Draft Decision

Essential Energy

Electricity Distribution Determination 2024 to 2029

(1 July 2024 to 30 June 2029)

Attachment 5

Capital Expenditure

September 2023

AUSTRALIAN ENERGY REGULATOR

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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).[1] 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 regulatory obligations, and to maintain the safety, reliability, quality, and security of its network (the capex objectives).[2]

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).[3] 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)).[4]

The *AER capital expenditure assessment outline* explains our and distributors' obligations under the National Electricity Law and Rules (NEL and NER) in more detail.[5] It also describes the techniques we use to assess a distributor's capex proposal against the capex criteria and objectives.

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. Our assessment of the ex-ante capex is consistent with the NEO, which in addition to providing for the lowest possible costs also recognises that services should be valued appropriately and adapt to changing circumstances to maintain efficiencies in the long term interest of consumers. This incentive-based framework provides distributors with the flexibility to prioritise their capex program given their circumstances and due to changes in information and technology.

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1 These are services that form the basic charge for use of the distribution system.

2 NER, cl. 6.5.7(a).

3 NER, cl. 6.5.7(c).

4 NEL, ss. 7, 16(1)(a).

5 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, these are decisions for the distributor to make. 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. Distributors may spend more or less than our forecast in response to unanticipated changes.

Assessment approach

We provide guidance on our assessment approach in several documents, including the following which are of relevance to this decision:

- AER's *Expenditure Forecast Assessment Guidelines.*[6]
- Regulatory Investment Test for Distribution and Transmission (RIT-D and RIT-T) Guidelines.[7]
- AER's *Asset Replacement Industry Note.*[8]
- AER's *Information and Communication Technologies (ICT) Guidance Note.*[9]
- AER's *Distributed Energy Resources Integration Expenditure Guidance Note*.[10]
- AER's Guidance Note on Network Resilience.[11]

We also had regard to the guiding principles in the AER's *Better Resets Handbook – Towards consumer-centric proposals* which encourages networks to develop high quality, well-justified proposals that genuinely reflect consumers' preferences.[12]

Our draft decision has been based on the information before us, which includes:

- the distributor's regulatory proposal and accompanying documents and models.
- the distributor's responses to our information requests.
- stakeholder comments in response to our Issues Paper.
- technical review and advice from our consultant's reports.

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6 AER, *Expenditure Forecast Assessment Guideline 2013*, August 2022.

7 AER, *RIT-T and RIT-D application guidelines (minor amendments) 2017*, September 2017.

8 AER, *Industry practice application note for asset replacement planning*, January 2019.

9 AER, *AER publishes guidance on non-network ICT capital expenditure assessment approach*, November 2019.

10 AER, *Distributed energy resources integration expenditure guidance note*, June 2022.

11 AER, *AER publishes a guidance note on network resilience*, April 2022.

12 AER, *Better Resets Handbook – Towards consumer-centric network proposals*, December 2021.

5.1 Draft decision

Our draft decision is that we are satisfied that Essential Energy's proposed total net forecast capex of $2,655.4 million ($2023–24) reasonably reflects prudent and efficient costs to maintain the safety, reliability and security of the network.

While we proposed to accept Essential Energy's proposed total forecast capex for the 2024–29 period, we have some remaining concerns with the efficiency of Essential Energy's Stand-alone Power Systems (SAPS). Therefore, our acceptance of Essential Energy's total capex forecast is provisional on Essential Energy providing sufficient justification to support the efficient cost of its SAPS proposal.

Table 5.1 outlines Essential Energy's total capex forecast and our draft decision.

Table 5.1 AER's draft decision on Essential Energy's total net capex forecast ($ million, $2023–24)

	2024–25	2025–26	2026–27	2027–28	2028–29	Total
Essential Energy's proposal and AER draft decision	534.3	527.7	531.4	525.6	536.5	2,655.4

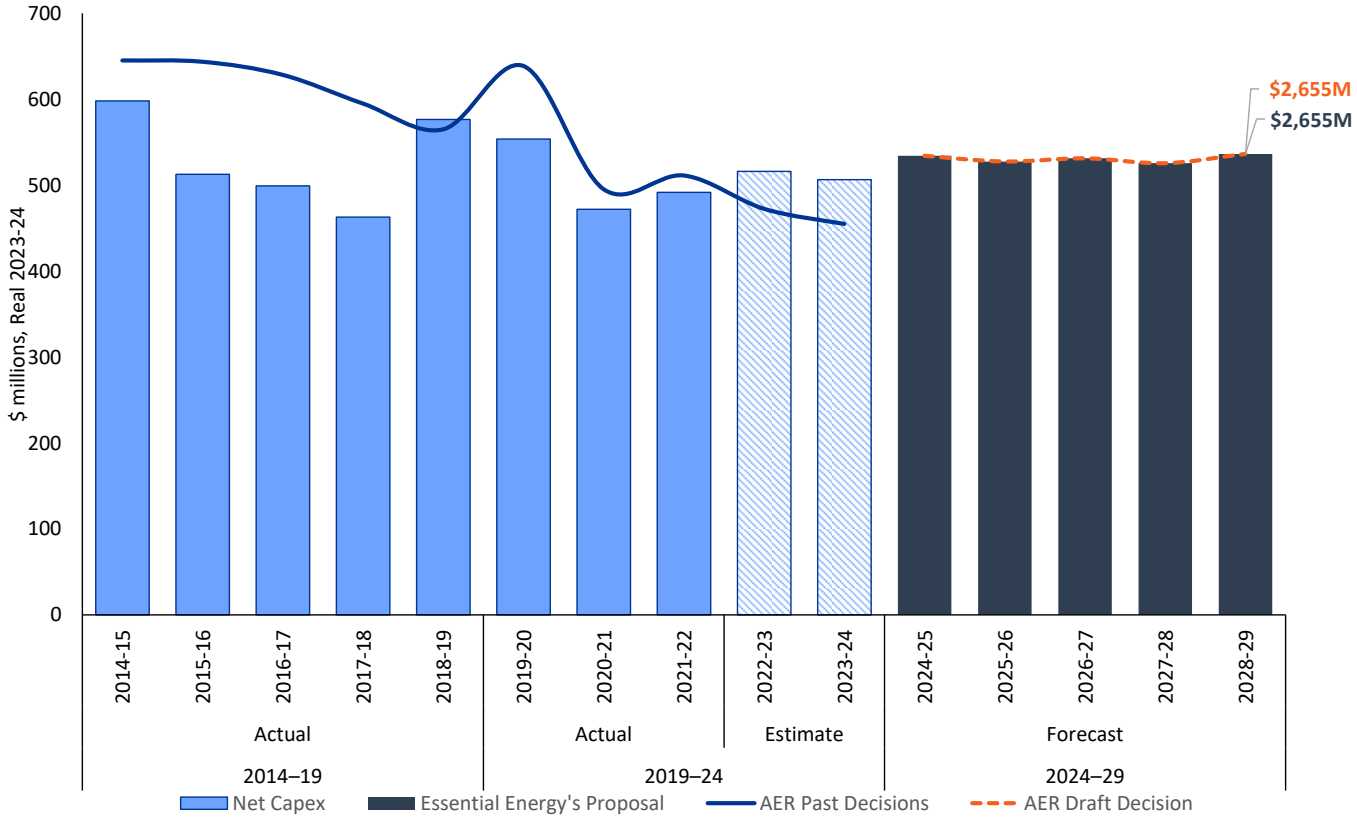
Source: AER analysis and Essential Energy's proposal.
Note: Numbers may not sum due to rounding.

5.2 Essential Energy's proposal

Essential Energy's proposal forecasts $2,655.4 million ($2023–24) capex over the 2024–29 regulatory control period. This represents a step up of approximately 3.6% compared to actual and expected expenditure over the 2019–24 period excluding disposals.

Figure 5.1 outlines Essential Energy's historical capex trend, its proposed forecast for the 2024–29 regulatory control period, and our draft decision.

Figure 5.1 Essential Energy's historical and forecast capex ($ million, $2023–24)



Source: AER analysis. Capex is net of asset disposals and capital contributions (capcons).

Table 5.2 provides a breakdown of Essential Energy's capex proposal.

In the forecast period, the main driver of Essential Energy's total capex forecast is repex, contributing 37% to the total capex. The drivers of its repex forecast are poles and pole top replacement. Its forecast repex is 3% lower than current and estimated repex in 2019–24.

Similarly, for other recurrent expenditure like recurrent information and communications technology (ICT) and fleet, we found Essential Energy's forecast to be in line or lower than its current period spend.

There is a material step up in its connections forecast. This is because of a change in Essential Energy's interpretation of its connections policy, where Essential Energy proposes to fund a greater proportion of potential shared assets in situations where it is in the long term of interests of consumers to do so.

Similar to other network service providers (NSPs), Essential Energy has proposed investment in new and emerging areas of capex; notably, in consumer energy resources (CER), climate resilience and cybersecurity.

Table 5.2 Essential Energy's capex category forecast compared with actual/estimated capex in 2019–24 ($ million, $2023–24)

Capex category	Essential Energy's 2019–24 capex	Essential Energy's 2024–29 capex[(a)]	Change from 2019–24 (%)	Proportion of total capex (%)
Repex	1,001.7	972.8	-3%	37%
Augex	104	109.9	5%	4%
Connections	8.2	66.9	716%	3%
Capitalised overheads	853.6	830.1	-3%	31%
CER integration[(b)]	13.7	86.6	n/a	3%
Resilience[(c)]	n/a	204.8	n/a	8%
Non-system assets[(d)]	591.3	393.2	-34%	15%
Total capex (excluding capcons)	**2,572.5**	**2,664.3**	**3.6%**	
Disposals	16.4	8.9		
Net capex	**2,556.1**	**2,655.4**		

Source: AER analysis. Totals may not sum due to rounding.
Notes: (a) 2024–29 total capex excludes capitalised provisions movements ($32m)
(b) 2024–29 CER integration includes CER-related ICT of $32.3m
(c) 2024–29 resilience includes Repex related resilience ($155.8m), Augex related resilience ($37.8m) and Property related resilience ($11.3m)
(d) 2024–29 non-system assets include ICT ($106.7m), Motor Vehicles ($183.6m), Capitalised leases ($15.3m), Building and Property ($73m) and Other Non-system ($14.5m).

5.3 Reasons for draft decision

We reviewed Essential Energy's capex drivers, programs and projects to inform our view on a total capex forecast that reasonably reflects the capex criteria. We conducted top-down analysis such as examining trends and forecast costs compared with historical capex, and interrelationships between cost categories. To complement this, we conducted bottom-up analysis of Essential Energy's major programs and projects.

Our capex assessment focused primarily on the material capex categories that either represented a significant uplift in expenditure, had stakeholder interest or are new and evolving area's such as CER and resilience. For capex that was relatively small and forecast using established modelling approaches and inputs in line with our expectations, we did not need to undertake a more detailed analysis of the individual programs and projects. Our draft decision is reflective of this approach as set out in Table 5.3 and Table 5.4 below.

Overall, we found that Essential Energy's forecast of $2,655.4 million ($2023–24) would be required to maintain the safety, reliability and security of electricity supply of its network. However, we have remaining concerns with the efficiency of Essential Energy's SAPS. Therefore, our acceptance of Essential Energy's total capex forecast for the 2024–29 period is provisional on Essential Energy providing sufficient justification to support the efficient cost of its SAPS proposal.

We also found some aspects of its forecast not to be consistent with prudent and efficient decision-making, especially in new and emerging areas of capex. But we also found that our alternative forecast, at the total capex level, was not materially different from Essential Energy's total forecast. We have set out areas of improvement for Essential Energy to consider in future processes.

Essential Energy's performance against the Better Resets Handbook expectations for capex

In considering the scope of our review we had regard to how Essential Energy has performed against the *Better Resets Handbook* expectations for capex. Essential Energy was one of the businesses selected to be on the Early Signal Pathway. It, therefore, had the benefit of the AER indicating at the Issues Paper stage the degree of the targeted review and where we would focus that review.

At the Issues Paper stage, we found that Essential Energy had partially satisfied the capex expectations. In particular, while it had satisfied most of the top-down testing of its proposal, we were not provided sufficient information leading up to the Issues Paper to assess the prudency and efficiency of its key projects and programs. There were also difficulties in reconciling and verifying Essential Energy's numbers and data in its proposal and models. For these reasons, we noted in the Issues paper that we would undertake a targeted review on several elements of Essential Energy's capex proposal – representing about 50% of Essential Energy's total capex forecast.

Since release of our Issues Paper, we have engaged extensively with Essential Energy to better understand and unpack its capex proposal. Essential Energy has been very cooperative, providing all requested information and data in a timely manner. Further, material in support of its forecast has been comprehensive and, on the whole, robust. We have, therefore, revised our targeted review from 50% to 31% of Essential Energy's total capex forecast. Table 5.3 provides a summary of our final assessment of Essential Energy's capex proposal against the Better Resets Handbook expectations for capex.

Table 5.3 Essential Energy's performance against the capex expectations

Capex expectations	Assessment	Position
1. Top-down testing of the total capex forecast and at the category level	• Total capex not materially different from current spend. • Essential Energy's forecast of modelled repex performs well against the repex model. • Recurrent expenditure like repex, fleet and recurrent ICT in line with actuals.	Satisfied
2. Evidence of prudent and efficient decision-making on key projects and programs	• Solid business/investment cases for several key projects and programs.	Partly Satisfied. Not fully satisfied due to the need to review the new and emerging cross-cutting capex categories (CER, resilience, cybersecurity)
3. Evidence of alignment with asset and risk management standards	• Key asset management documents outline the processes and approach to quantitative cost-benefit analysis and these are mostly consistent with industry practice	Satisfied
4. Genuine consumer engagement on capital expenditure proposals	• Major effort to engage with regional areas. • Extensive engagement with different customer groups to better understand their preferences. • At times, it was unclear how informed customers were in making their preferences for major investments.	Partly Satisfied

Our targeted review

Our targeted review involved assessing:

- Connections capex, because of the forecasted material step up relative to the current period
- Augex, because it is a step up from current period spend and also includes some resilience expenditure
- CER integration, resilience-related capex and ICT cybersecurity, because these are new and emerging areas relevant to a number of current regulatory proposals.

For all other categories not subject to targeted review, we undertook a broad high-level review of the main business cases driving the forecast to determine whether there are any material or systematic issues that might lead to over-forecasting.

Having regard to all the information before us, we have assessed that Essential Energy's total capex forecast reasonably reflects prudent and efficient costs. Table 5.4 sets out our provisional draft decision for Essential Energy by capex category.

Table 5.4 AER's draft decision by capex category ($ million, $2023–24)

Category	Essential Energy's proposal and AER's draft decision
Repex	972.8
Augex	109.9
Connections	66.9
Capitalised overheads	830.1
CER integration [(a)]	86.6
Resilience [(b)]	204.8
ICT	106.8
Fleet	183.6
Capitalised leases	15.3
Property	73.0
Other non-network	14.5
Total capex (excluding capcons)	**2,664.3**
Disposals	8.9
Net capex	**2,655.4**

Notes: (a) includes CER-related ICT.
(b) includes Repex related resilience, Augex related resilience and Property related resilience.

For some expenditure such as CER, non-recurrent ICT, cybersecurity ICT and climate resilience, we assessed the forecasted investment was not prudent and efficient at the category level. However, when we considered the total of these category level alternative estimates (in Table 5.5), we found that our alternative forecast at the total capex level was less than 4% and therefore not materially different from Essential Energy's total forecast.

Table 5.5 summarises, and Appendix A provides further details on, the reasons for our draft decision, by capex driver. This reflects the way we have assessed Essential Energy'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 or project/program. However, we use our findings on the different capex drivers to assess a regulated business' proposal as a whole and arrive at a substitute estimate for total capex where necessary. We also note that our decision on total capex does not limit a regulated business' actual spending.

Table 5.5 Summary of our findings and reasons, by capex driver

Driver	Findings and reasons
Repex[(a)]	We have included Essential Energy's repex forecast of $972.8 million in the total capex forecast. Essential Energy identified some of its repex as resilience-related and we have therefore assessed those within the resilience category. Overall, we found that the information provided adequately supported the proposed expenditure and note that the forecast is 3% below current period spending levels.

Driver	Findings and reasons
	Essential Energy also performs well against the repex model, with its modelled forecast repex about 14.4% below the repex model threshold, which suggests that overall its forecast modelled repex performs comparatively well against the other distribution network service providers (DNSPs). We note that Essential Energy took account of feedback we provided to it pre-lodgement on its running of the repex model. We also ran the repex model ourselves to test Essential Energy's repex model outcomes and found that any differences at the granular level of modelling did not have a material effect on the eventual repex modelling outcome.
Augex[(a)]	We have included Essential Energy's augex forecast of $109.9 million in the total capex forecast. Essential Energy identified some of its augex as resilience-related and we have therefore assessed those within the resilience category. Essential Energy proposed augex to address various compliance requirements, to address capacity constraints and to improve the reliability performance of its poor and worst performing feeder segments. Overall, we found that the information provided adequately supported the proposed expenditure.
Connections	We have included Essential Energy's connections forecast of $66.9 million in the total capex forecast. Essential Energy forecast is driven by a change in the interpretation of its current connections policy. This change in interpretation means Essential Energy will be funding a greater proportion of the connection costs of potential shared assets in situation where it is in the long term interests of consumers to do so. We also understand that other businesses have interpreted its connections policy in a similar fashion. Overall, we found that the information provided adequately supported the proposed expenditure. We are also satisfied that Essential Energy's new interpretation will facilitate more efficient outcomes for its customers as its Connection Funding Guideline makes it clear that Essential Energy will bear a greater proportion of the connection cost in the sharing cost arrangement if the benefit for its existing customer base is materially more than the connecting customer.
ICT	We have included Essential Energy's ICT forecast of $106.8 million in the total capex forecast. Our alternative estimate for ICT is not materially different from Essential Energy's forecast Overall, Essential Energy's proposed approach to forecasting its non-recurrent ICT programs was reasonable. We do not consider Essential Energy has demonstrated the Customer Relationship Management and Portal project is prudent and efficient. This project is interrelated with opex and is discussed further in Attachment 6 – Operating Expenditure. For ICT cyber security, our alternative estimate was not materially different from what Essential Energy proposed. In future regulatory proposals, we consider there are areas for improvement in Essential Energy's approach to non-recurrent ICT and ICT cybersecurity, which we discuss further in Appendix A.1.
Resilience[(a)]	We have included Essential Energy's resilience forecast of $204.3 million in the total capex forecast. Our alternative estimate for resilience is $121.6 million[(b)], which contributes a 3.1% reduction in our alternative estimate of total capex. This includes resilience-related expenditure we identified in repex (SAPS program) and property (relocation of its Lismore depot). We discuss our assessment of Essential Energy's resilience proposal in Appendix A.2. We found that aspects of its climate resilience proposal to be inconsistent with prudent and efficient decision-making, especially in relation to expenditure for its 'At risk poles' program, undergrounding program and SAPS program. While we have assessed that Essential Energy's total capex forecast reasonably reflects prudent and efficient costs, we have some remaining concerns with the efficiency of Essential Energy's SAPS program. Therefore, our acceptance of Essential Energy's total capex forecast for the 2024–29 period is provisional on Essential Energy providing sufficient justification to support the costings of its SAPS proposal.
CER integration	We have included Essential Energy's CER integration forecast of $86.6 million in the total capex forecast. Our alternative estimate for CER integration is $41.3 million, which contributes a 1.7% reduction in our alternative estimate of total capex. Essential Energy's proposed approach to CER integration raised some concerns. In future regulatory proposals, we consider there are areas for improvement in Essential Energy's approach to CER integration, which we discuss further in Appendix A.3.

Driver	Findings and reasons
Fleet	We have included Essential Energy's fleet forecast of $183.6 million in the total capex forecast. This forecast is 2.3% lower than the expected fleet capex in the 2019–24 period, despite Essential Energy describing the forecast peak of replacement cycles in the 2024–29 period. The primary drivers of fleet capex are elevated work platforms and light commercial vehicles. Essential Energy stated that a key driver was investment in alternative propulsion technology, which we reviewed further and found this to be less than 2% of the total fleet forecast and therefore not material in this case. In future regulatory proposals, we would expect any opex/capex benefits associated with changes in technology choices to be reflected in the proposal to demonstrate prudency and efficiency.
Property[(a)]	We have included Essential Energy's property forecast of $73 million in the total capex forecast (excluding the Lismore Depot relocation). This forecast is 3.2% lower than the expected property capex in the current period. Essential Energy noted this forecast is driven by the results of independent property condition reports. We considered the Lismore Depot relocation as part of our Resilience assessment.
Other non-network	We have included Essential Energy's forecast of $14.5 million for other non-network (i.e. furniture, fittings, plant and equipment) in the total capex forecast. Overall, we found that the information provided adequately supported the proposed expenditure.
Modelling adjustments	We have included an additional $37.9 million as part of our alternative capex forecast to address a modelling adjustment, which contributes a 1.4% increase in our alternative estimate of total capex. This adjustment is to ensure consistency with our standard approach to capex of applying a 6 month lagged Consumer Price Index series to align with the Roll Forward Model and Capital Expenditure Sharing Scheme (CESS) model. We have also considered the impact of labour real cost escalations as part of our assessment.
Capitalised overheads	We have included Essential Energy's forecast of $830.1 million for capitalised overheads. Overall, we found that the information provided adequately supported the proposed expenditure and note that the forecast is 3% below current period spending levels.
Asset disposals	We have included Essential Energy's fleet asset disposal forecast of $8.9 million. This figure is in line with historical disposal figures for fleet.
Ex-post review	We are required to provide a statement on whether the roll forward of the regulatory asset base (RAB) from the previous period contributes to the achievement of the capex incentive objective.[13] 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 value of the RAB.[14] We may exclude capex from being rolled into the RAB when a distributor has overspent the amount of capex above the allowance that does not reasonably reflect the capital expenditure criteria.[15] [16] We have reviewed Essential Energy's capex performance for the 2017–18 to 2021–22 regulatory years.[17] Essential Energy incurred total capex below its regulatory forecast for the ex-post review period. On this basis, the overspending requirement for an efficiency review of past capex is not satisfied. We are satisfied that including this actual capex in the RAB is likely to contribute towards achieving the capex incentive objective.

Notes: (a) Resilience includes Repex related resilience ($155.8m), Augex related resilience ($37.8m) and Property related resilience ($11.3m) from Essential Energy's capex proposal
(b) Includes the Lismore land acquisition excluded from Essential Energy's capex proposal.

13 NER, cl. 6.12.2(b).

14 NER, cl. 6.4A(a).

15 AER, *Capital Expenditure Incentive Guideline*, November 2013, p. 17.

16 NER, cl. S6.2.2A(b).

17 NER, cl. S6.2.2A(a1).

A Reasons for decision on key capex categories

This appendix sets out our assessment of key capex categories and programs/projects within Essential Energy's total capex forecast and the reasons for our decision. This appendix includes:

- Non-recurrent ICT (A.1)
- Resilience capex (A.2)
- CER integration (A.3).

This appendix discusses our alternative estimates at the category level. As discussed in section 5.3, when we considered the total of our category level alternative estimates, we found that our alternative forecast at the total capex level was less than 4% and therefore not materially different from Essential Energy's total forecast.

A.1 Non-recurrent ICT

A.1.1 AER's draft decision

We have included Essential Energy's non-recurrent ICT capex forecast of $64.3 million in the total capex forecast. While we identified concerns with two non-recurrent ICT programs, our alternative estimate for non-recurrent ICT was not materially different from what Essential Energy proposed.

As discussed in section 5.3, when we considered the total of our category level alternative estimates, we found that our alternative forecast at the total capex level was less than 4% and therefore not materially different from Essential Energy's total forecast.

A.1.2 Essential Energy's proposal

Essential Energy proposed $64.3 million for non-recurrent ICT capex across nine programs. As noted in section A.3, we have assessed Essential Energy's 'Network of the Future' ICT program as part of the CER capex category.

Essential Energy identified five strategic priorities for its ICT forecast:

- digital sustainability and enablement
- data and insights driven approach
- secure, trusted and compliant controls
- design for mobility
- seamless integration.

Below we focus on two key projects in Essential Energy's non-recurrent ICT forecast, as EMCa's review found the remaining projects to reasonably reflect prudent and efficient costs.

Customer strategy — CRM and Portal

Essential Energy proposed its customer relationship management (CRM) and Portal as the second of two project stages. The first stage is part of its Market Systems, Networking Billing and Meter data project, focusing on maintaining existing services, functionalities, capability and/or market benefits. The second stage relates to expanding and enhancing ICT capability for the CRM and Portal to improve customer service requirements.

Essential Energy provided a business case and cost-benefit analysis, which considered three options:

- Option 1: Integrated meter, market and customer system and leverage the new solution to also provide CRM and Customer Online Portal (COP) capability (recommended)
- Option 2: Integrated meter, market and customer system with separate CRM and COP capability
- Option 3: Replace the existing MI, CIS and NBM platform with a modern solution; rebuild the in-house MDM system; deploy separate CRM and COP capability.

Cyber security proposal

Essential Energy proposed $3.8 million capex for its cybersecurity program. It submits that its Cyber Security Strategy is to 'achieve a "whole of organisation" cyber security maturity uplift through targeted investments and a clear cyber security roadmap.'

Essential Energy states that its regulatory compliance obligations are growing in response to the increasing cyber security threat to the Australian government, its agencies and Australian businesses, including changes to the *Security of Critical Infrastructure Act 2018* (including related legislation), the NSW electricity distributor licence conditions, and the *Privacy Legislation Amendment (Enforcement and Other Measures) Act 2022*. Essential Energy concludes that given the growth in cyber security attacks, it considers it is reasonable to expect that the regulatory environment will continue to evolve to match these developing cyber security threats.

Essential Energy provided a business case and supplementary information to support its proposed program of investment for cybersecurity. It considered three options.

A.1.3 Reasons for decision

We have had regard to the information Essential Energy provided in support of its non-recurrent ICT capex forecast, including the business cases and cost-benefit models. We engaged EMCa to review Essential Energy's proposed capex for its eight non-recurrent ICT programs.[18] Where required, we have sought further information from Essential Energy through information requests.

Overall, from our review and EMCa's observations, we consider Essential Energy provided sufficient justification and our alternative estimate was not materially different from that proposed. We consider Essential Energy's cost forecasting methodology is reasonable.

[18] EMCa, *Report to AER on Essential Energy's DER and ICT,* August 2023.

EMCa's review found that most of Essential Energy's non-recurrent ICT forecast reasonably reflected the capex criteria because: [19]

- the non-recurrent ICT total expenditure (capex and opex) is forecast to decrease by 15% in the 2024–29 period compared to 2019–24, despite a significant amount of non-recurrent opex in 2024–29 associated with the software as a service accounting treatment.
- Essential Energy has a good track record for delivering ICT projects in the 2019–24 period on schedule and largely on budget. EMCa sampled the top-10 project post-implementation reviews from the 2019–24 period and found that, while some projects were over budget and some were under budget, the net effect was negligible at +2%. EMCa considers there is likely to be low deliverability risk considering this past performance and the expected completion dates by FY28 to allow time for any project slippage before the end of FY29.
- five projects are related to upgrading or replacing systems that are at the point in their life cycle where the risk-cost of retaining the current version exceeds the cost of replacement. EMCa notes that Essential Energy has undertaken reasonable measures within the 2019–24 period to extend asset lives as long as possible, while considering the timing of vendor support ceasing.
- one project (Data Centre Consolidation) requires a small amount of additional expenditure to finish off a project from the 2019–24 period.

For the regulatory proposal, EMCa noted that Essential Energy could improve by including in its overarching ICT strategy a summary of its risk analysis and controls for ensuring the program of work is deliverable at an efficient cost.[20]

The next sections focus on our findings on two key projects, as EMCa considered the remaining non-recurrent ICT projects reasonably reflected the capex criteria.

Customer strategy — CRM and Portal

EMCa advised that the 'Customer Strategy – CRM and Portal' project does not meet the requirements in the ICT Guidance Note. This project's driver is 'improving service capability'. Under our ICT Guidance Note, non-recurrent ICT projects that provide capability growth are expected to be supported by analysis that demonstrates a net economic benefit.[21] Essential Energy indicates that 20% of the project is required to maintain the service while the remaining 80% provides expanded service capability. EMCa noted that Essential Energy's cost-benefit analysis only attributed benefits as part of stage 1 in the recommended option 1, primarily comprising avoided charges from legacy systems.[22] However, there are no benefits accrued that relate to stage 2 and, therefore, Essential Energy has not demonstrated that stage 2 of the project has a positive net present value and has therefore not demonstrated that stage 2 is prudent and efficient.

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19 EMCa, *Report to AER on Essential Energy's DER and ICT,* August 2023, pp. 49, 54, 62.

20 EMCa, *Report to AER on Essential Energy's DER and ICT,* August 2023, p. 63.

21 AER, *Guidance Note for non-network ICT capex assessment approach*, November 2019.

22 EMCa, R*eport to AER on Essential Energy's DER and ICT,* August 2023, p. 57.

Our alternative estimate of total capex does not include this project. We do not consider this adjustment is material for the total ICT capex forecast. However, as discussed in Attachment 6 – operating expenditure, we have not accepted the proposed opex step change for cloud computing to account for the opex component of this project.

Cyber security

We recognise the importance of cyber security investment in supporting a reliable and secure electricity network.

We engaged EMCa to review Essential Energy's proposed capex for its cybersecurity program.[23] In coming to our position to accept Essential Energy's capex forecast for this program, we had regard to EMCa's advice. In summary, EMCa found that Essential Energy's cyber security program objectives and targets are appropriate as is its risk-prioritisation approach. EMCa also advised that Essential Energy selected the appropriate option from its options analysis.

EMCa advises that one element of Essential Energy's proposed cyber security capex is overstated but the remainder is adequately supported to maintain the risk level.[24] EMCa also found that the timing of the proposed initiatives and the implementation risk appears to be manageable, and that Essential Energy's cost forecasting methodology is reasonable (aside from some elements which can lead to over-estimation in aggregate).[25] We encourage Essential Energy to consider the feedback in EMCa's report for future regulatory proposals.

We received one submission in response to our Issues Paper about all of the NSW's ICT cybersecurity proposal. The Public Interest Advocacy Centre (PIAC) submitted that given cybersecurity requirements are likely to be mandated, it considered the level of influence consumers can exert on this issue to be relatively low. However, it noted that the growing importance of cybersecurity does warrant discussion on how increased risk should be best shared between networks and its customers.[26]

A.2 Resilience capex

A.2.1 AER's draft decision

We have included $204.8 million in the total capex forecast. This includes resilience-related expenditure we identified in repex (its SAPS program) and property (relocation of its Lismore depot).

We found that aspects of its climate resilience proposal to be inconsistent with prudent and efficient decision-making. Our alternative estimate for resilience is $121.6 million, which contributes a 3.1% reduction in our alternative estimate of total capex. As discussed in section 5.3, when we considered the total of our category level alternative estimates, we

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23 EMCa, *Report to AER on Essential Energy's ICT cyber security,* August 2023.

24 EMCa, *Report to AER on Essential Energy's ICT cyber security*, August 2023, p. 28.

25 EMCa, *Report to AER on Essential Energy's ICT cyber security*, August 2023, pp. 22, 28–29.

26 Public Interest Advocacy Centre, *Issues Paper 2024–29 Revenue Determinations: Ausgrid, Endeavour and Essential Energy*, June 2023, pp. 16-17.

found that our alternative forecast at the total capex level was less than 4% and therefore not materially different from Essential Energy's total forecast.

While we have accepted Essential Energy's proposed total forecast capex for the 2024–29 period, we have some remaining concerns with the efficiency of Essential Energy's SAPS program. Therefore, our acceptance of Essential Energy's total capex forecast is conditional on Essential Energy providing sufficient justification to support the costings of its SAPS proposal.

A.2.2 Essential Energy's proposal

Essential Energy submits that the change in climate will (unless mitigated) result in an increasing level of risk to supply interruptions to customers. Essential Energy states that its proposed climate resilience program is aimed at mitigating the increase in climate-related risk compared with current levels. Its proposal focuses on the increased risk from bushfires and floods.

Essential Energy submits that the 'lived experience' of consumers across Australia has demonstrated an increase in climate events. Essential Energy specifically refers to major incidents that have occurred in 2007, 2015, 2020 in Essential Energy's network area.

Essential Energy proposes $127.0 million for climate resilience and $14.4 million for community resilience. In assessing Essential Energy's resilience proposal, we have also included in Essential Energy's proposed capex of $52.2 million for SAPS program and $21.3 million to relocate its Lismore depot ($10 million on land and $11.3 million on buildings). We have included the latter items because Essential Energy has acknowledged throughout its documentation that these contribute towards resilience of its network.

We have therefore assessed $204.8 million (including community resilience) plus the $10 million of land acquisition Essential Energy did not include in its regulatory proposal as its total climate resilience proposal.[27]

Climate and economic modelling

Essential Energy engaged Risk Frontiers and KPMG to undertake climate and economic modelling of the impact of climate change on its network.

Based on this modelling and other factors, Essential Energy has included projects to address bushfire, windstorm and flood impacts. Essential Energy has modelled the impacts of increasing risk of bushfire separately to windstorms.

Essential Energy has applied the results of the Representative Concentration Pathway RCP4.5 scenario only (no weighting to other scenarios has been applied), which it considers to be the central case.

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27 The land acquisition was originally part of a separate cost pass through application submitted by Essential Energy in 2022. However, our decision indicates that we would instead review this requirement as part of its 2024-29 regulatory proposal.

Proposed investments to mitigate increased risk from climate events

Table A.1 sets out the Essential Energy's proposed projects within its total climate resilience program, including capex for the SAPS program and the Lismore depot relocation.

Table A.1 Essential Energy's network and community resilience proposal ($ million, $2023–24)

Project expenditure	Essential Energy forecast
'At risk' poles program	85.3
Underground cables	18.3
Solar and battery back-up radio sites	1.7
Microgrid/generation	16.9
Mobile strategic spares	4.8
SAPS	52.2
Lismore depot[(a)]	11.3
Community resilience	14.4
Total	**204.8**

Source: Essential Energy, *Response to information request 029*, May 2023.
Notes:(a) excludes $10 million of land acquisition Essential Energy did not include in its regulatory proposal.

Proposed STPIS adjustments

Essential Energy proposed Service Target Performance Incentive Scheme (STPIS) adjustments because of reliability benefits stemming from its microgrids, strategic spare programs and community resilience program.

A.2.3 Reasons for decision

We acknowledge Essential Energy's efforts to engage with its stakeholders on the future network and local effects of climate change. We also appreciate that there is much uncertainty around the impact of climate change on electricity networks, and its localised impact on communities. We are aware that the electricity industry is still at the early stages of understanding the impact of climate change on networks and local communities, including how to best allocate risks from extreme weather events so that it is in long term interests of consumers.

To support broader discussions around network resilience, we developed a guidance note to assist stakeholders understand how resilience-related expenditure would be treated under the NER.[28]

In coming to our position on the prudency and efficiency of Essential Energy's climate resilience program, we have had regard to the extent that its proposal satisfies relevant

[28] AER, *Network Resilience – a note on key issues*, April 2022.

criteria in our guidance note on network resilience. In that note, we set out our expectations of the type of evidence businesses should provide to demonstrate that their resilience-related proposal is prudent and efficient; these being:

- *Identified need*; that there is a casual relationship between the proposed resilience expenditure and the expected increase in the extreme weather event;
- *Testing of the preferred option*; that the proposed expenditure is required to maintain service levels and is based on the option that likely achieves the greatest net benefit of the feasible options considered; and
- *Genuine consumer engagement*; that consumers have been fully informed of different resilience expenditure options, including the implications stemming from these options, and that they are supportive of the proposed expenditure.

We also had regard to EMCa's advice in its technical review of Essential Energy's proposed capex for its climate resilience program.[29]

Overall, we appreciate Essential Energy's efforts in providing the evidence set out in our guidance note to support prudent and efficiency of its climate resilience investment. We discuss our assessment below. We then provide the findings of our bottom-up review, a more detailed assessment of each project in Essential Energy's climate resilience proposal, including the identification of areas of improvement in Essential Energy's analysis that we encourage it to consider in future processes.

Assessment against our resilience guidance note

Identified need

We consider that Essential Energy has not addressed this criteria.

We note that the modelling of increased climate risk has been limited to two climate resilience investments – its 'at risk' poles program and undergrounding program. For these programs, Essential Energy modified its standard Probability of Failure and Consequence of Failure models to reflect changes in risk, with the current base-line risk compared with the risk from increased probability of failure from climate change.

Overall, we do not have any major concerns with the climate projection modelling. We appreciate that there are uncertainties when projecting climate and consider that such modelling is new and evolving. We consider that the modelling of climate projections is based on a comprehensive set of information and data to undertake simulations from the 2020 baseline.

Our concerns relate to how climate projections are predicted to impact Essential Energy's network. Essential Energy appears to have largely relied on engaging with its customers on their 'lived experiences' from recent weather events and from historic exposure to climate related failure modes to investigate potential solutions to address the exposure. Essential Energy identified a number of investment options which were socialised with customers to test the customers' investment appetites. We do not consider that relying mainly on the 'lived

[29] EMCa, *Report to AER on Essential Energy on Climate-driven Resilience 2024–29*, August 2023.

experiences' of Essential Energy's customers to be a reasonable basis on which to derive its climate resilience investment.

Other than the 'at risk' poles program and undergrounding program, all other climate resilience expenditure is based on historical data and/or cost benefit analysis with the primary driver being reliability benefits to the affected customers. While we consider that Essential Energy has provided sufficient evidence of the identified need (reliability) of the investment, these are not premised on an *expected increase* in extreme weather events.

In our guidance note, we refer to the close relationship between reliability and resilience where resilience is an input that contributes to the achievement of reliability – the service level outcome. While improved reliability is generally referred to as the service level outcomes from a more resilient network, other service-level outcomes like maintenance of safety and network security of the network can also be affected. For instance, undergrounding more of an electricity network would make the network more resilient, resulting in a more reliable provision of services for consumers.

Testing of the preferred option

We consider that Essential Energy has partly addressed this criteria. Our assessment of the specific resilience programs is discussed below.

In summary:

- For its larger resilience programs – its 'at risk' poles and undergrounding program – we consider that Essential Energy did not provide sufficient evidence of the prudency and efficiency of these programs.
- For its other programs, Essential Energy has provided sufficient evidence to support the prudency and efficiency of its investments through cost benefit analysis including options analysis. Its supporting material indicates that the primary driver of the benefits from these programs is standard reliability, with resilience being an additional benefit (a secondary driver).

Genuine consumer engagement

We consider that Essential Energy has partly satisfied this criteria.

Essential Energy has undertaken an extensive engagement process on its climate resilience proposal. It has engaged widely with different customer groups and appears to have received support for its proposal.

PIAC observed that in Essential Energy's engagement forums, consumers generally supported individual proposals for investment in composite poles, limited undergrounding in high-risk areas, and stand-alone power systems and microgrids. However, the manner in which these options were presented did not always provide consumers with meaningful trade-offs and adequate context to understand how discrete responses related to wider questions of managing climate risk and uncertainty. PIAC concludes that while Essential Energy's process creates valid results regarding consumer's willingness to pay for levels of investment in each discrete response (composite poles, undergrounding, SAPS and microgrids), there are questions as to whether the resulting collection of responses represent the most effective means of achieving consumers preferred resilience outcomes in a way

that best accords with their preferences for the management of climate-related risk and uncertainty.[30]

Like PIAC, the AER's Consumer Challenge Panel (CCP26) also observed a high level of support for the package of resilience initiatives in the community deliberative forums during Phases 2 (online) and 4 (in person) of the engagement program. It notes that the degree of support was reinforced in the final round of deliberative forums when customer preferences for the expenditure were re-tested given the projected bill increases as a result of increases in interest rates and inflation. It also observed some differences between the views of different customer cohorts were apparent in the engagement discussions on resilience investment options. While residential customers were generally very supportive of the most ambitious resilience mitigation investments, other customer cohorts were not. The CCP considers that how these different views were reconciled in the proposal is not apparent.[31]

Findings from our bottom-up review

Microgrids ($16.9 million), mobile strategic spares ($4.4 million) and radio sites ($1.7 million)

We agree with EMCa's view that Essential Energy's proposed capex for these expenditure projects in its climate resilience program is reasonable. Essential Energy is proposing to strengthen solar and battery back-up power supplied to 50 radio sites, proposing microgrids for 6 sites to address poor historical reliability and additional mobile spares to supplement its existing holdings at sites where there is no ability to restore supply quickly.

Essential Energy provided solid cost benefit analysis including comparison of feasible options for each of these projects. We note that its analysis demonstrates that the primary benefit from these projects is reliability, with resilience being an important and secondary outcome.

At risk poles replacement program ($85.3 million)

EMCa noted that there was a lack of robustness in Essential Energy's cost benefit analysis including poor options analysis in support of Essential Energy's 'at risk' poles program. EMCa also observed:[32]

- Likely double-counting with Essential Energy's wider business-as-usual (BAU) poles program.

  Essential Energy's 'at risk' poles program forms part of a larger pole management program. The larger poles program includes a network-wide transition to the use of composite poles (from timber poles). EMCa observes that Essential Energy does not appear to have had regard to possible double counting of the 'at risk' poles which form part of its resilience program with its BAU program. Essential Energy acknowledged this

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30 Public Interest Advocacy Centre, *Issues Paper 2024–29 Revenue Determinations: Ausgrid, Endeavour and Essential Energy*, June 2023, pp. 15-16.

31 Consumer Challenge Panel (CCP) Sub-Panel CCP26, *Issues Paper Response – Essential Energy, CCP26 Advice to AER re 2024–29 Essential Energy Regulatory Proposal and AER Issues Paper*, May 2023, pp. 9-10.

32 EMCa, *Report to AER on Essential Energy's climate resilience 2024–29,* August 2023, pp. 22–24.

possible double count, and will include an updated poles volume in its revised proposal; in particular, Essential Energy states that: [33]

> Essential has not yet removed potential duplication between the risk-based pole replacements and the conditional based replacement program (repex)… It is Essential's intention to apply the greater of these options, i.e. with risk based poles removed from the condition based volume assessment, in a change in forecast pole replacements as part of its revised regulatory proposal.

- Potential for duplication with Essential Energy's proposed repex not adequately addressed.

  EMCa observes that it appears that Essential Energy has not had regard to the potential for the duplication of investment across the entire capex portfolio. For instance, its 'at risk' poles program is related to other programs such as the undergrounding and deployment of its SAPS program which remove poles in the areas of the network where these investments are planned to occur.

- Lack of alignment with increasing extreme weather risk.

  EMCa reviewed the alignment of Essential Energy's selection of poles, as determined from its modelling, with the highest areas of increase in bushfire risk as identified from its climate risk impact modelling. It expected to see some alignment with the highest areas of risk growth but instead EMCa found no clear relationship between these factors. We agree with EMCa that this demonstrates that the proposed program is likely to have a minor impact on mitigating increasing climate risk and that the modelled benefits are likely overstated.

Due to our and EMCa's concerns, we derived an alternative forecast of $19.6 million for Essential Energy's 'at-risk' poles program. Our alternative forecast recognises that Essential Energy's 23% incremental cost for its composite poles (compared to timber poles) in its BAU network-wide transition program is reasonable. While we consider this alternative forecast is likely on high side (as it is not feasible to replace a fraction of a pole to achieve the full benefit), we took a cautious approach by considering that there might be high risk areas where there is a reasonable chance that replacing timber poles earlier may be economically efficient.

Undergrounding ($18.3 million)

Essential Energy proposes capex of $18.3 million to underground 40km of its existing overhead network. Essential Energy states that this program will replace high risk assets that will be more prone to intense bushfires due to climate change.

We agree with EMCa that Essential Energy has not provided sufficient evidence to support the prudency and efficiency of the program. In particular, that:[34]

- Selection of undergrounding as the prudent option has not been adequately justified on an economic basis

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33 Essential Energy, *Response to information request 025,* May 2023, p. 8.

34 EMCa, *Report to AER on Essential Energy's climate resilience 2024–29,* August 2023, pp. 24-25.

EMCa observed that the selection of 40km of undergrounding corresponding with the highest risk value portions of the network has not been explained, other than by reference to the volume included in its consumer engagement. Further, while Essential Energy acknowledges other alternatives such as composite poles, it has not undertaken a comparison from an economic perspective. EMCa also notes that the AER queried whether the alternative of utilising covered conductor thick (CCT) was evaluated as part of the process, and Essential Energy confirmed it was not, and that 'this program was established based on the strong customer appetite for Essential Energy to be providing a form of underground option for investment.'[35]

- Claimed benefits of undergrounding have not been adequately justified if alternative plausible options are not assessed.

  EMCa notes that, while Essential Energy submits that there is a net present value (NPV) of $37.3 million for this project, this does not take into consideration plausible alternative options (such as pole replacement, or use of CCT) or re-prioritisation of existing programs as these may present the prudent and efficient option.

In addition to the potential overlap with other resilience and reliability programs, Essential Energy also did not include a STPIS adjustment on an overhead to underground conversion program with an expected reliability benefit.

Lismore depot ($21.3 million)

We have included $20.4 million, compared to Essential Energy's forecast of $11.3 million in its total capex forecast. This is for Essential Energy to relocate the depot at Lismore to higher grounds after recent flood events. We have included a greater amount than Essential Energy forecast to take account of a land acquisition that was not included in Essential Energy's capex proposal.

We did not accept the land acquisition amount in our review of the 2022 North Coast flood event cost pass through because it was not relevant to the cost pass through.[36] At that time, we indicated that we would review the land acquisition at the next reset. Our review indicates that the current location of the depot is on a flood plain and that moving it to higher ground (which requires land acquisition) would be prudent and efficient. We consider that this is a good example of building back with a better asset after an extreme weather event where the scope of work is well defined, and the cost-benefit are clear such that it is in the long term interest of consumers to proactively invest in climate resilience.

We are also removing $0.9 million from the forecast (thus the overall forecast of $20.4 million instead of $21.3 million) due to the expected residual insurance payout next period on the existing Lismore depot from recent flood events not included in Essential Energy's proposal. Based on our discussion with Essential Energy, it was acknowledged that it would be reasonable to net off the expected insurance payout of $3 million received against capex this period and next period to recognise the benefits of consumers paying for insurance premiums.

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35 Essential Energy, *Response to Underground Resilience Action Items – April 2023 Site Meetings,* April 2023.

36 AER, *Decision on Essential Energy North Coast flood event cost pass through,* March 2023.

Stand Alone Power Systems ($52.2 million)

Essential Energy is proposing to install 400 SAPS across its network in supply areas with long line length per customer, that is, over 3km/customer. This program will result in the removal of 1,500km of overhead lines from the network (about 1% of its total overhead network).

These overhead lines typically supply remote communities. Historically, proactive investments through traditional technologies (poles and wires) were deemed uneconomical in these areas. The introduction of SAPS as a feasible alternative option has changed the merits of its traditional reactive replacement approach. EMCa also observes that: [37]

> If the NPV is sufficiently positive, as Essential Energy has submitted, the SAPS installations are likely to provide improved services to consumers.

Overall, we consider the benefits outlined by Essential Energy for this program to be solid and its identified opex and capex offsets to be reasonable. If we are to consider the benefit on its own, there is a case for a higher cost capex program in a cost benefit perspective.

However, EMCa notes that the proposed units appear to have a high capital cost and would benefit from an assessment of the market-based testing that Essential Energy has undertaken to determine the efficient level of cost, and to ensure that competitive tension is maintained.

We request that Essential Energy provide reasons and supporting information to explain these high costs and therefore why such an investment is efficient. In this regard, our draft decision to accept Essential Energy's total capex forecast is provisional on a satisfactory response from Essential Energy on this matter.

Community resilience ($14.4 million in capex)

In assessing Essential Energy's community resilience proposal, we are cognisant of the role that energy providers have in the lead up to, during and after a natural disaster. There are minimum service levels or standards to ensure continued supply and restoration of services following unplanned outages. We are also aware that the role of energy providers is also a collaborative one with other responsible entities.

Essential Energy submits that its community resilience investments will enable Essential Energy to provide customers with a more reliable electricity supply service when planned maintenance disrupts electricity supply for significant periods.

Essential Energy's community resilience program includes investment in:[38]

- 1000 domestic generators, 20 large and 20 medium generators – to reduce customer outage times
- 20 portable SAPS units – to reduce customer outage times

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37 EMCa, *Report to AER on Essential Energy's climate resilience 2024–29,* August 2023*,* p.34.

38 Essential Energy, *10.06.11 Community Resilience Investment Case*, January 2023, pp. 6-7.

- 50 portable solar streetlights – to keep communities safe and secure when major natural events happen
- a communications van/hub – so customers can receive the information and other support they need as well as support the State Emergency Management Committee
- a portable depot – to allow Essential Energy crews to respond in a quicker and more effective manner.

Essential Energy has emphasised the extensive engagement process it undertook with its stakeholders in developing its community resilience proposal. It also notes that when it provided different options to its stakeholders (little or no community resilience expenditure, $7 million program or the more expensive option of a $14.4 million program), stakeholders strongly supported the higher cost option. [39]

Essential Energy also submits that whilst customers were highly appreciative of the Essential Energy's efforts to keep the lights on using non-network solutions, it was clear that the quantity and variety of non-network solutions that Essential Energy's had at its disposal was insufficient to meet customer expectations and requirements in the event of a major weather event or natural disaster. In addition, it was clear that communities were not well prepared to withstand and recover from these natural shocks when they occurred.[40]

Our alternative forecast is $6 million for Essential Energy's community resilience program. Based on the information before us, we are of the view that this level of expenditure is reasonable based the following:

- The basis of our alternative forecast falls within the definition of a distribution service such that the provided service is in connection with Essential Energy's distribution system;
- It recognises that Essential Energy has undergone significant challenges in dealing with extreme weather events in recent years and its large geographical footprint means it is more vulnerable to these events compared to some other networks;
- that there is a duty of care beyond the definition of distribution service for some of its most vulnerable customers, namely life support customers.

Given these reasons, our alternative forecast includes expenditure for Essential Energy's proposed portable SAPS units, a communications van/hub, portable streetlights and depot as well as $2 million of its portable generators as these are likely to assist front line workers better communicate and coordinate with emergency services and local communities to aid in the restoration of network services following an unplanned outage. The portable element of these investments would allow quicker network restoration times. We have not accepted Essential Energy's proposed funding for most of its portable generator expenditure because providing backup generations 'behind the meter' at customers' premises is not considered a distribution service (i.e. connecting generation assets to a private network). There are also competition concerns associated with investments of this nature.

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39 Essential Energy, *10.06.11 Community Resilience Investment Case*, January 2023, p. 4 and p.9.

40 Essential Energy, *10.06.11 Community Resilience Investment Case*, January 2023, p. 8.

STPIS adjustment

Essential Energy proposed STPIS adjustments due to reliability benefits stemming from its climate resilience investments.

Essential Energy proposed STPIS adjustments for these programs:

- SAPS
- Microgrids
- Community resilience
- Yass line upgrade (augex related)

We have reviewed each of these programs and its reliability impact as part of our resilience assessment and found its calculation reasonable. Given we have accepted the capex benefits associated for SAPS, Microgrids and Yass line upgrade programs, we would also accept the proposed STPIS adjustments associated with these programs.

Essential Energy is the only business in the group of 2024–29 regulatory proposals that has offered a STPIS adjustment. We commend Essential Energy for putting these adjustments in its proposal as its proposed adjustments in effect means a higher reliability target, meaning a commitment to better reliability outcomes for its customers. Its proposed adjustments also mean that it is not double-counting reliability benefits (as there are reliability benefits from resilience investment as well as what they would receive from STPIS).

A.3 CER integration

A.3.1 AER's draft decision

Essential Energy proposed a forecast of $86.6 million for CER integration in the total capex forecast. We found aspects of its CER integration expenditure proposal to be inconsistent with our guidance and this likely overstates the benefits associated with the proposed investments.

Our alternative forecast for CER integration is $41.3 million, which contributes a 1.7% reduction in our alternative estimate of total capex. As discussed in section 5.3, when we considered the total of our category level alternative estimates, we found that our alternative forecast at the total capex level was less than 4% and therefore not materially different from Essential Energy's total forecast.

A.3.2 Essential Energy's proposal

Essential Energy proposed $86.6 million of capex for CER integration investments. It also proposed $31.7 million for an opex step change related to CER (assessed in Attachment 6). The proposed capex consists of network capex (including augmentation), ICT expenditure to support the proposed implementation of dynamic operating envelopes (DOEs) and for network monitoring.

Essential Energy states that increasing numbers of CER lead to increasing levels of reverse power flow which causes overvoltage at times of low demand and can also lead to thermal overloading of network assets. Essential Energy's customer engagement revealed strong

customer support for network investments to address challenges for power quality relating to the energy transition.[41]

Essential Energy's proposal combines DOEs and network solutions, including HV/LV reinforcement, distribution transformer upgrades, voltage control and regulation settings and community battery storage.

Currently, 26% of Essential Energy's customers have rooftop solar. Essential Energy forecasts that this figure will increase to 47% by 2029, based on Frontier Economics' modelling of rooftop solar uptake in NSW and AEMO's 2022 Integrated System Plan (based on the Step Change scenario). Essential Energy's network has the highest penetration of rooftop solar in NSW.

A.3.3 Reasons for decision

We assessed Essential Energy's "Future Network" business case, supporting documents and responses to our information requests.[42] EMCa also reviewed the prudency and efficiency of the proposed expenditure, with a focus on whether Essential Energy sufficiently demonstrated the need for network investment to accommodate forecast levels of CER.[43]

We assessed the proposed CER integration expenditure against our guidance note the customer export curtailment value (CECV) methodology.[44] Our guidance note outlines the types of benefits that may be realised and how DNSPs should quantify them.[45] Relatedly, we apply the CECV methodology to derive CECVs, which we expect DNSPs to use when estimating wholesale electricity market benefits associated with their proposed investments.[46]

Our assessment focused on:

- Hosting capacity analysis. DNSPs should study the networks' ability to accommodate more CER connections without experiencing voltage or thermal violations. The output of this analysis is a forecast of export curtailment.
- Options analysis. The preferred investment option should be a credible option which maximises the net economic benefits, relative to a "business as usual" base case scenario.
- Benefit quantification. DNSPs should quantify credible types of benefits and use appropriate input assumptions to quantify benefits.

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41 27% of customers supported the option to "mitigate existing problems and pre-empt some" ($81 million over 2024–29) and 66% of customers supported the option to "avoid the problems from occurring" ($164 million over 2024–29).

42 This included "Attachment 10.05 – Future Network Business Case Overview", "Attachment 7.01 – DER Integration Strategy", "Attachment 7.01.01 – Hosting Capacity Study – Zepben".

43 EMCa, *Report to AER on Essential Energy's DER and ICT 2024–29,* August 2023.

44 AER, *Customer export curtailment value methodology*, June 2022

45 AER, *DER integration expenditure guidance note*, June 2022.

46 AER, *Customer export curtailment value methodology*, June 2022.

Hosting capacity analysis

Essential Energy engaged Zepben to undertake an assessment of hosting capacity. This analysis established the curtailment profile, being the hosting capacity minus the export demand over time. Zepben modelled each feeder of Essential Energy's network in "OpenDSS" (a distribution system simulator) using load flow modelling. The objective of this modelling was to assess the load and CER penetration levels that voltage violations against the prescribed AS4777 limits occur over time, with the particular focus on the next regulatory control period.

The results of the modelling demonstrate that the average constrained over-voltage triggered export levels for the various feeder types lie within a range of approximately 2.8kW to 7.2kW, with the majority of constraints manifesting in the range of approximately 2.8kW to 4.2kW solar export. Zepben noted that the current export limits are 3kW (rural connections) and 5kW (urban connections). Essential Energy plans to reduce its static export limits to 1.5kW from 2030 and to apply these to all low voltage customers, regardless of whether they are in urban or rural areas. This represents a material reduction from the current static export limits, which has the effect of causing a significant step change in curtailed energy in the counterfactual scenario. It is unclear how Zepben's hosting capacity analysis informed this decision.

In its analysis, the threshold for calculating curtailment of rooftop solar export was set at 253V for greater than 1% of the year to define 'sustained' overvoltage, which is consistent with the 2015 version of AS4777.2. EMCa noted that while this is appropriate for the majority of inverters on its network (as most will have been installed when the prevailing limit was 253V), the overvoltage limit under the 2020 version of AS4777.2 is 258V (which is applicable for new or replacement installations).[47] Therefore, it is a conservative limit which tends to underestimate hosting capacity and overestimate the forecast volume of curtailment.

Options analysis

Essential Energy proposed a mixture of demand side and supply side solutions. It also plans to implement export tariffs and rewards and a large portion of the proposed expenditure is included in its estimate of export long-run marginal cost.

Essential Energy proposed to invest in software, systems, data and dynamic network assets to improve network visibility and build dynamic grid management capability. The key feature of the proposal is the introduction of DOEs, which will initially be basic (targeting specific areas with limited hosting capacity) and then will become advanced (requiring a full network model to operate). It also proposed expenditure to augment the network to increase hosting capacity where it is necessary and justified.

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[47] Inverters compliant with AS 4777.2:20 will trip as follows:
(1) 240V: volt var settings initiate, with q requirement for the inverter to absorb VARs at 258V
(2) 253V: volt-watt response initiate and ramp down output (kW) with increasing voltages through to 265V
(3) 258V: trip if the 258V is sustained on average for 10 minutes
(4) 260V: trip if 260V is sustained for more than 1 second
(5) 265V or more: instantaneous trip.

Essential Energy considered three different investment options, with the only material difference being the timing of developing and implementing advanced DOEs. These options were:

- Basic DOEs offered from 2026; advanced DOEs offered from 2033 (the proposed option)
- Basic DOEs offered from 2026; advanced DOEs offered from 2031
- Basic DOEs offered from 2026; advanced DOEs offered from 2029.

Essential Energy noted that these options were compared with a base case scenario, however its base case represents a "do nothing" scenario, which does not include any costs (such as business-as-usual voltage management activities) and therefore provides no benefits. It would be prudent to compare the proposed investment in a DOE solution with a scenario that includes a more moderate level of investment.

Essential Energy's strategy for improving inverter compliance is to introduce dynamic operating envelopes. EMCa noted that addressing non-compliant inverters would have the twin effect of increasing available hosting capacity and creating a more equitable distribution of the available hosting capacity. The AEMC recently reviewed compliance with, and enforcement of, CER technical standards in the NER, and recommended several actions to improve inverter compliance.[48] We support these actions, including DNSPs introducing commissioning sheets for CER devices, and suggest that Essential Energy consider such actions to improve inverter compliance. This will enable Essential Energy to set higher static export limits and allow customers to export more of the electricity they generate.

Benefit quantification

Essential Energy broadly classified the benefits of its proposed investment as "CECV" (avoided export curtailment) and "non-CECV" (other benefits). These benefits are attributed to the proposed DOE and network visibility investments. It has also quantified network intervention benefits associated with proposed substation and transformer upgrades. Overall, the proposal has a benefit-cost ratio of 1.5.

Avoided export curtailment is the primary benefit, representing 48% of total benefits. To estimate the value of avoided export curtailment, Essential Energy elected to use its own CECVs, developed by HoustonKemp. In comparison, the AER's CECVs (2022 version) provide less than half the level of benefits quantified by Essential Energy using HoustonKemp's values. Essential Energy suggested that HoustonKemp's values more accurately reflect the long-term generation capacity mix under AEMO's ISP Step Change scenario given a requirement for profitability of new renewable generation installations.

It is apparent that HoustonKemp forecasts a different generation mix than that under AEMO's ISP Step Change scenario, with less investment in large-scale solar generation explaining the higher and diverging values relative to the AER's CECVs. In June 2023 we published updated CECVs based on AEMO's latest published input assumptions (for the Orchestrated

[48] AEMC, *Review into consumer energy resources technical standards, Final report*, September 2023.

Step Change scenario).[49] These values are greater than the 2022 CECVs but are still around 47% lower than HoustonKemp's CECVs over a 20-year forecast.[50]

As noted above, Essential Energy's forecast volume of export curtailment is strongly driven by its assumption that static export limits for both urban and rural customers will decrease to 1.5kW in 2030. Using the current policy settings (5kW urban and 3kW rural export limits) the benefit-cost ratio is 0.9 when HoustonKemp's CECVs are used and 0.7 when the AER's CECVs are used. We also modelled an alternative scenario using export limits of 2.4kW (rural) and 4kW (urban), which Zepben described as average export levels in its analysis. This results in a benefit-cost ratio of 1 when HoustonKemp's CECVs are used, and 0.7 when the AER's CECVs are used. Therefore, the efficiency of the proposed investment is highly dependent on both the assumed static export limits and the choice of CECVs.

Essential Energy quantified a number of other benefits (or "non-CECV" benefits), representing 27% of total benefits. CECVs do not impact the value of these benefits, which include deferred augex (63% of other benefits), reliability (14%), safety (12%), opex savings (6%), reduced losses (4%) and voltage regulation benefits (1%).

Essential Energy also estimated network intervention benefits associated with proposed substation and transformer upgrades, representing 25% of total benefits. Since these also include avoided curtailment benefits, they vary depending on the CECV selected. As with avoided export curtailment benefits, the AER's CECVs (2022 version) provide less than half the level of benefits quantified by Essential Energy.

Conclusion

We consider that Essential Energy has overstated the volume of export curtailment by applying a conservative assumption for voltage-related curtailment and applying an arbitrarily low static export limit to all customers in its analysis. It has also overstated the value of avoided export curtailment by applying its own CECVs, which are not up to date and reflect a different electricity generation mix than that forecast by AEMO.

Essential Energy has not compared its proposed investment against a "business as usual" base case scenario. Instead, it compares it against a "do nothing" option. It has also not considered other lower costs actions which may provide immediate benefits.

In our view, the prudent and efficient level of CER integration expenditure is likely to be somewhat lower than Essential Energy's proposed amount. Our alternative estimate of $41.3 million recognises:

- a smaller level of investment in DOE capability is likely to be justified when modelling assumptions are updated. EMCa noted that a smaller ICT investment, involving a lower cost trial and elements of the proposed program, would likely deliver customer benefits.
- network interventions are justified regardless of which CECVs are used.

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49 AEMO, *Draft 2023 Inputs, Assumptions and Scenarios Report*, December 2022.

50 Based on analysis of average daytime values (between 10am and 5pm).

- capex related to export services would likely have a modest increase based on an increase of CER connections.

However, our alternative estimate for CER capex does not result in an alternative total capex forecast that is materially different from that proposed by Essential Energy and therefore we have included Essential Energy's forecast of $86.6 million for CER integration.

Shortened forms

Term	Definition
ACS	alternative control services
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulatory
ASP	Accredited Service Provider
capex	capital expenditure
CCP26	Consumer Challenge Panel, sub-panel 26
CESS	capital expenditure sharing scheme
CSIS	customer service incentive scheme
DER	Distributed Energy Resources
DMIAM	demand management innovation allowance mechanism
DMIS	demand management incentive scheme
DNSP or distributor	Distribution Network Service Provider
DUoS	Distribution Use of System Charges
EBSS	efficiency benefit sharing scheme
ECA	Energy Consumers Australia
ENA	Energy Networks Australia
ESB	Energy Security Board
EV	electric vehicle
F&A	framework and approach
GSL	guaranteed service level
ICT	information and communication technologies
NEL	National Electricity Laws
NEM	National Electricity Market
NEO	National Electricity Objectives
NER	National Electricity Rules
opex	operating expenditure
PIAC	Public Interest Advocacy Centre
RAB	regulated asset base
repex	replacement expenditure

Term	Definition
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index
SAPS	stand-alone power systems
SCS	standard control service
Service classification guideline	Electricity distribution service classification guideline 2018
STPIS	service target performance incentive scheme
WACC	Weighted average cost of capital