecast amount is unlikely to represent efficient costs or its requirements moving forward. These concerns were also expressed by EMCa.[93]

In addition to our concerns, EMCa identified that:

- CitiPower has not adequately demonstrated that a forecast, based on historical trended volumes, if prioritised based on highest risk service lines, will not be sufficient to meet its safety obligations.
- The introduction of the proactive programs does not appear to be supported by actual network performance. EMCa observed a declining trend in safety impact fire starts and asset failures, and a level trend of reportable incidents involving the public (including asset failures).
- CitiPower's assumptions for the proactive component is based on limited data. Even though CitiPower relies on recent data as justification for its assumptions, EMCa noted that the following:

> Use of more recent replacement data is positive, however remains insufficient without other corroborating evidence that the incurred replacement levels are directed at addressing an elevated level of safety risk, systemic issues or defect. It is also unclear why this replacement volume should be undertaken in addition to the underlying level of defect driven replacements that are forecast based on other methods.[94]

Based on the information before us, including EMCa's findings, CitiPower has not established that its proposed service lines repex is prudent and efficient. Our substitute estimate is $5.8 million, which does not include the service lines proactive component

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91 CitiPower, *Response to Information request 049 - switchgear, transformers and service lines*, 9 July 2020.

92 CitiPower, *CP MOD 4.06 - Lines replacement*, January 2020.

93 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 64.

94 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 64.

of the forecast service lines asset group, and incorporates our findings on CitiPower's fault related capital as discussed previously. This results in a substitute estimate that is in line with its historical repex. As such, we are satisfied that the amount is sufficient for CitiPower to maintain the safety and reliability of its network as demonstrated by its current performance.

Underground cables and overhead conductors – modelled asset groups

CitiPower included approximately $4 million for both its underground cables and overhead conductors repex over the forecast regulatory control period. In addition, CitiPower proposed a base adjustment to opex, which equates to a total of $22.6 million ($2020–21)[95] for minor repairs of underground cables and overhead conductors over the forecast regulatory control period.[96] It submitted that the amount was incorrectly capitalised over the current regulatory control period and the nature of the work is that of repair, and does not extend the life of the asset. Therefore, it has also provided us a recast RIN to ensure that its historical capex removes the impact of minor repairs.

Based on the information before us, including advice from EMCa, we do not accept the base adjustment in the opex forecast, we discuss our reasons for the decision in Attachment 6.[97] We have shifted the amount to repex and have assessed it against the capex criteria. We discuss our findings on the reclassified minor repairs repex and originally proposed repex in turn below.

Minor repairs repex

The information before us indicates that the proposed amount for minor repairs is not prudent nor efficient. Table A.2 shows the proposed breakdown of the base adjustment that amounts to $20.5 million ($2020–21) of expenditure over the 2021–26 regulatory control period.

Table A.2 Components of the proposed minor repairs base adjustment

Type	Description	Minor repairs - total expenditure ($2020–21, million)
Underground	Cable termination replacement	$1.8
Underground	66kV cable screen bonding link box replacement	$1.5
Underground	Minimum cable depth restoration	$0.5
Major Plant	Transformer cooling systems - pipe work, filtration maintenance	$0.7
Major Plant	Zone substation switchyard lighting refurbishment	$0.3
Major Plant	Transformer oil regeneration	$0.6

95 The forecast takes into account the impact of the proposed opex rate of change.

96 CitiPower, *MOD10.06 - Opex model*, January 2020, public.

97 AER, *Draft Decision - CitiPower regulatory determination 2021–26 - Operating expenditure*, September 2020.

Type	Description	Minor repairs - total expenditure ($2020–21, million)
Overhead	Overhead conductor repairs	$0.2
Underground	Underground cable repairs	$15.0
	Total	**$20.5**

Source: Numbers may not add up due to rounding. CP MOD 10.06 - Opex model. The numbers presented here exclude the opex rate of change.

As shown in Table A.3, in addition to activities that relate to works on cables and conductors, CitiPower included miscellaneous refurbishment activities for other assets (such as transformers and switchyard lighting) as part of its minor repairs forecast. The inclusion of these activities duplicates what is already included in other repex categories. For example, CitiPower has forecast transformer-related refurbishment as part of 'Other repex'.[98] CitiPower has not explained why it has included amounts above beyond what's already included in its repex forecast. This is consistent with the over-forecasting bias that is systemic in its forecasting methodology. In addition, there is no evidence that CitiPower has, in fact, removed those activities from historical repex, during the process of recasting its RIN.[99] Therefore, we have not included any non-cable or non-conductor expenditure in our substitute estimate of capex.

We also have a number of concerns regarding the prudency and efficiency of the underground cables and overhead conductors expenditure. CitiPower has not provided any supporting information to justify its proposed expenditure. It did not provide any cost benefit analysis, business cases or risk monetisation to demonstrate that the proposed amount is prudent and efficient.

Further, while CitiPower claims that its proposed amount is representative of its historical incurred expenditure, we found no evidence of this. CitiPower did not provide any historical information, unitised volume and unit cost information that supports its proposed amount. EMCa made the following observation:

> We also observe that, while CitiPower claims that its proposed amount of $4.1m per year (in $2021 terms) results from its analysis of such repair costs in 2019, it was not able to provide the individual repair volume and cost information that we would have expected to see as the basis of this claimed amount. Rather, CitiPower was only able to account for around $1.9m of historical repair costs. CitiPower was also unable to account for its historical recast of minor repairs on the basis of volume and unit cost information, from

[98] CitiPower included $1.3 million ($2019) of transformer refurbishment in its other repex. See, CitiPower, *CP MOD 4.09 - Plant and Stations*, January 2020.

[99] The evidence before us indicates that CitiPower has only recast the overhead and underground asset groups. AER analysis of CitiPower, *Workbook 2 - New historical CAT,* January 2020, Public and the Category Analysis RINs.

which it is reasonable to infer that this is not how CitiPower undertook its 'recast' analysis.[100]

In the absence of cost benefit analysis and historical incurred expenditure that supports its forecast, CitiPower has not established that its forecast for minor repairs repex is prudent or efficient. We have come up with a substitute estimate based on CitiPower's historical data, in particular the historical data for fault repex, for underground cables and overhead conductors.[101] Our substitute estimate is based on our approach for forecasting fault repex. It relies on the simple average of historical volumes and the average unit rates over the 2015–2016 to 2018–2019 financial years, which results in a substitute estimate of $12.7 million ($2020–21, excluding the impact of real cost escalation).[102]

Repex component – as proposed

CitiPower included $3.4 million for underground cables and $0.6 million for its overhead conductors repex. We have assessed the repex component of the total underground cable and conductor expenditure based on the standard repex assessment approach, having regard to:

- The repex model, which was calibrated with data on a like for like basis,[103] indicated that the forecast for both the asset groups was lower than the model predicted. We have placed lower weight on the repex model in this circumstance, due to the reclassification of minor repairs back to repex. In coming to our final decision, we will re-run the repex model, with updated input data, depending on CitiPower's revised proposal and its position on minor repairs.
- Reasoning for the forecast for underground cables and overhead conductors being 48 per cent lower and 382 per cent higher, respectively, than the historical actual repex over the current regulatory control period.[104]
- EMCa's advice that there are a number of concerns with the forecast, particularly around the over-forecasting bias and a unit costs that is higher than efficient.

In addition, for total expenditure, we sought to understand the impact of our substitute estimate on minor repairs plus the as-proposed repex, when compared to the historical incurred repex (on a like for like basis) from a top-down perspective:

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100 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 202.

101 In its regulatory proposal, CitiPower indicated that it has excluded underground cables and overhead conductors from its forecast fault program due to the reclassification of minor repairs. See, CitiPower, *MOD 4.11 - Network Faults*, January 2020, public.

102 We excluded the proposed rate of change forecast from our substitute estimate for capex, consistent with our standard approach for capex forecasting.

103 We relied on recast RIN data as the basis of input to the repex model. The recast RIN series is historical series that took into account the impact of the reclassification of minor repairs from capex to opex

104 We have based our trend analysis on a like-for-like bases, namely the trend analysis compared the reset RIN to the recast RIN (as provided) as part of Workbook 3, See CitiPower, *Workbook 3 - Recast CAT* - January 2020.

- Forecast overhead conductors of $1 million is $0.6 million above the historical incurred expenditure ($0.4 million) over the current regulatory control period.
- Forecast underground cables of $15.6 million is within 0.1 per cent from its expenditure over the current regulatory control period.

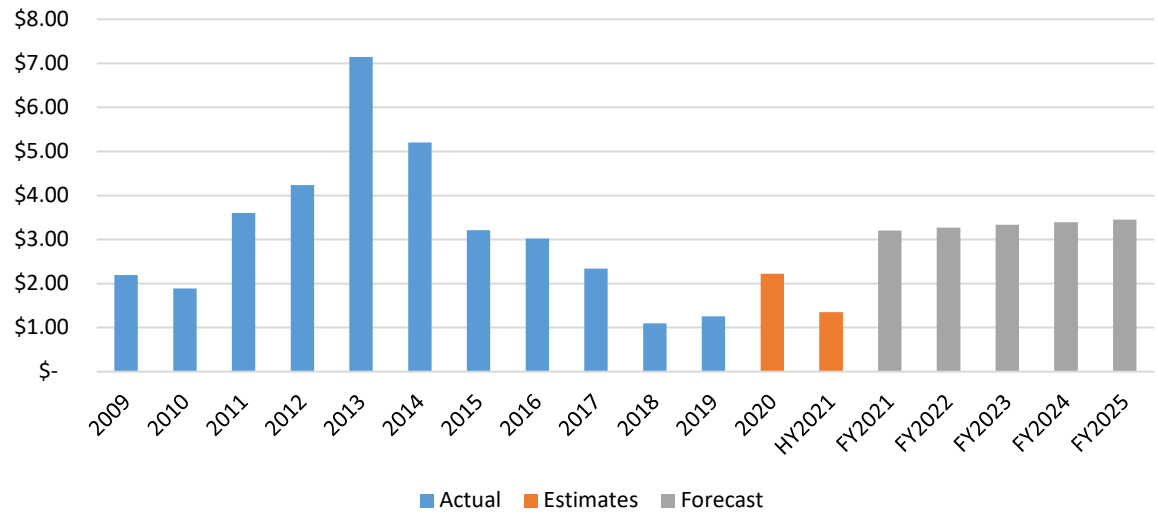
The total forecast overhead conductors expenditure (including minor repairs and as proposed repex) is materially higher than its historical expenditure, without clear justification. However, given the quantum of the expenditure, any further reductions are immaterial. Therefore, we have included approximately $1 million in our substitute estimate for capex.

For underground cables, while we have the same concerns around the lack of bottom-up justification, given the total forecast for cables, minor repairs and as proposed repex, is in-line with its CitiPower's revealed recurrent repex, we are satisfied that $15.4 million represents prudent and efficient costs.[105]

Pole top structures – an unmodelled asset group

CitiPower forecast $16.6 million for its pole top structures repex. This is a 72.5 per cent increase from its current regulatory control period actuals. Figure A.8 below shows the long-term trend of pole top structures replacements.

Figure A.8 the long term trend of pole top structures repex from 2009 to 2026 ($ million, 2020–21)



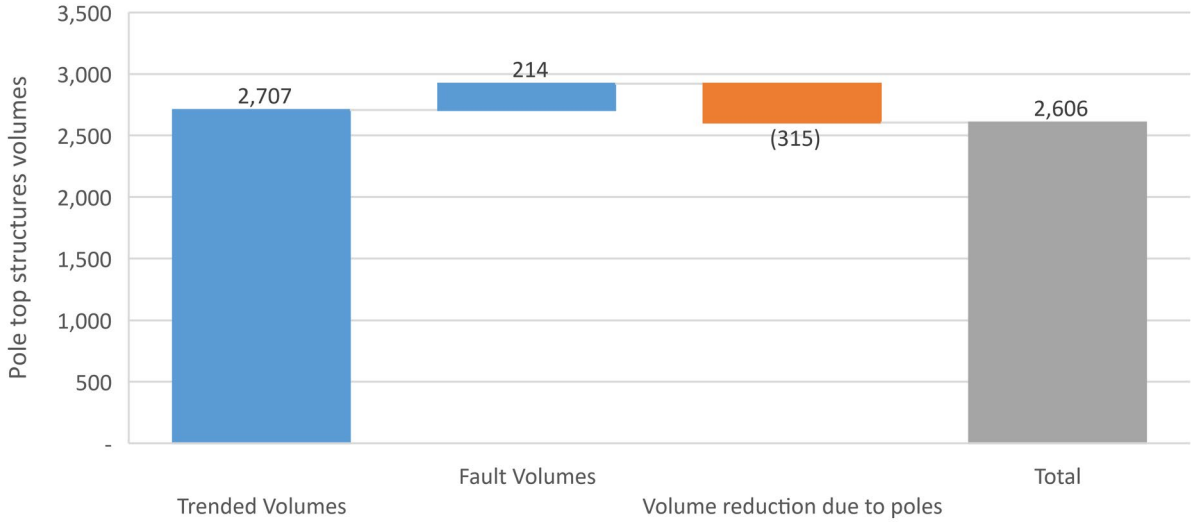
Source: AER analysis.

[105] The substitute estimate incorporates the impact of CPI changes and real cost escalation.

We, including EMCa, requested CitiPower provide us with any cost benefit analysis, business case or risk monetisation to justify its forecast for pole top structures.[106] In response, CitiPower has explained that pole top structures forecast are volumetric. We were not provided with any supporting business cases nor cost benefit analysis.

CitiPower has relied on trended volumes and historical unit rates over the 2014–18 years to build its forecast requirements over the 2021–26 regulatory control period. CitiPower also added volumes for fault related capital, and a negative adjustment to take into account its increased replacement of poles.[107] Figure A.9 shows CitiPower's forecasting methodology for pole top structure volumes.

Figure A.9 CitiPower's pole top structure forecasting methodology



Source: AER analysis of CP supporting models - CP MOD4.06 and CP MOD4.11.

EMCa noted that CitiPower has not justified its proposed pole top structures repex for the following reasons:

- Its forecast increased expenditure from the current regulatory control period is not explained. CitiPower describes the main drivers of replacement as asset condition and/or asset failure, but there were no evidence to explain how asset failure or condition explain the increase.[108]
- Its forecasting approach overstates the replacement volumes based on a historical 'find and fix' reactive management approach. CitiPower describes its forecast for pole top structures as continuing its current find and fix approach. EMCa observed that adopting the averaging of historical defects over the period 2014–15 to

106 CitiPower, *Information Request 019 - EMCa questions*, 20 May 2020.
107 AER analysis of the supporting models, CitiPower, *CP MOD 4.06 - Lines replacement*, January 2020, public.
108 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 55.

2017–18 effectively 'locks in' the elevated replacement volumes that are evidenced in the first prior years and continue through to 2016–17.[109]

- CitiPower's proposed reduction to account for the increase in its proposed pole replacement program is likely to be insufficient. EMCa noted that the derivation of the negative adjustment was not provided. However, EMCa estimated that the proposed incremental increase in poles could result in negative adjustment of 159 units per annum (a total of 795 pole top structures)[110] rather than CitiPower's proposed negative adjustment of 315 pole top structures, which is shown in Figure A.9 above.

In addition, we found that CitiPower's forecast unit costs are 32 to 39 per cent higher than its current regulatory control period unit costs, without sufficient reasoning. In particular, its forecast does not take account of the efficiencies due to its transformation program in the current regulatory control period. In the absence of any cost benefit analysis or supporting documentation, CitiPower has not established that its proposed increase to pole top structures repex is prudent and efficient. Therefore, we have relied on CitiPower's observed pole top structures repex as the basis for our substitute estimate, which results in a forecast of $9.7 million ($2020–21) for its entire pole top structure asset group. The substitute estimate is consistent with CitiPower's average repex over the 2016–2019 regulatory control years and it has taken into account our findings on fault related capital, which are discussed above.

Protection repex – an unmodelled asset group

CitiPower proposed $27 million for replacing secondary protection and control assets at zone substations, which is 83.6 per cent higher than its repex over the current regulatory control period. This program consists of 49 replacement projects, primarily focused on protection relays and remote terminal unit replacements. CitiPower indicated that asset condition and risk, asset obsolescence, and system security compliance are the primary drivers of the proposed replacement. CitiPower provided the output of its CBRM as supporting justification for its forecast.[111]

EMCa reviewed this program and highlighted:

- Documents provided[112] by CitiPower do not provide sufficient justification for the proposed forecast expenditure, including how the replacement projects were selected or how the level of expenditure is reflective of a prudent and efficient level.[113]

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109 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 55.

110 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 56.

111 CitiPower, *Response to Information Request #032 - CBRM HI and POF summary - supplementary response*, public, 17 June 2020.

112 CitiPower provided an expenditure model which includes a list of projects with forecast repex. CitiPower has also provided protection and control asset class strategy. CitiPower, *Response to information request #019 - protection and control asset class strategy*, 12 May 2020.

113 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, pp. 87.

- CitiPower has not demonstrated the relationship between its CBRM tool and its forecast expenditure, to determine how it has arrived at a prudent level of replacement for this category. EMCa noted that the model produces a probability of failure and what appears to be an assessment of network performance consequence from failure of the protection assets. It is not evident from the model, or from the information provided, how CitiPower has used this information, if at all, in producing its expenditure forecast.[114]
- Even though CitiPower has established the need for some level of increase of its supervisory control and data acquisition (SCADA) network control and protection replacement program, the extent of the proposed increase and the timing of replacement projects has not been demonstrated with the information provided.

Based on the information before us, including advice from EMCa, CitiPower has not justified that its forecast expenditure for protection repex, is prudent and efficient. Our substitute estimate is $14.7 million, which is consistent with its average historical repex over the 2016–2019 regulatory control years. We will have regard to any additional justification that CitiPower provides in its revised proposal when we make our final decision.

Other repex – an unmodelled asset group

CitiPower's forecast of $24.9 million for other repex is 40 per cent higher than its historical repex.[115] This category includes a number of assets that do not fit in any other repex categories. They are largely non-homogenous and are lumpy in nature. The largest component of CitiPower's 'other' repex is a $14.1 million program for cable pit refurbishments targeting highest risk (roadway) pits in the Melbourne's central business district (CBD).

CBD cable pit refurbishment

In 2018, CitiPower revised its pit management approach from reactive to proactive, citing 'unacceptable safety risk to employees, the public and our assets'.[116] As part of this proactive program, CitiPower determined a forecast replacement volume of 45 roadway pits. This is based on a 20 per cent defect rate as determined from recent inspections, and forms part of a 10-year program to address about 90 pits (out of 480 known roadside pits).

Based on the information before us, CitiPower has not established that the proposed program, in particular the proposed volume and unit costs, under its proactive replacement strategy, represents prudent and efficient costs. Our concerns are:

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[114] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, pp. 88.

[115] CitiPower initially included $69.9 million in other repex to take into account additional environmental obligations. However, CitiPower has notified us of its withdrawal of its environmental expenditure. CitiPower has updated its environmental repex to be consistent with its historical expenditure.

[116] CitiPower, *2021–26 Regulatory proposal – business case 4.06 – CBD cable pit refurbishment – Public,* January 2020, p. 5.

- There are insufficient credible options considered. The option analysis only compared the proposed proactive approach, a pre-determined volume, against the reactive approach, which is not a feasible option when considering the change in policy to a proactive approach.
- A lack of testing of the chosen replacement volumes. The chosen pit volume is based on an inspection defect rate, which has reduced with more inspections conducted.[117] It is unclear if the inspection sampling was targeted or random, which would impact the defect rate and forecast volume. In terms of testing the volumes, the risk monetisation model indirectly varies the volume by applying a ± 10 per cent to the capex.[118] This implies the same ± 10 per cent to the volumes (for a constant unit rate) and is not a significant variation in volumes to test the efficiency of the program in terms of addressing risk at a reasonable cost.
- To substantiate its unit costs, CitiPower provided observed unit costs for two completed like-projects and an estimated unit cost, which appear to have a wide scope of works.[119] There is insufficient evidence that the provided unit costs are representative of its requirements for all 45 pits, as they appear to contradict the proportional observed defects per pit as part of its sampled inspection.[120] In addition, the unit costs do not appear to take into account the efficiency gains from its transformation program.
- Limited evidence of network reliability issues, safety incidents or near misses associated with CitiPower's pit failures to justify the increased expenditure.[121]

EMCa reviewed this program and considers the adoption of a pit refurbishment program is sound. However, like our findings, EMCa found the modelling did not support the proposed proactive program, and highlighted additional issues with the input assumptions that, when considered altogether, inflate the risk cost:[122]

- The likelihood of consequence (20 per cent) for a catastrophic failure will result in a loss of life appears likely overstated, 'particularly when moderated for the time a person may be present at the time of the catastrophic failure and incur fatal injuries.'[123]
- CitiPower included three pit failure modes and categorised them as: catastrophic for failure due to dynamic vehicle loading; major for pedestrian loading; and,

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117 The defect rate in the business case is 20 per cent (six pits out of 30 inspections) but the defect rate is 15 per cent (six out of 39 inspections) in the response to information request 040.

118 CitiPower, *2021–26 Regulatory proposal – model 4.05 – CBD cable pits – Public,* January 2020.

119 The scope of works for the above projects includes the removal of the existing concrete roof turret and slab, cleaning and remediation of existing walls, floor and cracks, installation of temporary cable supports, installation of concrete ring beam using masonry anchors (including new steel support beams), installation of new pre-cast concrete roof slab, installation of new ladder, and the reinstatement of roadways and pavement. CitiPower, *Response to Information request 040 – Q1*, June 2020.

120 CitiPower, *Response to Information request 040 – Q2,* June 2020.

121 CitiPower, *Information request 040 – Q2,* June 2020.

122 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26,* September 2020, pp. 91–92.

123 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26,* September 2020, p. 92.

significant for internal pit failures. EMCa indicated that the catastrophic risk would typically be assigned a consequence of higher magnitude, which would more likely involve a pedestrian. In contrast, a pit failure due to dynamic loading from a vehicle would less likely result in a fatality given the protections in a vehicle. The values assigned for probability of failures for a catastrophic failure (around 10 per cent) and a significant failure (around 1 per cent) are reversed. It is expected that the risk of catastrophic failure would be lower than the risk for a significant failure. The reversal of these values would impact the risk modelling.

After accounting for adjustments to the above assumptions in the model, EMCa found that the:[124]

> …risk cost does not exceed the annualised program cost in the study period. Absent better information, we consider that a program of a similar size to continuing a reactive management approach of $2.9m,[125] is likely to be more representative of an efficient level of expenditure.

Overall, CitiPower has not demonstrated that the expenditure proposed for its CBD cable pit program is prudent and efficient. Our draft decision has adopted a substitute estimate of $2.9 million, which is consistent with its reactive approach to-date.[126] In making our final decision, we will have regard to any additional information in CitiPower's revised proposal, particularly further justification for its unit costs and volumes.

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124 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26,* September 2020, p. 92.

125 Based on CitiPower's estimate of expenditure for the next RCP from expenditure incurrent in 2017 and 2018 as described in CitiPower *BUS4.06 CBD cable pits*, page 9.

126 CitiPower, *2021–26 Regulatory proposal – model 4.05 – CBD cable pits – Public*, January 2020.

A.2 DER integration capex

DER includes solar PV, energy storage devices, electric vehicles (EVs) and other consumer appliances that are capable of responding to demand or pricing signals. Increasing DER penetration represents a change in the way that consumers interact with electricity networks and the demands that are placed on networks.

DER integration expenditure addresses increasing DER penetration on the network. This includes managing voltage within safety standards and allowing solar customers to dynamically export back into the grid. DER integration capex includes:

- augmenting the network to physically provide greater solar PV export capacity
- ICT capex to develop greater visibility of the low-voltage (LV) network and manage changes being driven by technological developments (batteries and EVs).

A.2.1 Draft decision

CitiPower has not demonstrated that its initial DER integration capex forecast of $60 million is prudent and efficient. We have included $43.4 million for this category in our substitute estimate of total capex, which is $16.7 million (28 per cent) lower than CitiPower's initial proposal.

A.2.2 CitiPower's initial proposal

CitiPower's initial DER integration capex forecast includes the following programs:

- solar enablement (augex) – augmenting distribution transformers to increase capacity
- digital network (ICT capex) – ICT capex technology upgrades
- digital network devices (augex) – targeted rollout of network devices to facilitate the two programs above
- LV supply quality (augex) – business-as-usual augex required to maintain supply quality
- dynamic voltage management system (DVMS) (ICT) – enables remote and dynamic voltage adjustment.

For this draft decision, these programs have been grouped together to form the DER integration capex category. The relevant forecasts have also been subtracted from CitiPower's respective augex and ICT capex forecasts, ensuring the forecasts are not double counted and the total net capex amounts reconcile.

A.2.3 Reasons for draft decision

CitiPower has adequately supported most aspects of its DER integration capex proposal. However, we consider CitiPower has overstated its solar enablement program by including investments that would be more prudent to undertake in subsequent regulatory control periods. In addition, CitiPower has not fully explained

how its solar enablement program interrelates with other aspects of its DER integration capex forecast, particularly its digital network program, as well as its tariff structure statement proposal. Stakeholders such as CCP17 raised similar concerns.[127]

Solar enablement

CitiPower stated that it proposed this program because it is forecasting a large increase in solar PV penetration during the forecast regulatory control period.[128] This is expected to cause localised network voltages to rise, which may cause solar inverters to trip off as a safety measure that prevents the solar PV system from producing and exporting.[129] CitiPower is also forecasting an associated solar enablement step change, which includes tapping and an ongoing compliance program. Transformer tapping is an operational practice that helps to regulate network voltages. Our opex decision (Attachment 6) outlines further detail.

We are supportive of CitiPower facilitating solar PV growth on its network. However, its forecast overstates what is necessary to deliver the Victorian Government's Solar Homes program. Specifically, its analysis includes investments that would be more prudent to undertake in subsequent regulatory control periods. Secondly, the solar enablement program business case uses a 30-year NPV analysis period, unlike the standard 20-year NPV period CitiPower uses for other repex and augex projects.

We think capex required to increase DER export capacity can be considered SCS and is consistent with the capex objectives. In assessing the solar enablement program, consistent with EMCa's advice, we have been guided by two principles: timeliness and proportionality. Considering timeliness ensures that investments are undertaken as they are needed and not before they are required. Considering proportionality requires that, given the substantial amount of network augmentation proposed, possible lower cost solutions are exhausted and each augmentation is individually justified.

EMCa stated that considering these principles will help facilitate the most appropriate actions being taken to accommodate distributed solar and to enable customers to achieve the benefits of their own investments.[130] As a result, overall our draft decision better reflects the costs needed for customers to export energy and ensures that customers are not overcharged.

Timeliness – Optimal investment timing

EMCa's review of CitiPower's solar enablement program identified that distribution transformer upgrades that would be more prudent to undertake in subsequent regulatory control periods have been included in CitiPower's initial proposal.[131] CitiPower sought to determine a time profile for its proposed expenditure as the year

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127 CCP17, *Advice to the AER on the Victorian electricity distributors' regulatory proposals,* June 2020, p. 105.

128 Solar customers as a proportion of total customers.

129 CitiPower, *Solar enablement business case,* January 2020, p. 3.

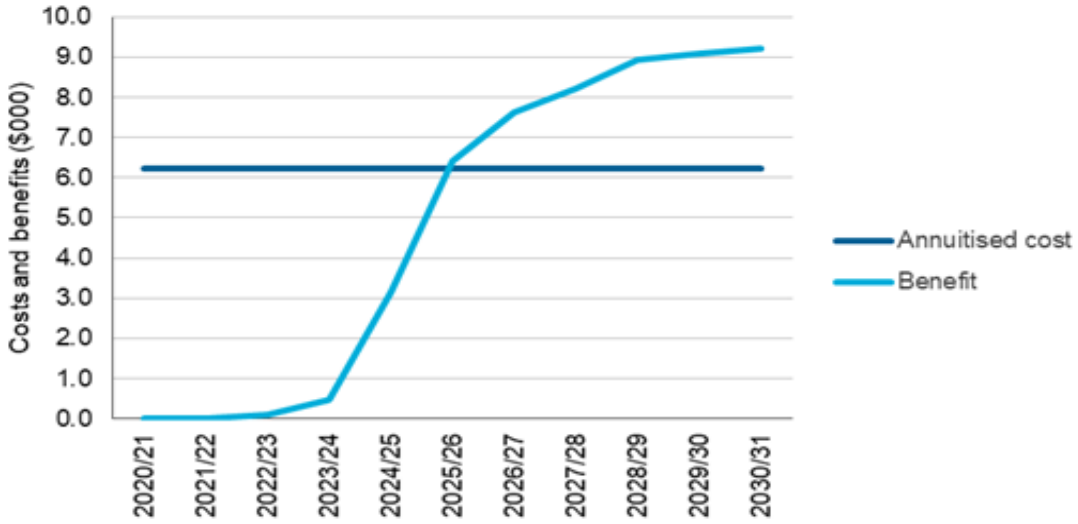
130 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 128.

131 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 133.

when the cost-benefit analysis model first produces a positive NPV. This is erroneous and also inconsistent with the method CitiPower (and other distribution businesses) apply in seeking to determine the appropriate timing for other augex projects.

The applied approach brings forward augmentations when they are still uneconomic, but have a positive NPV only because their forecast of distant future positive net benefits is offsetting the still negative net benefits within the forecast period. The standard approach is to identify when the annual benefits exceed the annual costs, in this case represented by the annuitised cost of the upgrade being considered. EMCa's analysis highlighted that the net benefits to customers are far smaller if these augmentations are undertaken before this time. Figure A.10 below outlines an example of this analysis and highlights that the optimal investment timing for this specific transformer is 2025–26.[132]

Figure A.10 Annuitised costs and modelled benefits of one transformer upgrade ($2020–21)

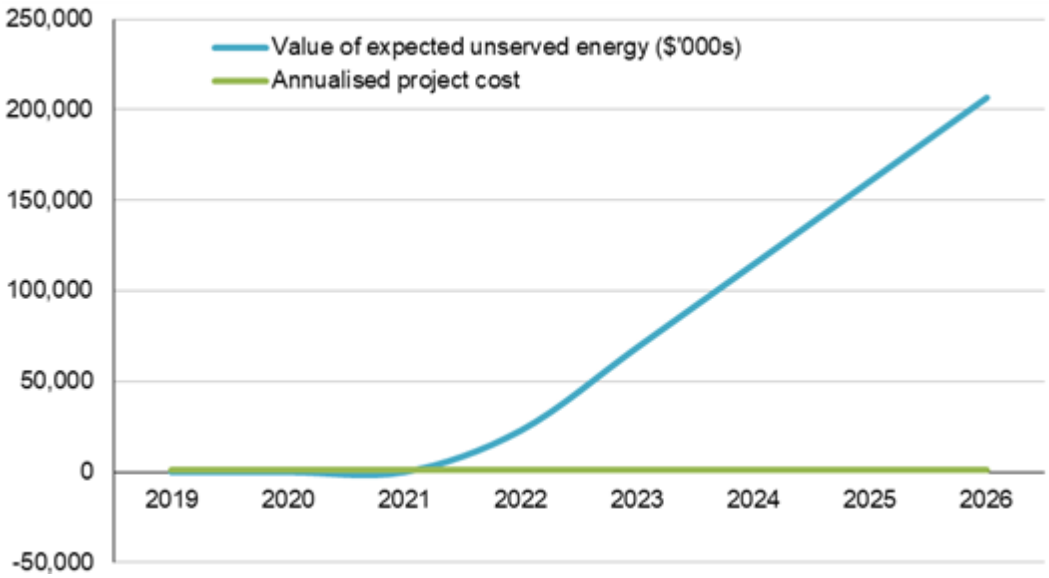


Source: EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 133.

Figure A.10 highlights that the annual benefits of this distribution transformer upgrade are not expected to exceed the annualised costs until 2025–26. This type of analysis is consistent with how some distributors propose and we typically assess repex and traditional augex proposals. Figure A.11 below outlines the analysis CitiPower undertook for its CBD security augex project. It used this approach to ascertain the optimal timing of each of its traditional augex proposals but has not done so for DER.

[132] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 133.

Figure A.11 CitiPower's assessment of the energy not served vs the annualised option cost ($2020–21)



Source: EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 115.

EMCa applied the same analysis approach to all proposed distribution transformers. Conducting the analysis of the proposed 30-year period produces 240 distribution transformers that are economic to upgrade in the forecast period, compared with CitiPower's proposal of 319 transformers.[133] In other words, 79 of the proposed transformers have an optimal investment timing trigger point (where the expected benefits exceed the expected costs) outside the forecast period (2026–27 or later). Therefore, EMCa's analysis highlights that it is not prudent and efficient to upgrade these transformers in the forecast period.

To further support this position, EMCa conducted both NPV analysis and optimal investment timing analysis for a sample of distribution transformers. EMCa's NPV analysis showed that the upgrades should be triggered around the same time as determined by the optimal investment timing analysis method. In other words, the net benefit is low if the upgrade is done prematurely, but increases significantly if the timing is deferred. In addition, EMCa's analysis shows that if the upgrade is deferred even further beyond this point, the net benefit reduces, which further supports the assertion that the selected timing is optimum.

Proportionality – NPV analysis period

CitiPower's solar enablement business case is based on a 30-year NPV analysis. Standard approaches to this type of analysis for other augex and repex projects use a 20-year NPV period. EMCa noted that CitiPower had not adequately considered the

[133] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 133.

uncertainty inherent in justifying capex based on a 30-year model of assumed PV export benefits.[134] EMCa advised that using a 20-year NPV period aligns with CitiPower's cost-benefit analysis approach for its augex and repex programs.

CitiPower stated that a 30-year analysis period is appropriate because uncertainty had already been factored into its analysis by using conservative assumptions for forecast PV uptake and installed inverter capacity.[135] However, this response indicates that CitiPower has not placed weight on the potential for battery technology to develop and consumer behaviour to change in response to cheaper and developing technologies.

CitiPower also submitted that shortening the NPV analysis period would require the time over which assets are depreciated to be shortened as well.[136] However, we do not agree with this assertion. There are many examples of other expenditure where the economic analysis period does not align with the depreciation life. For example, the standard approach to conduct NPV analysis is generally over 20 years, including for repex and augex. However, these assets are not depreciated over 20 years. For example, CitiPower's distribution system assets have a standard life of 51 years. In addition, CitiPower's ICT assets have a standard life of six years, but the economic analysis is not conducted over this same period.

EMCa's review also came to the same conclusion. EMCa did not agree that the NPV analysis period must equal the depreciation life of the relevant asset. EMCa stated that:

> Low-voltage assets may well have economic lives of 45 years or more and are typically depreciated accordingly. Similarly, we would expect that an LV asset that is installed as part of an LV augmentation, whether for solar enablement purposes or for other reasons, would have a similar expected life in service.
>
> The question at issue here is not the life of the asset itself, but the analysis period for which it is reasonable to consider benefits to justify the augmenting the existing low-voltage network, in this case, for solar enablement purposes. This requires consideration of a reasonable forecasting horizon, within which a reasonable estimate of costs and benefits can be made.[137]

Other considerations

CitiPower conducted forums, surveys, a deep dive workshop, and published and consulted on an options paper to develop options for enabling solar. It contends that customer feedback from these engagement activities was pivotal in shaping its approach and noted that its customers can tolerate reasonable constraints but the network must be prepared to accommodate more solar and ensure these constraints are not excessive. However, CCP17 submitted that the way the investment proposal

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134 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 128.
135 CitiPower, *Response to information request 41,* July 2020, p. 9.
136 CitiPower, *Response to information request 41,* July 2020, p. 12.
137 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 131.

was presented to customers may have led to the CitiPower overstating customers' expectations.[138]

CitiPower concluded that allowing some (reasonable) level of solar constraint and removing it when the cost of continuing to allow the constraint outweighs the cost of removing was the only option that is capable of maximising the net benefits of solar. A key component of this assessment is the value CitiPower attributes to the additional solar proposed to be added to its network.

Many stakeholders highlighted concerns with how CitiPower valued solar PV exports in its solar enablement modelling:

- The Victorian Department of Environment, Land, Water and Planning (DELWP) submitted that the Victorian Government is committed to helping Victorians take control of their energy bills, create jobs and take strong and effective action on climate change via the Solar Homes program, and CitiPower's proposed solar enablement program will support the delivery of its program over the forecast period.[139] However, DELWP acknowledged that assessing the proposed investment is challenging due to lack of agreed methodology and limitations of transparency in assumptions and approaches.[140]
- CCP17 submitted that the assumed value of rooftop solar exports used in the modelling does not consider that over the life of the investment there might be zero or negative pool prices.[141]
- EnergyAustralia submitted that there are some aspects in the treatment of DER that warrant closer attention, particularly the value of solar export, and noted that generally the DER integration proposals tended to overstate the value of solar export.[142]
- Energy Users' Association of Australia (EUAA) stated that the value of DER may be overstated, highlighting that in both South Australia and Queensland in the last twelve months, at times in the middle of the day increased solar PV can have no value or a negative value with the incidence of negative pool prices increasing.[143]
- VCO supported a standard approach for valuing exported generation that reflects the expected changes in the value of DER exports over time.[144]

Similar concerns were raised in response to our consultation paper on Assessing DER Integration Expenditure,[145] in addition to a lack of consistency across distributors in

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138 CCP17, *Advice to the AER on the Victorian electricity distributors' regulatory proposals,* June 2020, p. 106.
139 DELWP, *Victorian Government submission on the electricity distribution price review 2021–26,* May 2020, p. 2.
140 DELWP, *Victorian Government submission on the electricity distribution price review 2021–26,* May 2020, p. 3.
141 CCP17, *Advice to the AER on the Victorian electricity distributors' regulatory proposals,* June 2020, p. 106.
142 EnergyAustralia, *Submission to VIC DNSP proposals,* June 2020, p. 1.
143 EUAA, *EDPR submission,* June 2020, p. 11.
144 VCO, *2021–26 Victorian EDPR – Joint submission*, May 2020, p. 10.
145 See: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/assessing-distributed-energy-resources-integration-expenditure/initiation.

valuing the benefits associated with investing in DER integration. In response, we and the Australian Renewable Energy Agency commissioned the VaDER study earlier this year.[146] The Commonwealth Scientific and Industrial Research Organisation and Cutler-Merz were engaged to conduct a study into potential methodologies for valuing DER and have extensively engaged with stakeholders, including CitiPower, as part of the study.

The final report of the VaDER study is due to us in early October 2020, which will help to address some of the stakeholder concerns outlined above. We will publish the final report as soon as practicable. We will then consider the report's recommendations and formally implement them as we consider appropriate as part of our DER integration expenditure guideline, now due for completion in 2021. Given the extensive stakeholder engagement in forming the VaDER study's recommendations, we anticipate that consumers will expect Victorian distributors to prepare their revised proposals in the spirit of these recommendations.

Substitute estimate

Our substitute estimate conducts the optimal investment timing analysis discussed above over a 20-year analysis period, rather than the 30-year period that CitiPower proposed. This is consistent with our standard assessment approaches for more traditional types of expenditure, such as repex and augex. This approach reduces the number of distribution transformers that are economic to upgrade in the forecast period from 319 to 180 and contributes $18.6 million[147] to our substitute estimate of total capex.

Digital network

CitiPower's DER integration capex forecast includes a digital network program. It outlined that its network is going through a large transformation. It has good visibility of its high-voltage network, but changing customer requirements such as demand management programs, EVs and battery uptake require it to develop greater visibility of its low-voltage network.[148] CitiPower expects this program will allow it to manage the network more efficiently in real-time, through better forecasting, monitoring and diagnosis, and eventually through automation.[149]

The listed benefits of its digital network program are promoting EVs uptake, optimising load control of customer appliances, enhancing cost-reflective pricing, detecting electricity theft, proactively managing asset failures, avoiding overblown fuses, looking after vulnerable customers and keeping customers safe.[150] CitiPower proposes to

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146 See: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/assessing-distributed-energy-resources-integration-expenditure/consultation.

147 This amount is before real price escalation changes have been taken into account.

148 CitiPower, *Digital network business case,* January 2020, p. 4.

149 CitiPower, *Digital network business case,* January 2020, p. 3

150 CitiPower, *Digital network business case,* January 2020, p. 5.

implement more advanced technological capabilities and extend its advanced metering infrastructure (AMI) coverage to type 1-4 contestable metering customers (large customers) and unmetered supply customers in a targeted rollout.

CCP17 acknowledged that a level of investment is needed to establish a data gathering and analytics capability to explore some of the benefits identified. However, it questioned why CitiPower could not draw reasonable advantages regarding energy theft, customer energy profile modelling and EVs charging analysis from its existing systems, noting that Victorian customers have already spent a significant amount on advanced metering at most customer supply points.[151]

Therefore, CCP17 submitted that it did not support the digital network programs because other simpler and less costly alternatives exist to achieve similar outcomes; many expectations of customer acceptance of these initiatives are untested; the benefits to customers are not clear, are over a long time period subject to exogenous factors that may or may not change.[152]

EMCa's review highlighted that digital network may have merit but that the investments may be premature for the forecast regulatory control period. EMCa noted the needs analysis for real-time data to support digital network has not been fully justified.[153] EMCa considered that the claimed positive net benefit is strongly dependent on benefit streams continuing for 10 to 20 years and there is considerable uncertainty in these benefit streams beyond 10 years.[154]

However, CitiPower has provided quantified benefits for its digital network program to improve the capabilities regarding EVs uptake, cost-reflective pricing and customer appliance load control. As highlighted above, these aspects were not accounted for in the distributors' solar enablement proposals. We consider it would not be reasonable to highlight that CitiPower had not accounted for these considerations in its solar enablement program, but then materially reduce the complementary ICT proposals that aim to facilitate these capabilities.

While we agree with EMCa's assessment and stakeholder submissions that highlighted that the digital network programs may be marginally overstated, we consider it is more critical for CitiPower to account for the capabilities outlined above, particularly EVs uptake and cost-reflective pricing, in its revised solar enablement proposal. Therefore, we have included CitiPower's initial digital network forecast ($11.5 million) in our substitute estimate of total capex. As noted above, CitiPower has flagged that it intends to reconsider the intended outcomes and output measures of its DER integration capex forecast, and test alternative options in light of additional stakeholder engagement on its proposal.

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151 CCP17, *Advice to the AER on the Victorian Electricity Distributors' Regulatory Proposals,* June 2020, p. 100.

152 CCP17, *Advice to the AER on the Victorian Electricity Distributors' Regulatory Proposals,* June 2020, p. 100.

153 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 149.

154 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 151.

A.3 Augex

The need to build or upgrade the network to address changes in demand and network utilisation typically triggers augex. The need to upgrade the network to comply with quality, safety, reliability and security of supply requirements can also trigger augex.

A.3.1 Draft decision

We do not accept CitiPower's proposed augex forecast of $131.5 million, as CitiPower has overstated the risks involved with delaying the replacement and upgrade of key assets. Our substitute estimate is $103.5 million[155], based on our finding that the efficient and prudent timing for its Port Melbourne project is beyond the forthcoming regulatory control period.

A.3.2 CitiPower's initial proposal

CitiPower has proposed $131.5 million in non-DER augex. We have divided this between traditional augex ($120.4 million) and communications augex ($11.1 million).

Traditional augex

The major projects CitiPower proposed in this category are:

- CBD Supply ($25.5 million);
- Russell Place Supply Area ($11.2 million);
- Port Melbourne Supply Area ($19.6 million); and
- Brunswick Supply Area ($28.7 million).

CitiPower proposed the CBD Supply project to meet its security of supply obligations as maximum demand grows. It proposed the other three major projects to replace older assets and retire a legacy voltage standard (6.6kV).

CitiPower also proposed $29.2 million for smaller projects not supported by business case analysis. Based on descriptions CitiPower provided, 85 per cent of capex for these smaller projects is driven by forecast demand growth, leaving the remainder driven by other requirements (such as regulatory compliance).[156]

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[155] The substitute estimate takes into account modelling adjustments, such as the impact of CPI and labour price growth.

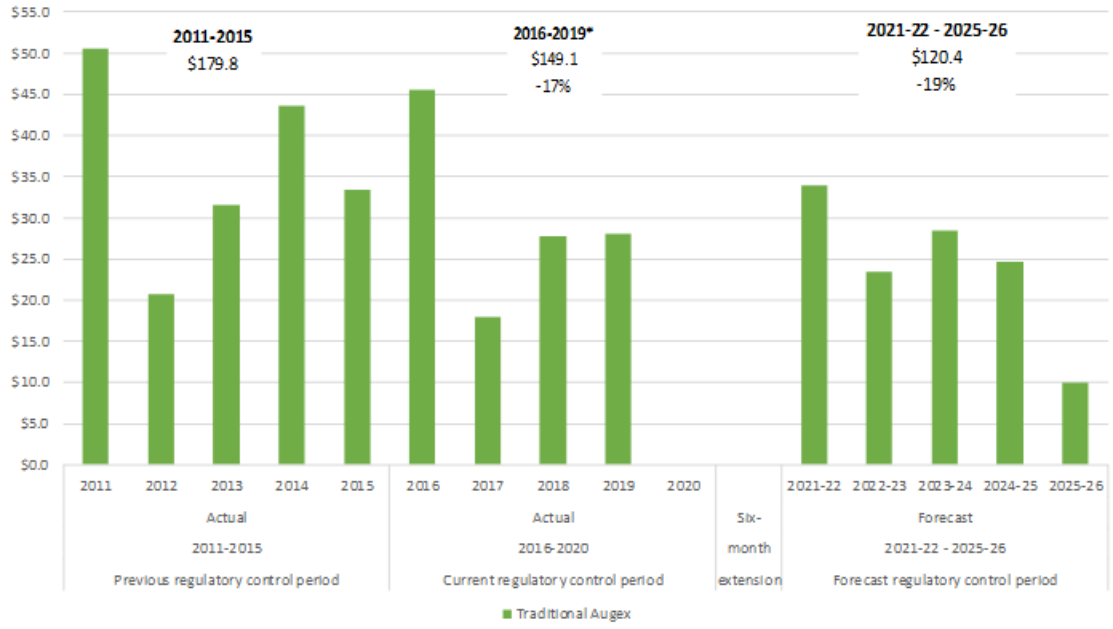
[156] CitiPower, *Response to Information request 16 – Q3,* 29 April 2020, pp. 1–2.

A.3.3 Reasons for draft decision

Traditional augex

As discussed in Section B (Forecast Demand), CitiPower's maximum demand forecasts are materially overstated. However, CitiPower has forecast a 19 per cent decrease in yearly traditional augex, compared to actuals over the 2016–2019 regulatory control years, as shown in Figure A.12.

Figure A.12 CitiPower's historical vs forecast traditional augex ($ million, 2020–21)



Source: AER analysis based on CitiPower RIN data.

Note: Traditional augex is defined as augex excluding 'network communications' augex and DER capex. No estimate was made for 2020 or the six-month extension.

As a small urban distributor, CitiPower tends to have a smaller number of larger projects. The 6.6kV upgrade projects included in actuals and the forecast are also inherently required only once. Accordingly, we have treated major projects in this category as non-recurrent expenditure, and assessed them bottom-up, particularly given their interrelationship with its repex forecasts.

CBD supply

CitiPower has a specific regulatory obligation relating to security of supply to the Melbourne CBD ('N-1 Secure'). There is also a 6.6kV upgrade component.

CitiPower's business case in part relies on its demand forecasts. We sensitivity tested CitiPower's demand forecasts against alternative demand forecasts at the zone substation level using AEMO's 2019 terminal station forecasts. This did not change the need for this project within the 2021–26 regulatory control period.

EMCa observed that the proposed timing and costs for this project are likely to be reasonable.[157]

6.6 kV upgrade projects

CitiPower has included three projects to upgrade its 6.6 kV network. The projects are to upgrade the 6.6kV network in the Port Melbourne, Brunswick and Russell Place supply areas. CitiPower submits that the 6.6 kV network is out-dated and not consistent with current industry standards. CitiPower highlights that other distributors in the NEM (such as Ausgrid and United Energy) have moved away from 6.6kV networks.

CitiPower has provided a range of documentation, such as a business case and risk monetisation model, to support the augmentation. In addition, CitiPower has undertaken a RIT-D for its Russell Place zone substation, with an augmentation proposed to commence in late 2020.[158]

These projects are driven by the need to replace existing ageing assets (risk driven), albeit with an augmentation solution. We consider that they are more reasonably considered replacement-type expenditure, rather than augex. The distinction does not change our assessment.

We have reviewed the supporting analysis and risk monetisation to determine the prudency and efficiency of the expenditure. Our review of the supporting risk monetisation for the Port Melbourne supply area has highlighted the following concerns:

- **Overstated probability of failure**: CitiPower's modelling assumes, using a probability of failure calculation, that if any of its three transformers within a zone substation fails, then there would be a loss of the entire substation. The lost supply would take three days to restore.

  CitiPower has not taken into account the joint probability of failure, namely, that for a loss of supply to occur, two of its transformers would be required to fail simultaneously for a loss of supply to eventuate.[159] We questioned CitiPower on its assumption, CitiPower indicated that in the event of a catastrophic failure, it is likely that the failure of one transformer would result in the failure of adjacent transformers causing the resultant full outage.[160] CitiPower did not model the likelihood of that event. Based on its response and its modelling, the likelihood of the catastrophic failure of a transformer simultaneously leading to the failure of the adjacent transformer is assumed to be 100 per cent certain.

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157 EMCa, *Review of aspects of proposed expenditure – CitiPower's regulatory proposal 2021–26,* August 2020, p. 114.

158 CitiPower, *Response to information request 52 – HV fuses, surge diverters and Russell Place*, 16 July 2020.

159 In an information request, CitiPower has indicated that the zone substation currently has two transformers rather than the three transformers included in its modelling. CitiPower, *Response to information request 54 - Port Melbourne supply area and transformer repex*, 21 July 2020.

160 CitiPower, *Response to information request 54 - Port Melbourne supply area and transformer repex*, 21 July 2020.

- **Overstated likelihood of consequence**: CitiPower's modelling assumes that 100 per cent likelihood of consequence for the majority of its variables. A 100 per cent likelihood of consequence overstates the risk, as it assumes that in any failure event, there will be multiple fatalities, which does not take into account the location or the controls in place that mitigate that consequence.
- **Overstated cost of consequence**: for the reliability cost of consequence, CitiPower assumes that in the event of a transformer failure, the entire load will be lost and a generator would be required to backfill for the lost load for four weeks (at a cost of $14 million). Not only is the probability of failure overstated, but the cost of consequence calculation does not take into account that there is an existing zone substation (Fisherman's Bend Zone substation) within the supply area, that has existing capacity and very low load that could accommodate load transferred to it. In an information request response, CitiPower confirmed that there is an existing 1.7 MVA transfer capability. The transfer capability was not included in its risk modelling. The inclusion results in a lower cost of a consequence and the deferral of the calculated efficient timing.

While EMCa observed that the range of options considered are adequate and that the costs are likely to be reasonable, it concluded that the efficient timing for the project is likely to fall in the 2026–2031 regulatory control period.[161]

The above concerns affect the timing of each of the projects. For Russell Place and the Brunswick supply area however, while these concerns affect the timing, the efficient timing remains within the forecast regulatory control period. For the Port Melbourne supply area, incorporating Fisherman Bend's transfer capacity and adjusting for the above concerns (particularly for the joint probability of transformer failure) results in an efficient timing in the 2026–2031 regulatory control period. Based on the information before us, CitiPower has not established that its augmentation timing at Port Melbourne is efficient or prudent, therefore, we have adopted a substitute estimate that includes all of the proposed augex within this category, with the exception of the Port Melbourne supply area.

Remaining traditional augex

This comprises 18 individual projects with an average value less than $2 million each ($29.2 million in total). EMCa observed that as projects in this category are unsupported by business case analysis it is not possible to determine their prudency and efficiency bottom-up.[162] Given the downward overall trend in traditional augex we consider this forecast is reasonable and have not assessed the need for these projects bottom-up.

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[161] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 107–108.

[162] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 95.

Communications augex

CitiPower proposed other augex programs including network communications device upgrades and other technology upgrades. EMCa's review highlighted that CitiPower did not provide information to support its communications augex forecast.[163] We encourage CitiPower to include further supporting information including business cases and cost models for these aspects of its forecast in its revised proposal.

Consistent with our alternative control services (ACS) capex draft decision, we have reallocated a proportion of CitiPower's proposed network communications expenditure to ACS capex. CitiPower allocated 100 per cent of its 3G shutdown network communications program to SCS capex. However, as outlined in our ACS metering draft decision (Attachment 16), some 3G shutdown capex should be allocated to ACS metering. The 3G systems that are being replaced are used to backhaul bulk data from AMI meters. This data is used for both metering and standard control network services. Therefore, this cost should be shared between SCS and ACS. Based on our analysis, we have allocated 90 per cent of this program to SCS capex and the remaining 10 per cent to ACS capex.

Similarly, CitiPower allocated 88 per cent of its annual communication devices program to SCS capex. Our ACS metering analysis has determined that this allocation should be 25 per cent SCS capex and 75 per cent ACS capex. Our substitute estimate of total capex is consistent with these reallocations. Our metering draft decision (Attachment 16) outlines further analysis of these reallocations.

A.4 Connections capex

Connections capex is expenditure incurred to connect new customers to the network and, where necessary, augment the shared network to ensure there is sufficient capacity to meet new customer demand.

A.4.1 Draft decision

We do not accept CitiPower's gross connections and capital contributions forecasts of $426.3 million and $291.5 million respectively as COVID-19 has since affected construction activity. Our substitute forecast adjusts gross connections and capital contributions to $376.5 million and $256.7 million respectively, based on a dwelling construction forecast by the Housing Industry Association (HIA).

A.4.2 CitiPower's initial proposal

CitiPower proposed $426.3 million for gross connections, and $291.5 million for connections capital contributions. For high-volume connections (typically residential and smaller connections), CitiPower forecast volumes initially based on their average by type between 2015–16 and 2018–19, then applied growth rates for construction

[163] EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 119.

activity taken from the Australian Industry Construction Forum for regions in its network. It similarly averaged unit rates by type between 2015–16 and 2018–19.

For 'low-volume' connections, CitiPower used a combination of bottom-up build and historical average methods. CitiPower has forecast contributions, gifted assets and rebates based on 2016–17 to 2018–19 averages. It stated it used this shorter period due to the change in its connections contributions policy from July 2016.

A.4.3 Reasons for draft decision

CitiPower forecast connections based on construction activity forecasts produced prior to COVID-19. The virus has strongly affected the construction industry, and is likely to continue to reduce activity due to its effect on net migration and overall output.

Compared to current regulatory control period expenditure, prior to COVID-19 effects, CitiPower's net connections capex is reasonable from a top-down perspective. On a yearly basis, compared to the three and a half years for which we have actuals under its current connections policy (since July 2016), CitiPower forecast a 6 per cent decline (including after applying its real escalation).

We have therefore adopted this forecast but made a COVID-19 adjustment, based on HIA forecasts released in April. We have used these forecasts as they provide a Victoria-specific forecast and extend one year into the forthcoming regulatory control period.[164] To estimate the effects of the virus over financial year 2021–22, we compared forecast dwelling starts with actual yearly dwelling starts prior to COVID-19 over the current regulatory control period (calendar years 2016–19). This gives a ratio of 0.58. This is an approximate measure of the forecast effects of the virus, as this is the major factor the HIA sought to account for in producing these forecasts. We then applied this ratio to CitiPower's forecast gross connections and capital contributions for 2021–22. This results in a 9 per cent reduction to both, reducing net connections by $11.5 million compared to CitiPower's proposed $134.8 million.

Currently, the duration of the main consequences of the COVID-19 virus is highly uncertain. The Reserve Bank of Australia's August Statement on Monetary Policy assumes international border restrictions will ease from the middle of 2021 in its baseline scenario.[165] Net migration and construction activity will likely then take time to recover. This indicates it is reasonable to assume the effects of the COVID-19 on construction will have ended by July 2022. Therefore, for the years after financial year 2021–22, we have accepted CitiPower's pre-COVID-19 forecasts.

For our final decision, we would incorporate any new information that would materially affect the forecast. This could include:

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[164] Housing Industry Association, *HIA Housing Forecasts - April 2020 COVID-19 Update*, April 2020.

[165] Reserve Bank of Australia, *Statement on Monetary Policy*, August 2020, Section 6 (Economic Outlook).

- Updated construction forecasts for Victoria (including those that would allow us to distinguish effects by type of connection)
- Any actual 2020 capex data from CitiPower; or
- Updated information about the likely length of the pandemic.

A.5 ICT capex

ICT refers to all devices, applications and systems that support business operation. ICT expenditure is categorised broadly as either replacement of existing infrastructure for reasons due to end of life, technical obsolescence or added capability of the new system, or the acquisition of new assets for a distributor need.

A.5.1 Draft decision

We do not accept that CitiPower's initial ICT capex forecast of $83.4 million would form part of a total capex forecast that reasonably reflects the capex criteria. We have included $66.6 million for this category in our substitute estimate of total capex, which is $16.8 million (20 per cent) lower than CitiPower's initial proposal.

A.5.2 CitiPower's initial proposal

CitiPower's initial proposal includes an ICT capex forecast of $83.4 million, which is split into $53.4 million in recurrent ICT and $30.0 million in non-recurrent ICT. Table A.3 summarises CitiPower's initial proposal and our draft decision. As noted above in Section A.2, we have included CitiPower's digital network and solar DVMS programs in the DER integration capex category. These programs are therefore excluded from the numbers and analysis presented below.

Table A.3 Draft decision on CitiPower's ICT capex forecast ($ million, 2020–21)

Category	Initial proposal	Draft decision	Difference ($)	Difference (%)
Recurrent ICT	53.4	40.0	-13.4	-25
Non-recurrent ICT	30.0	26.7	-3.3	-11
Total ICT capex	**83.4**	**66.6**	**-16.8**	**-20**

Source: AER analysis.

Note: Numbers may not sum due to rounding.

A.5.3 Reasons for draft decision

We have had regard to all the information before us, including EMCa's review and stakeholder submissions. We received several submissions that raised questions or concerns about CitiPower's ICT capex, including from CCP17, Energy Consumers Australia and Origin Energy. The submissions noted that:

- the benefits were not always clear and opex benefits/savings appeared relatively low
- the duplication of retailer provided services should not be included within regulated revenue.

Consistent with the approach outlined in our ICT expenditure assessment guideline, we have assessed recurrent ICT capex separately to non-recurrent ICT capex.[166]

Recurrent ICT

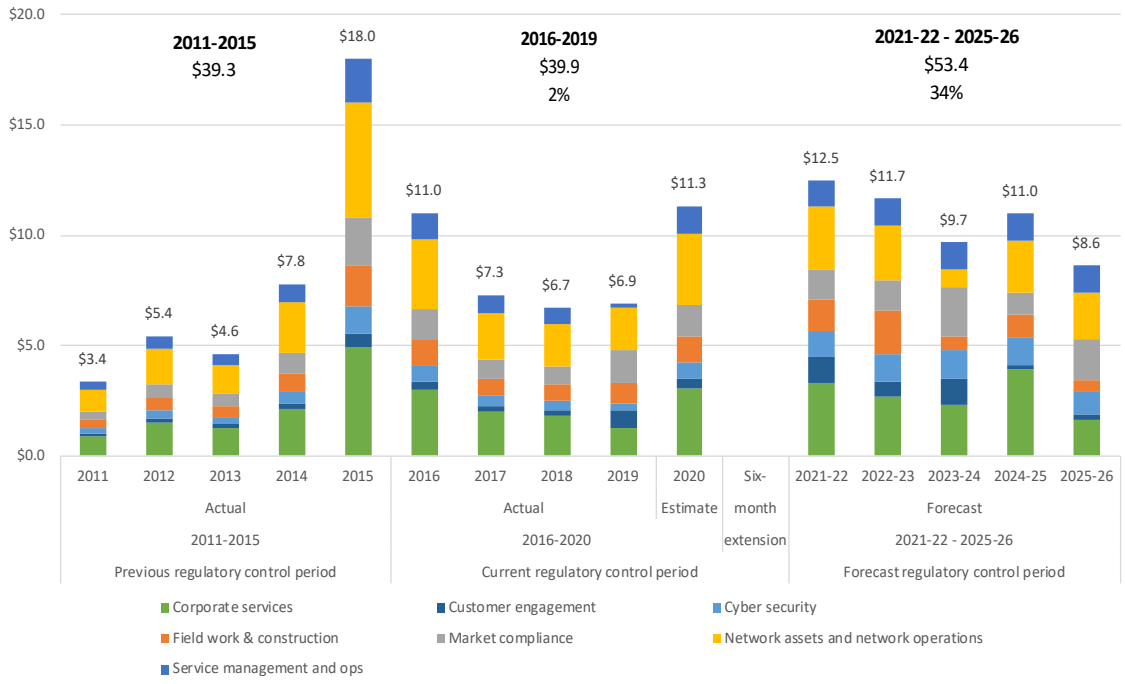
We have assessed this aspect of the forecast primarily through a top-down assessment. This is because historical costs are a likely indicator of future costs for this ICT capex category given the recurrent nature of these investments. We also had regard to benchmarking analysis of recurrent ICT total expenditure (totex) to assess CitiPower's recurrent ICT capex forecast.

Top-down assessment

Given the recurrent nature of these investments, historical costs are a likely indicator of future costs for this category of ICT capex. CitiPower's historical expenditure for each recurrent ICT program shows that its total forecast expenditure is 12 per cent higher than current regulatory control period expenditure for these programs. Its forecast is also slightly higher than its longer term trend, as highlighted in Figure A.13. From a top-down perspective, CitiPower's ICT capex appears to be a slightly overstated forecast of the prudent and efficient costs for this capex category.

[166] AER, *ICT capex assessment review*, 8 May 2019.

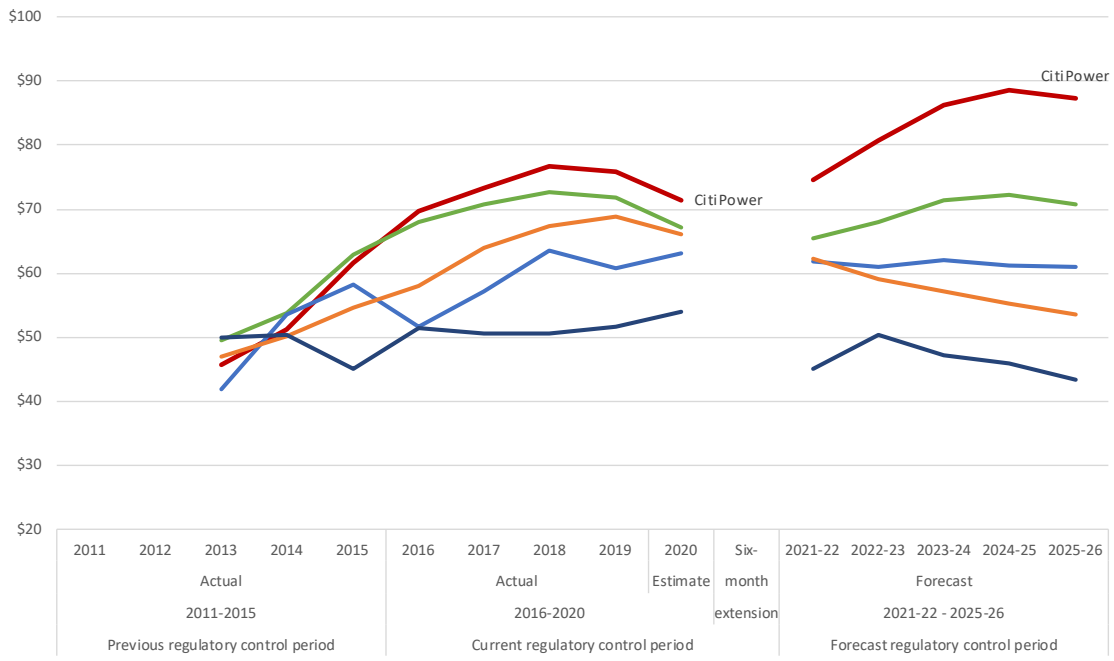
Figure A.13 CitiPower's historical vs forecast recurrent ICT snapshot ($ million, 2020–21)



Source: CitiPower's initial proposal and AER analysis.

Note: The four years of actual data from the current period (2016–19) have been prorated to a five-year period.

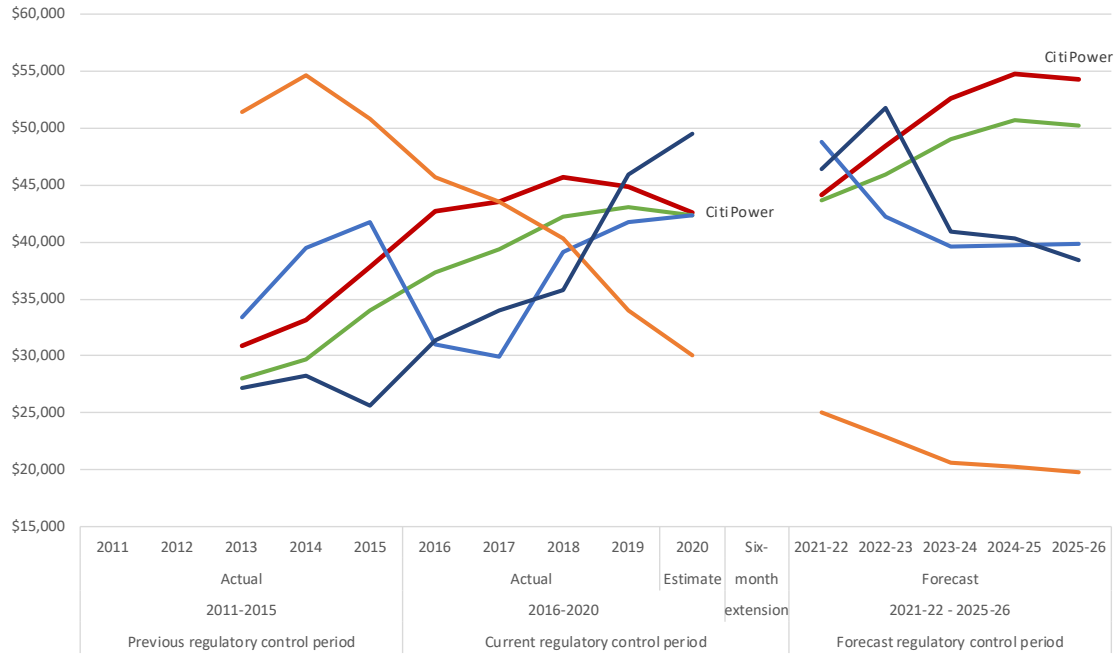
Figure A.14 Victorian ICT benchmarking – Recurrent ICT totex per customer ($ million, 2020–21)



Source: AER analysis.

Note: Data presented is a five-year moving average.

Figure A.15 Victorian ICT benchmarking – Recurrent ICT totex per end user ($ million, 2020–21)



Source: AER analysis.

Note: Data presented is a five-year moving average. End user refers to network employees that use these devices.

Figure A.14 highlights CitiPower's actual recurrent ICT totex per customer ranged from $45 to $72 between 2013 and 2019, and is expected to fall just below $90 per customer over the forecast regulatory control period. This places CitiPower at the upper end of the five Victorian distributors for recurrent ICT totex per customer both in terms of historical revealed expenditure and forecast expenditure.

Figure A.15 illustrates CitiPower's actual recurrent ICT totex per end user has increased sharply from 2013 to 2019. Since 2017, the five Victorian distributors have spent between approximately $30,000 and $45,000 in ICT totex per end user. CitiPower's forecast places it at the upper end of this benchmarking metric compared with the other distributors, particularly by the end of the forecast period.

Based on our top-down trend and benchmarking analysis, we have conducted a more detailed bottom-up assessment of a sample of CitiPower's recurrent ICT programs and projects. EMCa also reviewed a sample of recurrent ICT business cases.

Bottom-up assessment

EMCa identified that CitiPower's forecast is reasonable for all elements other than the cloud infrastructure and network management programs. CitiPower indicated that it will jointly undertake these programs with Powercor. EMCa's analysis therefore applies to the total expenditure for each program across the two distributors.

For the cloud infrastructure program, EMCa stated that CitiPower's proposed strategy is sound. EMCa's assessment reflected that the capex-opex trade-off for the preferred option is adequate. However, EMCa found that CitiPower did not adequately justify its proposed capex for refreshing and growing its remaining on-premise infrastructure.[167] It noted that CitiPower's forecast expenditure is higher than its most recent three years of capex would indicate. Therefore, EMCa concluded that the capex for the preferred option 2 is overstated and should be lower than proposed.

For the network management program, EMCa stated that CitiPower's proposed frequency of upgrades and refreshes are unlikely to be prudent and efficient. EMCa's concerns relate to annual network data processing and four EDNA refreshes in five years.[168] It believes that the frequency of system upgrades (not refreshes) is excessive and that the value of each upgrade may not be realisable.[169] EMCa recommended that a slightly lower forecast than the proposed amount would represent an efficient level of expenditure.

Our trend and benchmarking analysis, along with EMCa's bottom-up concerns, indicate that CitiPower's recurrent ICT forecast is likely to be slightly overstated. We have applied a top-down adjustment to the forecast. Our substitute estimate is ($39.9 million) consistent with CitiPower's actual recurrent ICT capex from the current regulatory control period.

Non-recurrent ICT

CitiPower has not justified its $30.0 million forecast for non-recurrent ICT capex. Our substitute estimate does not include CitiPower's customer enablement program and adjusts the forecast for its intelligent engineering program. We have not identified any material issues in CitiPower's remaining non-recurrent ICT programs.

We have reviewed the information CitiPower provided in support of its non-recurrent ICT capex forecast, including the business cases and cost-benefit models. Where required, we have sought further information from CitiPower through information requests. We have also had regard to the findings of EMCa from their bottom-up review.

Customer enablement

CitiPower proposed to implement apps and other data platforms that will facilitate customer communication in relation to network services such as connections and outages ($2.0 million). The program also aims to facilitate customers' understanding of their energy usage.[170] Our assessment sought to identify if the proposed investment

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167 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 173.
168 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 176.
169 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 175.
170 CitiPower, *Customer enablement business case,* January 2020, p. 4.

was likely to be prudent and efficient, providing a positive expected value to consumers.

The first claimed benefit provides an additional means of accessing information in relation to network connections. While we consider this relevant, convenience is the only additional value the proposed app is likely to provide. In addition, the added value is likely to be quite low, as it may be slightly more convenient to use the app than using the identical web page facility.

The second claimed benefit provides improved availability and customer access to information. Given energy retailers already provide their customers with access to information on their energy usage, this benefit duplicates services that are inefficient in a monopoly network context. EMCa also does not consider that real-time data is required to extract the claimed benefits and therefore does not consider CitiPower has fully justified the proposed costs of this project. EMCa concluded that some of the benefits could be achieved through a combination of price signals through tariff reform and third-party providers.[171]

The third claimed benefit provides a reduction in call centre time. As consumers already have access to these same services through the web page, the choice of an app would not make a material difference to calls. We think that CitiPower's approach to valuing savings in customer time through the use of these additional services overstates customer benefits. CitiPower used an apportioned time saving between using an app versus a website and the average consumer wage rate as a proxy. We think the time saved from using an app compared to a website is immaterial[172] and the use of the average consumer wage rate as a proxy for enquiry time overvalues the time customers invest in following up a connection or outage enquiry.

Red Energy and Lumo Energy submitted that the provision of competitive services or duplicating services already provided by energy retailers must not form part of the revenue cap or regulated services provided. They considered that duplicating these costs across both networks and retailers is not in the long-term interests of consumers.[173]

Based on our assessment, stakeholder submissions and EMCa's analysis, we do not consider that CitiPower has established that its customer enablement program is prudent and efficient. Any realised benefits are likely to be insignificant. Once these benefits are removed, CitiPower's preferred option becomes NPV negative. Therefore, we have not included this program in our substitute estimate of total capex.

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171 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 154.

172 We think the difference in time spent on an app versus a website is relatively immaterial given the frequency with which customers would actually use either interface.

173 Red Energy and Lumo Energy, *Victorian electricity distribution determination, 2021 to 2026,* June 2020, p. 1.

Intelligent engineering

CitiPower proposed a program to correctly map its network assets against physical earth with the use of the Global Positioning System (GPS) ($4.6 million). It explained that coordinates between its own assets are correct, but because they are not correctly mapped to GPS, the discrepancy can result in higher costs and higher risk of safety incidents through working around its underground assets.[174] CitiPower stated that the benefits of this program are:

- conflating its geospatial information system records to the physical earth
- introducing a master data management system
- enhancing map Insights
- improving Dial Before You Dig (DBYD) accuracy and access to information.[175]

EMCa indicated that it has concerns the benefits of this project may be overstated because CitiPower could not necessarily have 100 per cent confidence in the revised mapping. However, it considers it is prudent for CitiPower to remap the network, and noted that these issues appear to be of such significance that there is a case for undertaking some of this work in the current regulatory control period rather than waiting until the next regulatory control period.[176] CitiPower responded to a query in an information request that there is no work underway on this project in the current regulatory control period.[177]

However, we do not think the inclusion of the DBYD application is prudent and efficient under preferred option 2. Consistent with our concerns regarding the customer enablement program, we consider this app may only provide a degree of convenience over an identical web page facility. In addition, an official DBYD application already exists, which suggests that it is not the role of a monopoly network to duplicate an application, particularly if it is only applicable to a few Victorian electricity networks.

We do not have material concerns with option 1, which excludes the DBYD application. Based on EMCa's advice, we recognise CitiPower's proposal to remap its network is prudent and efficient. We have therefore included the capex forecast under option 1 for intelligent engineering in our substitute estimate of total capex.

CCP17 and Spencer&Co both submitted that although the program would streamline internal business operations, it was unclear how CitiPower had taken these savings into account in its forecast.[178] CitiPower explained that it had not incorporated the expected savings into its opex forecast, but it had also not included some additional

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174 CitiPower, *Intelligent engineering business case,* January 2020, p. 4.

175 CitiPower, *Intelligent engineering business case,* January 2020, p. 4.

176 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, pp. 157–158.

177 CitiPower, *Response to information request 23*, May 2020, p. 4.

178 CCP17, *Advice to the AER on the Victorian Electricity Distributors' Regulatory Proposals,* June 2020, pp. 79, 93; Spencer&Co, *Advice to ECA on Victorian submissions,* June 2020, p. 22.

operational costs it expects to incur through the digital network program in its forecast.[179]

We have found that the two operational benefits, the first from the intelligent engineering program and second the additional cost of the digital network program not included in CitiPower's forecast, are comparable. We have therefore not made an adjustment for this in our draft decision.

Other non-recurrent ICT programs

CitiPower has justified its other non-recurrent ICT programs – systems applications and products (SAP) S/4 HANA, five-minute settlement and cyber security ($23.5 million), which we have included in our substitute estimate of total capex. AusNet Services and Jemena have similar proposals, and we have seen other distributors outside Victoria require similar SAP upgrades and increasing cyber security ICT capex requirements, including SA Power Networks, Ausgrid and TasNetworks. We are also satisfied that the Australian Energy Market Commission's decision to delay the commencement of the five-minute settlement rule by three months will not materially affect the proposed capex program.[180]

Stakeholder submissions on these programs were limited. CCP17 suggested that we consider the economies of scale and customer impact of the proposed parallel upgrade by CitiPower, Powercor and United Energy to SAP S/4 HANA. We are satisfied that the proposed capex for each of the three programs is efficient. CitiPower explained that the cost breakdown for the SAP S/4 HANA upgrade was developed by internal staff with expertise in the SAP systems implementation.[181]

EMCa concluded that based on the number of SAP modules and the organisational business process complexity and migration from a legacy SAP platform to a modern SAP platform, the proposed implementation cost for a single instance for the preferred option is reasonable.[182] CitiPower also provided evidence that 90 per cent of recent ICT projects have been delivered within budget and underspends that have occurred have not been substantial.[183]

A.6 Other non-network capex

Other non-network capex includes property, fleet, plant, tools and equipment. Property expenditure relates to the maintenance, refurbishment and optimisation of offices, operational depots, warehouses, training facilities and other specialist facilities. The indirect costs associated with property assets have been assessed as part of overheads and the costs below refer to 'direct' capital costs only.

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179 CitiPower, *Information request 28*, June 2020, p. 3.

180 Australian Energy Market Commission, *Rule determination: National electricity amendment (delayed implementation of five minute and global settlement) rule 2020*, July 2020, p. i.

181 Powercor, *Response to information request 28,* June 2020, pp. 4–5.

182 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 163.

183 CitiPower, *Response to information request 23,* May 2020, pp. 1-2.

Fleet includes expenditure for purchasing new vehicles and related items, including mounted plant. This can be divided between light fleet (passenger and light commercial vehicles) and heavy fleet (elevated work platforms, crane borers and other heavy commercial vehicles).

A.6.1 Draft decision

We accept CitiPower's proposed other non-network capex forecast. We have included in our substitute estimate for capex $20.7 million, which takes into account modelling adjustments. CitiPower's property capex appears reasonable based on historical trend. CitiPower's fleet forecast also appears reasonable based on its bottom-up fleet model and our benchmarking analysis.

A.6.2 CitiPower's initial proposal

CitiPower proposed $21.1 million in other non-network capex for the forecast regulatory control period. This forecast is comprised of:

- $15.6 million for property capex. This includes $9.5 million for securities facilities upgrades and $6.1 million for building compliance. This is to ensure that its property is in line with industry standards
- $4.2 million for fleet capex and $1.2 million for tools and equipment capex which reflects an average level of capex from 2015–16 to 2018–19. CitiPower expects these requirements to remain constant.[184]

A.6.3 Reasons for draft decision

Property

CitiPower's underlying assumptions overstate the benefits of the proposed programs. In addition, its modelling does not adequately quantify the risks outlined. However, the overall property capex forecast appears reasonable based on historical trend.

Top-down assessment

CitiPower's property forecast is 32 per cent below its actual and estimated property capex over the current regulatory control period.

CitiPower undertook more property capex than it forecast, which we approved ($12.4 million) in the current regulatory control period capex was significantly above the $1.6 million it spent in the 2011–15 regulatory control period.

With the CESS in place, we can be reasonably satisfied that CitiPower incurred efficient actual capex expenditure. Given CitiPower's material total capex underspends

[184] CitiPower, *Regulatory Proposal 2021–26*, January 2020, p. 92.

in the current regulatory control period and its overspending on property capex. This indicates that CitiPower considered these works to be important.

Therefore, from a top-down perspective we consider CitiPower's property forecast is reasonable.

Bottom-up assessment

Although we are satisfied our top-down assessment indicates CitiPower's forecast below historical trend is a reasonable input into our substitute capex forecast, we have identified several issues with CitiPower's property proposal.

We engaged EMCa to examine the business cases for each of CitiPower's property capex. EMCa reviewed the cost benefit analysis provided by CitiPower in response to our information requests.

For the facilities upgrade project, EMCa considered CitiPower did not provide evidence to support the assumptions used in its cost benefit analysis and is likely to have overstated the risk. For example, CitiPower's assumptions imply a death or serious injury rate of 1.6 per year but did not present evidence to support these risks.[185]

However, EMCa has found that the project remains NPV positive after adjusting the assumptions. EMCa also noted the depots component which accounts for 38 per cent of the project costs are likely to duplicate costs that would be included in CitiPower's recent and proposed depot upgrades.[186] EMCa also considered that CitiPower did not provide evidence to support the cost estimate for its building compliance related expenditure.

We agree with EMCa's assumptions and findings. Although we are accepting CitiPower's property forecast, we consider the concerns outlined above and in the EMCa report warrant consideration in CitiPower's revised proposal.

Fleet and other

CitiPower has supported its historical expenditure based forecasts with a bottom-up fleet model. Its replacement policies are broadly in line with our benchmarks for efficient service lives. CitiPower's capex forecasts are reasonable. It has also included a reasonable forecast of disposals incorporating fleet, based on historical disposals generally.[187]

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185 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 192.

186 EMCa, *Review of aspects of CitiPower's regulatory proposal 2021–26*, September 2020, p. 193.

187 CitiPower, *Response to Information request 16 – Q7*, 29 April 2020, p. 5.

A.7 Capitalised overheads

Overhead costs include business support costs not directly incurred in producing output, and shared costs that the business cannot directly allocate to a particular business activity or cost centre. The Australian Accounting Standards and the distributor's cost allocation methodology determine the allocation of overheads.

A.7.1 Draft decision

We are not satisfied that CitiPower's capitalised overheads forecast of $110.3 million would form part of a total capex forecast that reasonably reflects the capex criteria. We have included an amount of $90.2 million in our substitute estimate of total capex. We are satisfied that our substitute estimate would form part of a total capex forecast that reasonably reflects the capex criteria.

A.7.2 CitiPower's initial proposal

CitiPower forecasts $110.3 million in capitalised overheads for 2021–26 regulatory control period, which involved:

- adopting its 2018 standard control capitalised overheads as the base year
- step increases in the base year, to reflect CitiPower's forecast opex rate of change for the next regulatory control period

A.7.3 Reasons for draft decision

To arrive at our substitute estimate we have adjusted the overheads to reflect our lower substitute of direct capex, our new estimate for the base year, and our substitute for CitiPower's rates of change. The net effect of these adjustments results in a substitute estimate of capitalised overheads that is $20.1 million lower than CitiPower's forecast.

Adjusting for our lower estimate of direct capex

Reductions in CitiPower's forecast expenditure reduce the size of total overheads. Our assessment of CitiPower's proposed direct capex demonstrates that a prudent and efficient distributor would not undertake the full range of direct expenditure contained in CitiPower's regulatory proposal.

It follows that we would expect some reduction in the size of CitiPower's capitalised overheads. We do accept that some of these costs are relatively fixed in the short term and so are not correlated to the size of the expenditure program. However, we maintain that a portion of the overheads should vary in relation to the size of the expenditure.

As a result, in the absence of alterative information and consistent with our previous determinations, we have adopted a 75 per cent fixed and 25 per cent variable ratio to adjust overheads.

Other adjustments

We have also amended CitiPower's model to adjust the base year from 2018 to the average of the overheads expenditure between 2016 and 2019. We consider the average reflects a more accurate representation of current regulatory control period overheads as it is less affected by annual variation. We then substituted the forecast rates of change used to escalate the overheads to maintain consistency with our own substitute forecast of CitiPower's opex rate of change. Our opex decision (Attachment 6) outlines further detail.

B Forecast demand

Maximum demand forecasts are fundamental to a distributor's forecast capex and opex, and to our assessment of that forecast expenditure. This is because we must determine whether the capex and opex forecasts reasonably reflect a realistic expectation of forecast demand for SCS.[188] Hence reasonable demand forecasts based on the most current information are important inputs to ensuring efficient levels of investment in the network. This section sets out our decision on CitiPower's forecast network maximum demand for the forthcoming regulatory control period.

B.7.1 Draft decision

We are not satisfied that CitiPower's demand forecasts reasonably reflect a realistic expectation of demand over the forthcoming regulatory control period. We consider AEMO's 2019 Transmission Connection Point forecasts for CitiPower's network are reasonable, based on information currently available.

B.7.2 CitiPower's initial proposal

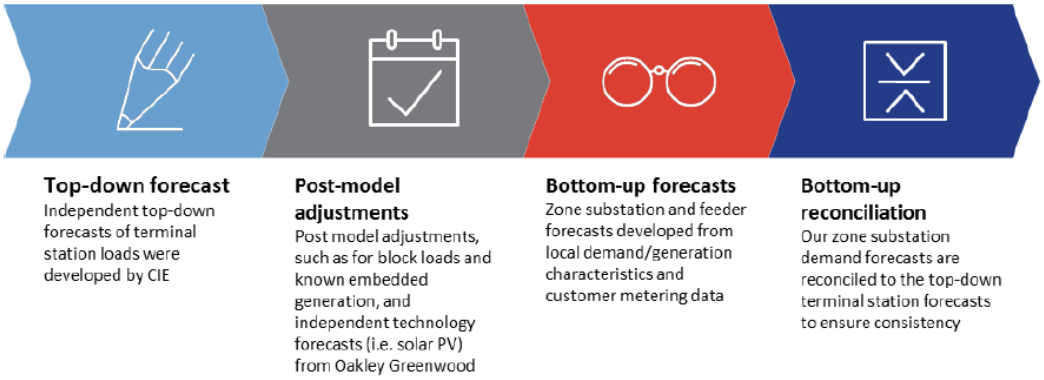
CitiPower's consultant, the CIE, has forecast growth in non-coincident maximum demand of 1.3 per cent per year between 2021 and 2026. CitiPower has used this to forecast its demand driven augex projects, after reconciling them with its bottom-up zone substation forecasts.

CitiPower's RIN includes a different set of demand forecasts that are significantly higher. The CIE's top-down forecasts are based on a combination of modelling using variables such as income per person, electricity prices, population, temperature and air-conditioning take up, and post-modelling adjustments for the effects of solar PV, electric vehicles, battery storage, other forms of distributed generation and energy efficiency.[189] The CIE produced these for each terminal station separately. Independently, CitiPower forecast maximum demand at each of its zone substations. CitiPower then adjusted these bottom-up forecasts to reconcile with the CIE's top-down terminal station forecasts. CitiPower used these reconciled zone substation forecasts to determine the need for demand driven augmentation, as summarised in Figure B.1 below:

[188] NER, cll. 6.5.6(c)(1)(iii) and 6.5.7(c)(1)(iii).

[189] CIE, *CitiPower and Powercor Maximum Demand Forecasts*, 12 March 2019, p. 10; Oakley Greenwood, *Post-Model Adjustments for Terminal Station Forecasts*, 7 December 2018, p. 3.

Figure B.1 CitiPower's demand forecasting approach[190]



Source: CitiPower - Regulatory proposal 2021–26.

B.7.3 Reasons for draft decision

We are not satisfied that CitiPower's demand forecasts are reasonable, based on considering:

- specific assumptions and methods used in CitiPower's demand forecasts;
- historical trends in demand;
- a comparison of results with AEMO's 2019 Transmission Connection Point Forecasts;
- CitiPower's past demand forecasting performance, compared to AEMO's; and
- the need to account for effects of COVID-19.

Stakeholders have expressed concern at over-stated demand forecasts leading to windfall CESS benefits, and the potential for this to re-occur.[191] We share these concerns and have looked at CitiPower's demand forecasts in detail.

Traditionally, the key driver of augex has been growing maximum demand. However, since 2008 system peak demand has remained relatively flat in Victoria and other states except Queensland.[192]

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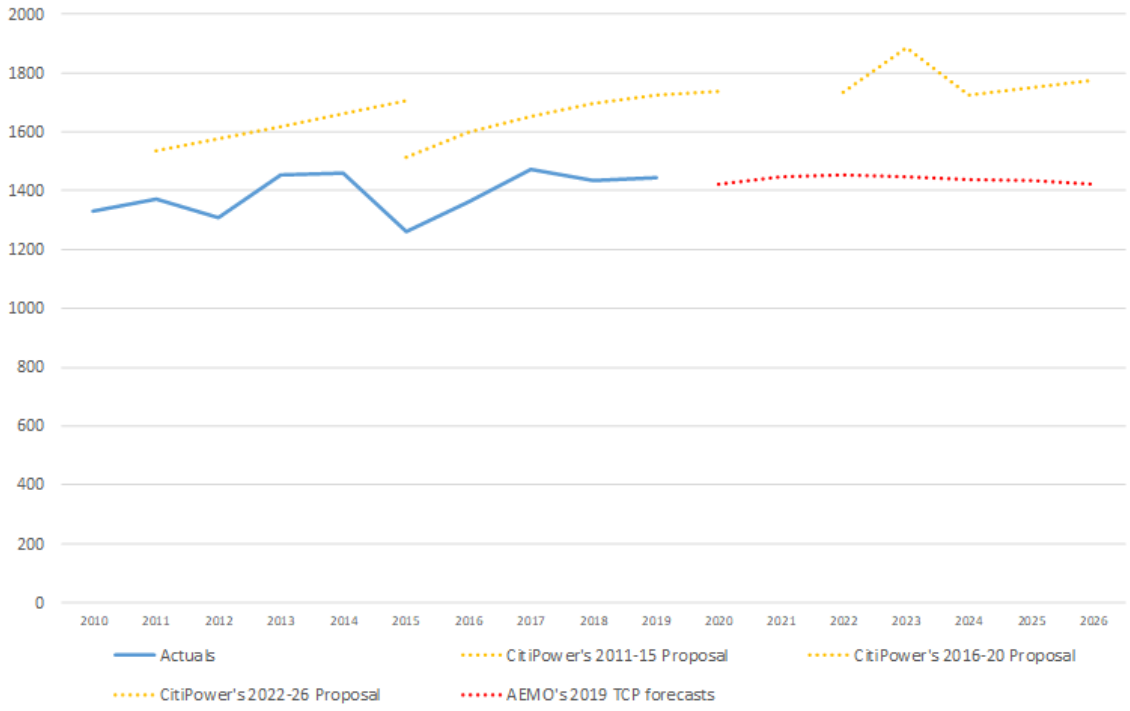
190 CitiPower, *Regulatory proposal 2021–26*, January 2020, p. 75. We note that the bottom up and the CIE's top down forecasts do not reconcile in all cases. CitiPower has added additional demand to its bottom up forecasts due to new forecast loads, without explaining the basis for this in its proposal. Generally these two forecasts should in fact reconcile, as adding new loads on top of the top down modelling creates consistency issues, even if these loads were not known at the time of the regression modelling. CitiPower, *Response to information request 16*, Q4 (a), p. 2.

191 VCO, *2021–2026 Victorian EDPR - Joint Submission,* May 2020, p. 4; CCP17, *Advice to the AER on the Victorian Electricity Distributors' Regulatory Proposals for the Regulatory Determination 2021–26,* 10 June 2020, pp. 59–62; Origin Energy, *Submission to Victorian electricity distributors regulatory proposals,* May 2020, p. 3.

192 AER, *State of the Energy Market*, 1 July 2020, pp. 71–72.

As shown in Figure B.2, CitiPower forecast strongly rising maximum demand in its 2011–16 proposal and its 2016–20 proposal. In both cases this increase did not eventuate.

Figure B.2 CitiPower's historical and forecast maximum non-coincident demand (MW, PoE50) [193]



Source: AER analysis based on past proposals.

CitiPower's consultant, the CIE, has again forecast strong growth in maximum demand compared to historical trends. From summer 2009–08 until 2018–19, AEMO's weather corrected non-coincident actuals show average annual growth of 1.0 per cent (POE50). The CIE forecast demand growth at a 30 per cent higher rate for 2020–21 until 2025–26: an increase of 1.3 per cent per year.[194]

To forecast its opex, CitiPower has included maximum demand forecasts in its RIN that are higher still (shown in Figure B.2 above). CitiPower's proposal does not discuss this large discrepancy. We consider CitiPower should have transparently identified and argued for the large difference between these forecasts initially to justify any increase in its demand forecast above those produced by regression modelling. The remainder

[193] The forecasts are based on the higher maximum demand forecasts CitiPower included in its RIN. CIE, *Maximum Demand Forecasting for CitiPower and Powercor - 2015 update*, July 2015, page 159; CitiPower, *2011–15 Regulatory Proposal*, p. 32; AEMO, *Transmission Connection Point Forecasts for Victoria*, November 2019.

[194] This is based on the demand forecasts produced by CitiPower's consultant, CIE that are the basis for its augex forecasts. CitiPower stated higher forecast demand in its reset RIN.

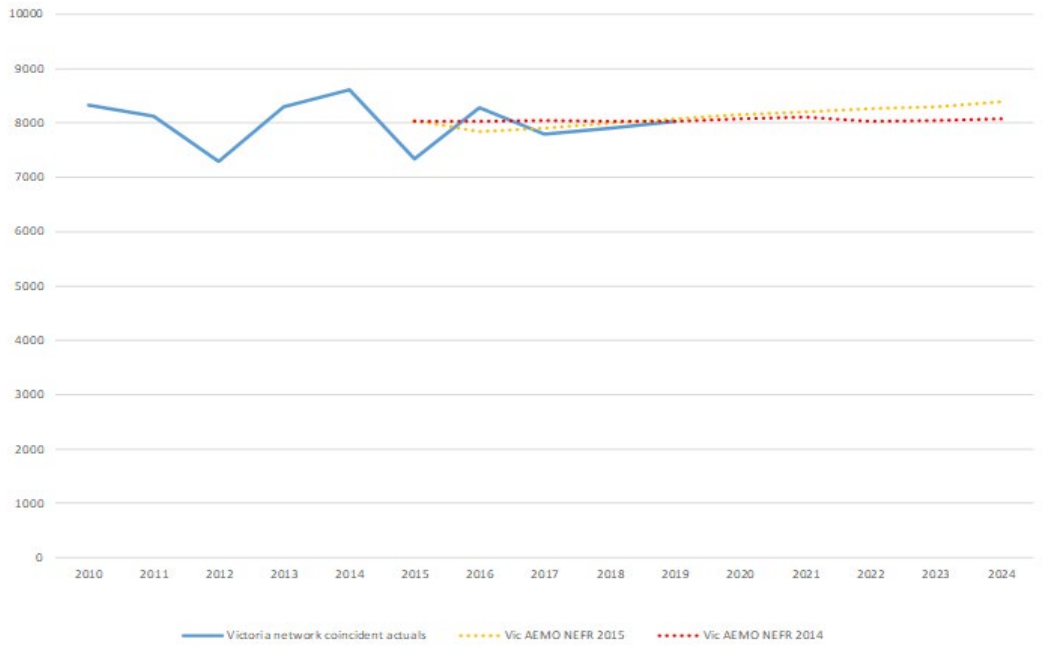
of our decision focuses on the CIE's forecasts, which CitiPower used to forecast its capex.

The CIE's forecasts use econometric regression modelling. Typically regression modelling is sensitive to choices made by the researcher. Hence we consider that internal consistency alone may not be sufficient to establish that a forecast reasonably reflects a realistic expectation of demand. A forecast involving a substantial increase compared to historical trends also needs to be justified by comparing its results with any other authoritative forecasts, and where there are material differences, clearly demonstrating why the chosen methods and assumptions are superior. We have also given weight to the accuracy of past forecasts.

We consider AEMO's Transmission Connection Point forecasts should be the main basis for comparison. For transmission planning, AEMO's role in producing demand forecasts is mandated by the NER, and it has no strong incentive to over- or under-forecast. AEMO also consults widely with stakeholders in producing its forecasts through its standing Forecasting Reference Group. In contrast to the CIE's forecasts, AEMO's 2019 forecasts are for declining non-coincident maximum demand in CitiPower's network over the forthcoming regulatory control period: a decline of 0.3 per cent per year.

AEMO's forecasts for Victoria that were available during the previous decision process have proven relatively unbiased. This is shown in Figure B.3 below. Unbiased POE50 forecasts should be above or below actuals by roughly equal amounts and cancel out over a number of years.

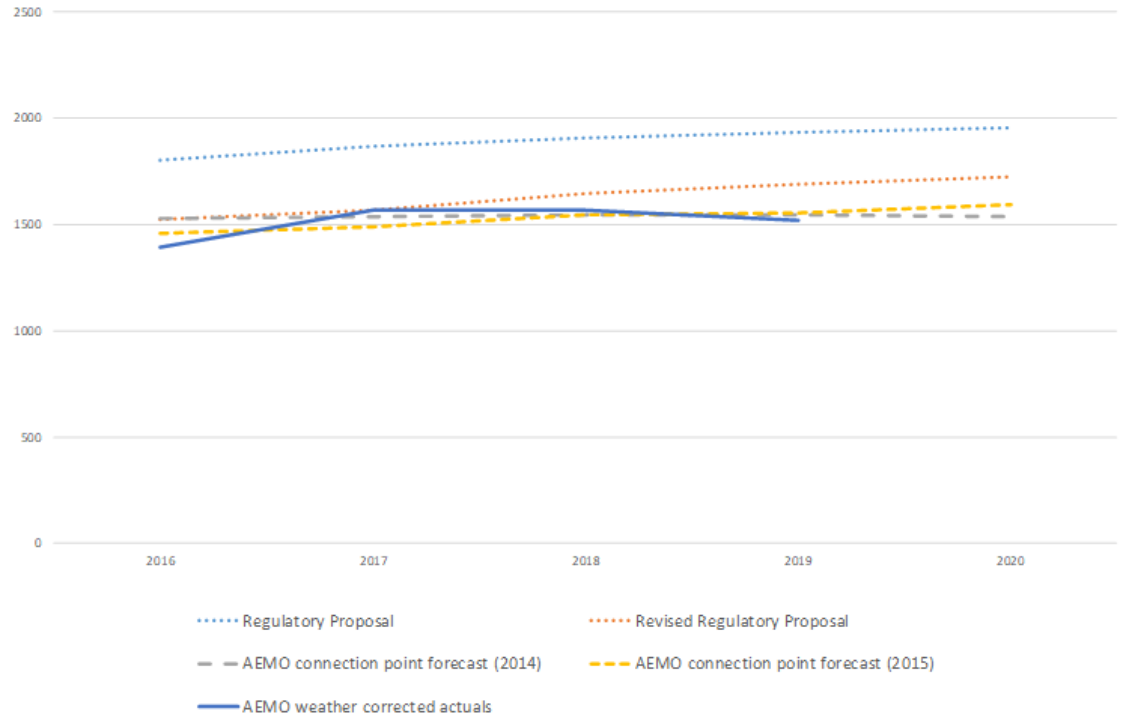
Figure B.3 AEMO's historical forecasts vs actuals in Victoria (MW, Network Peak, PoE50)



Source: AEMO National Electricity Forecasting Reports 2014 and 2015; AEMO Transmission Connection Point Forecasts 2019; AER Analysis.

In the previous regulatory control period, CitiPower forecast 2.0 per cent average annual maximum demand growth in its draft proposal, which it increased to 3.1 per cent in its revised proposal. AEMO's 2014 forecasts were for 0.1 per cent average annual growth, which it increased to 2.3 per cent average annual growth in 2014. In percentage terms, CitiPower's forecasts were reasonably accurate when compared with AEMO's weather corrected actuals, which grew at 3.0 per cent per year from 2015–16 to 2018–19. However, the levels diverged significantly. CitiPower's initial and revised proposals exceeded weather corrected actuals by 27.4 per cent and 11.1 per cent respectively. AEMO's, however, were close to weather corrected actuals: the 2014 forecasts were 1.9 per cent higher, and the 2015 forecasts were 2.3 per cent higher as shown in Figure B.4 below.

Figure B.4 AMEO and CitiPower's Forecasts vs AEMO's Weather Corrected Actuals (MW, Non-Coincident, POE10)



Source: AER Final Decision for CitiPower 2016–20; AEMO 2019 Transmission Connection Point Forecasts; AER Analysis

We asked CitiPower to explain why it considers its forecasts for the forthcoming regulatory control period superior to AEMO's. CitiPower criticised AEMO's forecasts for failing to adequately consider bottom-up drivers of demand growth.[195] In this respect, CitiPower's modelling differs from AEMO's in two ways. First, the CIE ran its regressions at the terminal station level, whereas AEMO starts from the state level and

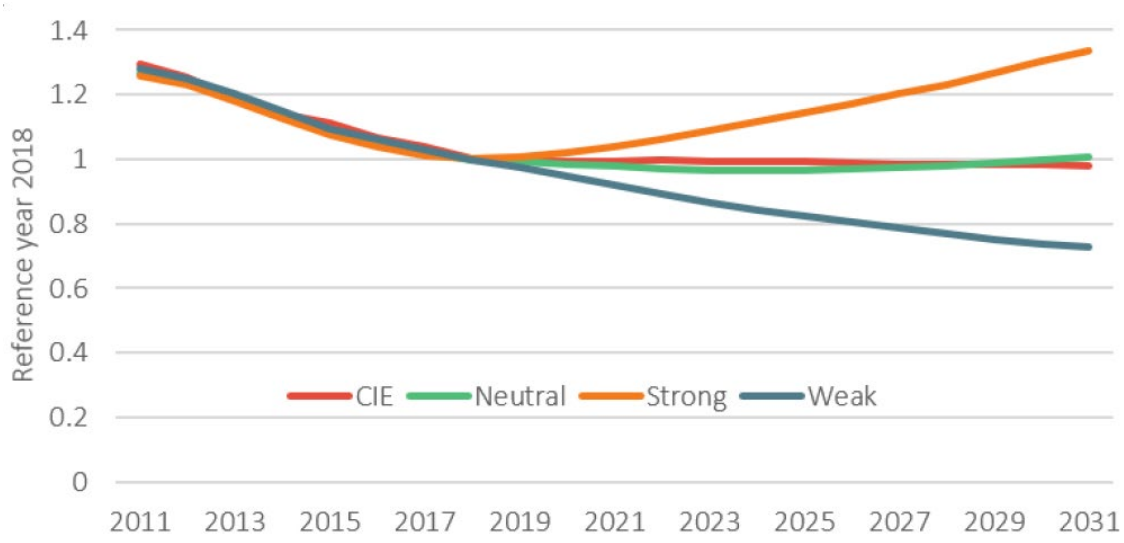
[195] CitiPower, *Response to information request 1*, Q 2 (a), March 2020, p. 2–4.

allocates demand growth between terminal stations. Second, CitiPower has produced bottom-up demand forecasts at the zone substation level.

Methodologically, there is no strong reason to prefer regressions performed at the terminal station level compared to the whole state level. Indeed, in aggregate, results from regressions at a smaller geographical level can be less reliable, as random variations tend to 'smooth out' over a larger area. Regarding CitiPower's zone substation level forecasts, CitiPower's own demand forecasting procedure appropriately depends on reconciling its bottom-up zone substation forecasts to its top-down terminal station forecasts, which take precedence. Bottom-up, we have used CitiPower's forecasts at the zone substation level to produce a substitute set of demand forecasts that reconcile to AEMO's (as discussed in the non-DER augex section). Therefore, CitiPower has not demonstrated that its forecasts are superior to AEMO's on methodological grounds.

A key output from the modelling is demand by customer. CitiPower provided Figure B.5 below. This highlights how the CIE's forecast is for the historical decline in demand per customer to end relatively rapidly, contrary to historical trends.

Figure B.5 CitiPower's long-term trends of demand per inhabitant for different scenarios (reference year in 2018)



Source: ENEA Consulting. [196]

We also examined specific methods and assumptions used by the CIE. We found the following issues:

1. CitiPower's post-modelling adjustments assume a different average solar PV system size (4kW) than to its solar enablement business case (6kW). Although

[196] Enea Consulting, *Load Forecasting Documentation*, 18 December 2018, p. 11, provided by CitiPower in Information request 44.

CitiPower states that the effect of this difference is likely to be immaterial, it has not demonstrated this, and it did consider the effect sufficiently material to update its proposed DER augex. [197]

2. The modelling assumed EVs charging would take place at the network peak to a greater extent than is assumed in the source it identifies. That source itself is AEMO's 'worst case scenario'.[198] Our draft tariff structure statement decision is for EVs owners to be subject to time of use tariffs, which will incentivise charging at non-peak times as outlined in Attachment 19 of this draft decision.
3. The CIE has 'cherry picked' out negative income elasticity coefficients where their regression has found these in some geographical areas, based on their belief that GDP growth and demand must always be positively related. This is not a neutral, evidence based approach. GDP growth and demand growth have generally diverged in Australia, so it is plausible there is no longer a strong underlying relationship between the two.[199] Manually over-riding negative income elasticities with positive ones introduces an upwards bias to forecast demand.
4. The CIE did not remove historical block loads before running its regressions, due to difficulties in identifying them. It also did not weight forecast block loads for probability of occurrence. This can bias forecasts upwards.[200]

Structurally, the key difference between the CIE's approach and AEMO's is that the CIE uses variables such as economic growth, population and price in its regression model, whereas AEMO's 2019 terminal station forecasts fit curves based on historical trends (after weather correction).

While in principle regression modelling based on underlying drivers of demand can be a reasonable approach, its success depends on specifying the model correctly, to incorporate all significant drivers. The poor historical performance of all Victorian distributors' demand models indicates that a key variable or variables are missing, such as energy efficiency, solar PV uptake or reduced industrial consumption.

While CitiPower has sought to address this using post-modelling adjustments, these do not necessarily appropriately correct for the error introduced by model misspecification. For solar PV take-up, the CIE reported that incorporating this variable within the model improved its explanatory power.[201] However, it nevertheless chose to rely on post-modelling adjustments because it found evidence for omitted variable bias, which it identified as likely due to excluding energy efficiency from the model. In general, evidence that one variable should have been included is not good grounds to exclude

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197 CitiPower, *Response to information request 1,* Q 3 (a), pp. 6–7.

198 CitiPower, *Response to information request 1,* Q 3 (b), p.7.

199 AER, *State of the Energy Market*, 1 July 2020, pp. 71–72.

200 CitiPower stated that it only included committed future loads. However, this does not quantify the degree of commitment: the probability of a committed future load going ahead will still generally be less than certainty. CitiPower, Response to information request 1, Q 2 (f), p. 6.

201 CIE, *CitiPower and Powercor Maximum Demand Forecasts*, 12 March 2019 pp. 18–19.

another. Instead, either a suitable proxy should be found for any significant omitted variables or an alternative approach adopted.

In the absence of a well-specified model, AEMO's forecasts are likely to be more accurate. AEMO's 2020 state-wide forecasts do not first regress demand on variables such as GDP growth and prices, and then account for effects such as solar PV and energy efficiency afterwards. Instead, for residential demand, they model the effect of all variables on demand per customer as part of a single process.[202] This is less likely to cause misspecification bias. Moreover, given the relationship CitiPower's demand model uses between demand and GDP growth, even if we were to accept its method as reasonable, it would need to update its forecasts for the effects of COVID-19. CitiPower has indicated that it is working on revisions to its demand forecasts to take account of COVID-19 effects.

AEMO's 2020 Victoria-wide forecasts are for an initial decline in maximum demand due to COVID-19, and then flat maximum demand over the forthcoming regulatory control period.[203] Overall, maximum demand declines by 0.5 per cent per year until 2025–26 (compared to average maximum demand over 2015–16 to 2019–20), which is similar to its 2019 transmission connection point forecasts. Hence, using AEMO's approach (which does not depend as strongly on GDP as an input) COVID-19 does not sufficiently affect demand across Victoria to be likely to change our conclusions for opex and capex. We note this reduction may be conservative, as AEMO's central scenario models COVID-19 as a temporary shock, rather than assuming a permanent effect due to lower migration and population growth. We will also consider AEMO's final transmission connection point forecasts due in November as part of our final decision, as these will provide data for each network separately.

[202] AEMO, *Electricity Demand Forecasting Methodology Information Paper*, August 2020, pp. 27-28.

[203] AEMO, *2020 Electricity Statement of Opportunities*, August 2020, p. 106.

C Repex modelling

This attachment describes the general repex modelling assumptions for the Victorian distributors and details specific adjustments for CitiPower during our engagement. Inputs and outputs of the model, including the NEM median data are published alongside this decision.[204] Further detail on our repex modelling approach is detailed in the Repex Model Outline.[205]

General repex modelling approach for all Victorian electricity distribution determinations

Our assumptions on the most representative calibration period and the conversion from financial year to calendar year are consistently applied for all Victorian distributors.

Transition from calendar year to financial year

The Victorian regulatory control periods are transitioning from a calendar to financial year basis. We have relied on as reported calendar year as our input data.[206] In order to estimate the forecast repex requirements in financial year basis, we have taken the average of the 2021 and 2026 calendar years, along with the full calendar year forecast for 2022, 2023, 2024 and 2025. This approach ensures that we capture a distributor's most recent replacement practices via its most recent actual reported and audited information.

Calibration period

The calibration period refers to the historical time period used to analyse a distributor's historical replacement practices.[207] For the Victorian electricity distribution determinations, we have relied on the four most recent calendar years (2016–2019 inclusive) as our calibration period. Due to the six-month transition from calendar year basis to financial year basis, we have four full years of current period data available for the draft decision.

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[204] AER, *Draft Decision - CitiPower distribution determination - Repex Model*, September 2020.

[205] AER, *Repex Model outline for electricity distribution*, February 2020.

[206] Data reported as part of the annual Category Analysis regulatory information notices.

[207] The time period that is most representative of a distributor's expected future repex requirements is selected as the calibration period. In doing so, we have regard to changes in legislative obligations or other factors that may affect our analysis or a distributor's historical replacement practices. AER, *Review of repex modelling assumptions,* December 2019, p.7

Specific modelling adjustments for CitiPower – review of regulatory proposal

After reviewing CitiPower's proposal and supporting documentation, including CitiPower's consultant report on repex modelling,[208] we have made further adjustments to our standard modelling approach.

Service lines

CitiPower's category analysis RIN contained a reporting anomaly in which service lines expenditure, volumes, and age profile were not reported under a single asset category.[209] To obtain a complete data set for service lines, an adjustment was made to combine the two sets of data together.

CitiPower reported its historical service lines volumes in kilometres, instead of number of customers/spans. In line with GHD's review of CitiPower's repex model inputs, we converted the volumes into meters, and divided by the average length of a customer line length (22 meters) to obtain an estimate of the number of customers.[210] We invite CitiPower to re-adjust its reported service lines units of measurement in the 2021–26 regulatory control period RINs to be consistent with other distributors.

Recast data

CitiPower proposed to reclassify 'minor repairs' from capex to opex as it noted that the reclassification better reflects the nature of the work.[211] The reclassification affected a number of categories within the underground cables and overhead conductor asset groups. It was reflected in its recast RINs.[212] No other asset groups' volumes or expenditure were recast.

In order to forecast repex, while excluding the impact of 'minor repairs', we have relied on the recast category analysis RIN as the basis of the input expenditure and volumes for the relevant asset categories.[213] Even though our draft decision did not accept the reclassification of minor repairs from repex to opex, we have not adjusted the input data for this draft decision repex model. In coming to our final decision modelling approach, we will have regard to CitiPower's revised proposal and its position on minor repairs.

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208 CitiPower, *CP ATT097 - GHD - Repex modelling review*, December 2019, public.

209 CitiPower reports its service line age profile under 'Service lines; other', and its historical replacement expenditure and volumes as 'Service lines; <=11kv; residential; simple type".

210 CitiPower, *CP ATT097 - GHD - Repex modelling review*, December 2019, p.17.

211 CitiPower, *Regulatory proposal 2021–26, January 2020*, p.106.

212 CitiPower, *RIN003 - Workbook 3 - Recast CAT*, January 2020, public and CitiPower, *RIN001 Workbook 1 - Reg determination*, January 2020, public.

213 Recast volumes were provided as part of information request. See CitiPower, *Response to Information Request #045 - Repex model input data*, 02 July 2020.

Specific modelling adjustments for CitiPower – engagement with CitiPower

During the review process, we have engaged with CitiPower on its repex model inputs through a number of information requests and meetings.[214] In July 2020, we provided CitiPower its preliminary repex modelling outputs. In response, CitiPower questioned some of the repex modelling assumptions and provided us an alternative view on some of the repex model input data and assumptions. We discuss CitiPower's questions, suggestions and our response below.

Underground cables

CitiPower submitted that it has not undertaken any major underground cable replacement works in the CitiPower network in the calibration period. The absence of replacement, particularly following the reclassification of replacement to opex for minor repairs, has resulted in very low levels of expenditure reported and subsequently low unit costs. CitiPower provided us a suggested list of substitutes shown in Figure C.1.

Figure C.1 Calculated and proposed unit costs (UC) for underground cables

Asset group	Asset category	AER - historical UC	CitiPower - suggested UC
Underground cable	< = 1kV	90.9	323.2
Underground cable	> 11kV & <= 22kV	33.1	301.0
Underground cable	> 33kV & <= 66kV	33.1	748.9

Source: CitiPower, repex model response - AER preliminary analysis, 31 August 2020.

We have not made any adjustments in the draft decision repex model to reflect CitiPower's suggested unit costs. Our draft decision did not accept the reclassification of minor repairs to opex, which has an impact on the derived historical unit. We will have regard to CitiPower's revised proposal and its position on minor repairs, in determining our final decision repex model input data, assumption and the necessary adjustments, if justified.

Transformer repex

CitiPower submitted that it had not replaced large zone substation transformers during the calibration period. Therefore, it submitted that its historical unit cost is not an

[214] CitiPower, *Response to Information Request 15*, April 2020; CitiPower, *Response to Information Request 22*, May 2020; and CitiPower, *Response to Information Request 45*, July 2020.

accurate representation of its forecast unit cost.[215] It further noted that this discrepancy was identified and adjusted by GHD's review of CitiPower's repex modelling inputs. [216]

After reviewing and considering the information before us, particularly acknowledging the lumpiness of replacement of some assets in small networks such as CitiPower's network, we consider a post-modelling adjustment to be justified, and have adopted the zone substation unit rates as per the GHD report ($1.5 million).

Other repex

We excluded the 'other' asset categories from the repex model[217], because of the heterogeneity of the reported assets within those categories and the inability to adequately obtain consistent sets of historical and NEM median data. This approach is in-line with previous decisions, where unique assets, or assets that cannot be benchmarked, are excluded from the modelling.

CitiPower submitted that the exclusion of these assets compromises the usefulness and the accuracy of the repex analysis, diminishes the coverage of a key regulatory tool and adopts the principle of the 'lowest common denominator'. It submitted that its preferred approach is to model the 'other' asset categories, while relying on the distributors' own calibrated historical performance, given that there are readily available asset information.

We considered CitiPower's submission but have maintained our modelling approach of excluding unique assets. Our approach ensures the integrity of the comparative analysis, where the model tests a set of consistent asset categories. The repex model benchmarks a distributor's asset unit cost and calibrated lives against the median unit cost and calibrated life of each asset across the NEM. This comparison function is key to testing the prudency and efficiency of proposed modelled repex. The exclusion of unique assets ensures that asset categories that cannot be meaningfully compared with other distributors are not included in the repex modelling threshold.

It is important to note that irrespective of whether a particular asset category is considered modelled repex or unmodelled repex, we expect distributors to provide robust cost benefit analysis to support its repex forecasts. Our consideration of CitiPower's analysis is discussed in Appendix A.

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215 CitiPower, *AER repex model – preliminary results –CP PAL and UE questions*, August 2020, p.1.

216 CitiPower, *CP ATT097 - GHD - Repex modelling review, December 2019*, p.16.

217 If an asset is a common asset in the NEM, but due to data reporting issues, it is not reported in the distributors CA RIN over the calibration period, we may utilise similar assets' unit costs and estimated replacement lives as a substitute for missing data.

D Ex-post prudency and efficiency review

We are required to provide a statement on whether the roll forward of the RAB from the previous period contributes to the achievement of the capex incentive objective.[218] The capex incentive objective is to ensure that, where the RAB is subject to adjustment in accordance with the NER, only expenditure that reasonably reflects the capex criteria is included in any increase in the value of the RAB.[219]

As the Victorian distribution network service providers are moving from calendar regulatory years to financial regulatory years, this ex-post assessment will apply to the 2014, 2015, 2016, 2017, 2018 and 2019 calendar regulatory years. The NER require that the last two years of the current regulatory control period are excluded from past capex ex-post assessment. The ex-post prudency and efficiency will exclude calendar regulatory year 2020 and the first half of calendar year 2021.[220]

The NER states that we may only make a determination to reduce inefficient past capex if any one of the following requirements is satisfied:

- The distributor has spent more than its capex forecast (the 'overspending' requirement).
- The distributor has incurred capex that represents a margin paid by the distributor, where the margin referable to arrangements that, in our opinion, do not reflect arm's length terms (the 'margin' requirement).
- Where the distributor's capex includes expenditure that should have been treated as opex (the 'capitalisation' requirement).[221]

D.1 Draft decision

We are satisfied that CitiPower's capex over the regulatory control years from 2014 to 2019 should be rolled into the RAB.

D.2 Reasons for draft decision

We have reviewed CitiPower's capex performance for the 2014 to 2019 regulatory control years. This assessment has considered CitiPower's actual capex relative to the regulatory forecast provided and the incentive properties of the regulatory regime for a distributor to minimise costs. CitiPower's incurred total capex is below its forecast for each of those regulatory control years.

We have also had regard to some measures of input cost efficiency as published in our latest annual benchmarking report.[222] We recognise that there is no perfect

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218 NER, cl. 6.12.2(b).

219 NER, cl. 6.4A(a).

220 The first half of the calendar year will be considered a regulatory year for the purpose of this review.

221 NER, cl. S6.2.2A(b) to (i).

benchmarking model, but our benchmarking models are robust measures of economic efficiency and we can use this measure to assess and compare a distributor's efficiency.

The results from our most recent benchmarking report highlights that CitiPower remains the most efficient distributor out of the 13 NEM distributors with a multilateral total factor productivity (MTFP) score of 1.532 for 2018.[223] This represents a 4.4 per cent increase from its 2017 MTFP value, and continuation of its upward trend since 2014. While this provides relevant context, we have not used our benchmarking results in a determinative way for this capex draft decision, including in relation to this ex-post prudency and efficiency review.

Based on our review, we consider that the 'overspending' and 'margin' requirements are not satisfied.[224]

As for the 'capitalisation' requirement, CitiPower has informed us that it had incurred capex of approximately $15.6 million in the current period that should have been classified as opex.[225] It submitted that the reclassification better reflects the nature of the work as the costs are incurred to maintain the age of the asset, and do not result in the creation of a new asset. [226] Our draft decision has not accepted the reclassification of ‘minor repairs’ from capex to opex in the forecast regulatory control period, as CitiPower has not established that that these works are, in fact, of operating nature. Therefore, the reclassification of minor repairs has not met the ‘capitalisation’ requirement.

For the reasons set out above, we are satisfied that the entirety of CitiPower's capital expenditure in the regulatory control years from 2014 to 2019 should be rolled into the RAB.

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222 AER, *Annual benchmarking report: Electricity distribution network service providers*, November 2019.

223 Economic Insights, *Economic Benchmarking Results for the Australian Energy Regulator’s 2019 DNSP Annual Benchmarking Report*, October 2019, p. 17.

224 NER, cl. S6.2.2A(c)

225 AER Analysis of recast RIN as compared to the category analysis RIN.

226 CitiPower, *Regulatory Proposal 2021–2026*, January 2020, p. 106.

Shortened forms

Shortened form	Extended form
ACS	alternative control services
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AMI	advanced metering infrastructure
augex	augmentation expenditure
capex	capital expenditure
CBD	central business district
CBRM	condition based risk management
CCP17	AER's Consumer Challenge Panel
CESS	capital expenditure sharing scheme
CPI	consumer price index
DBYD	Dial Before You Dig
DELWP	Victorian Department of Environment, Land, Water and Planning
DER	distributed energy resources
DVMS	dynamic voltage management system
ECA	Energy Consumers Australia
EMCa	Energy Market Consulting associates
ESV	Energy Safe Victoria
EUAA	Energy Users' Association of Australia
EVs	electric vehicles
GDP	gross domestic product
GPS	Global Positioning System
HI	health index
HIA	Housing Industry Association
ICT	information and communications technology
LV	low-voltage
MTFP	multilateral total factor productivity

Shortened form	Extended form
NEL	National Electricity Law
NEO	National Electricity Objective
NER	National Electricity Rules
NPV	net present value
opex	operating expenditure
PTRM	post-tax revenue model
PV	photovoltaic
RAB	regulatory asset base
repex	replacement expenditure
RIN	regulatory information notice
RIT-D	distribution regulatory investment test
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index
SAP	systems applications and products
SCADA	supervisory control and data acquisition
SCS	standard control services
STPIS	service target performance incentive scheme
totex	total expenditure
VaDER	Value of DER
VCO	Victorian Community Organisations
VM1	Victoria Market transformer 1