DRAFT DECISION

Energex
Distribution determination
2020 to 2025

Attachment 5
Capital expenditure

October 2019

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 Energex for the 2020–2025 regulatory control period. It should be read with all other parts of the draft decision, which includes the following documents:

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

Attachment 12 – Classification of services

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Attachment 17 – Connection policy

Attachment 18 – Tariff structure statement

Contents

Shortened forms

Shortened form	Extended form
ADMS	advanced distribution management system
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
augex	augmentation expenditure
CAM	cost allocation method
capex	capital expenditure
CCP14	Consumer Challenge Panel (sub-panel 14)
CESS	capital expenditure sharing scheme
DER	distributed energy resources
ECA	Energy Consumers Australia
EQ	Energy Queensland
ICT	information and communications technology
IGE	Intelligent grid enablement
LV	Low voltage
NEL	National Electricity Law
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
NPV	net present value
PV	photovoltaic
RAB	regulatory asset base
repex	replacement expenditure
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index
SCADA	supervisory control and data acquisition
SCS	Standard control services
STPIS	service target performance incentive scheme

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. Generally, these assets have long lives and the distributor will recover capex from customers over several regulatory periods. A distributor's capex allowance contributes to the return of capital 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, 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 (the National Electricity Objective).[3]

The AER capital expenditure assessment outline explains the obligations of the AER and distributors under the 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. The outline is part of the supporting information for this draft decision.

This attachment sets out our draft decision on Energex's initial total capex forecast. The following appendices provide our detailed analysis:

- Appendix A – Capex driver assessment
- Appendix B – Engagement process
- Appendix C – Forecast demand
- Appendix D – Ex-post prudency and efficiency review

We have based our draft decision on our analysis of the information we have received to date. Energex's revised proposal, submissions and further analysis will inform our final decision in April 2020. We use real $2019–20 unless otherwise noted.

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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, *Draft Decision – Energex distribution determination 2020–25 – AER capital expenditure assessment outline*, October 2019.

5.1 Draft decision

Energex has not satisfied us that its total net capex forecast of $2019.8 million reasonably reflects the capex criteria. Our substitute estimate of $1793.4 million is 11 per cent below Energex's forecast. We are satisfied that our substitute estimate reasonably reflects the capex criteria. Table 5.1 outlines our draft decision. Our substitute estimate will allow Energex to maintain the safety, service quality and reliability of its network, consistent with its legislative obligations.

Table 5.1 Draft decision on Energex's total net capex forecast ($ million, 2019–20)

	2020–21	2021–22	2022–23	2023–24	2024–25	Total
Energex's proposal	413.9	400.5	410.0	405.6	389.8	2019.8
Draft decision	382.6	358.2	355.2	354.2	343.2	1793.4
Difference	31.3	42.3	54.8	51.4	46.6	226.4
Percentage difference (%)	(8%)	(11%)	(13%)	(13%)	(12%)	(11%)

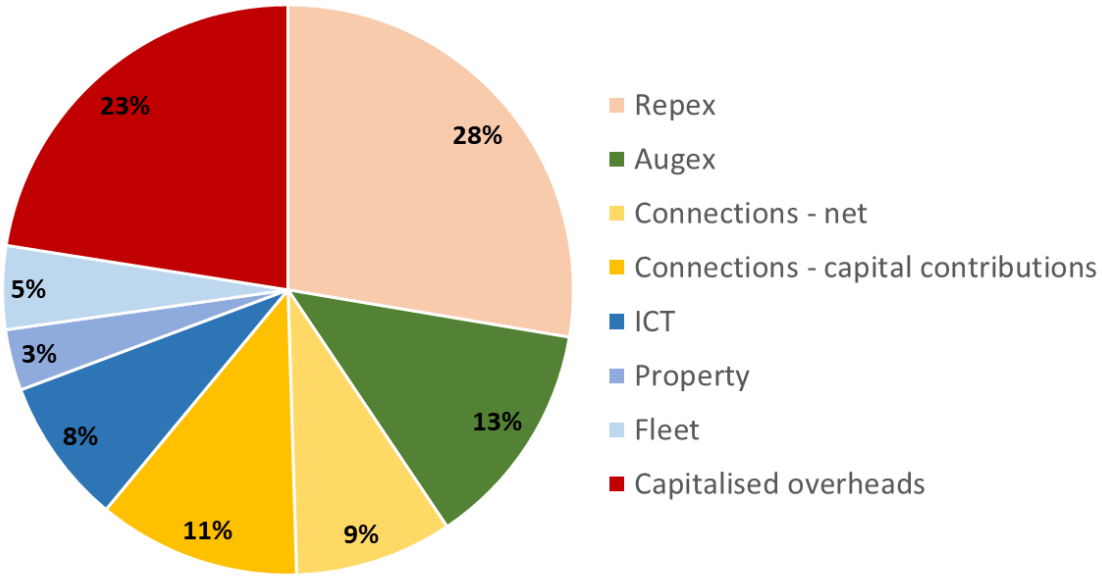
Source: AER analysis and Energex.

Note: Numbers may not sum due to rounding. The figures above do not include equity raising costs, capital contributions and asset disposals. See attachment 3 for our assessment of equity raising costs.

5.2 Energex's proposal

For the 2020–25 regulatory control period, Energex proposed total forecast net capex of $2019.8 million. Figure 5.1 outlines Energex's gross forecast (including capital contributions) by capex driver.

Figure 5.1 Energex's forecast total gross capex

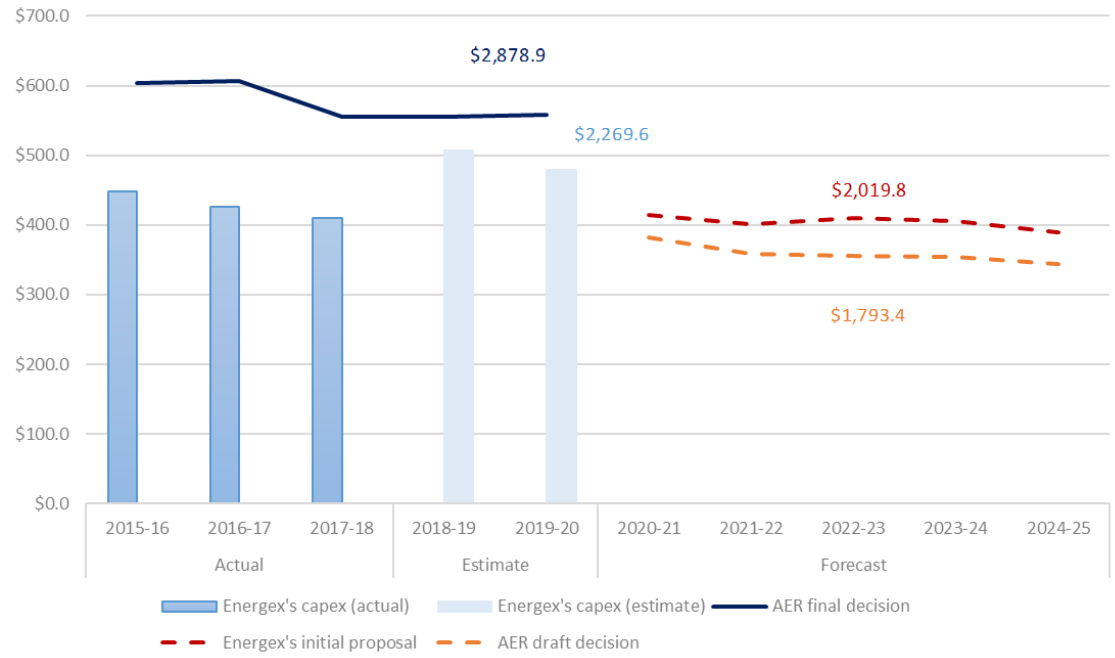


Source: AER analysis and Energex.

The largest contributors to Energex's gross capex forecast are repex (28 per cent), capitalised overheads (23 per cent) and connections (20 per cent including capital contributions).

Energex's 2020–25 capex forecast is $249.8 million (11 per cent) lower than its actual and estimated net capex of $2269.6 million over the current 2015–20 regulatory control period. Figure 5.2 outlines Energex's historical capex performance against its 2020–25 capex forecast.

Figure 5.2 Energex's historical vs forecast net capex snapshot ($ million, 2019–20)



Source: AER analysis and Energex.

Note: Energex's historical allowance is not directly comparable to its recast data, initial capex forecast and the AER draft decision due to its cost allocation method and classification of services changes.

Figure 5.2 above uses recast historical capex so that it is comparable with Energex's initial proposal and our draft decision for the 2020–25 regulatory control period. However, this means that Energex's historical capex and our 2015–20 final decision are not comparable. Based on historical spend actually incurred, Energex estimates that it will underspend its capex allowance by around $370 million (or around 13 per cent) for the 2015–20 regulatory control period.

5.3 Reasons for draft decision

This section summarises our reasons for this draft decision. We provide further detail in appendix A.

Overall, we observe that the lack of necessary supporting material was evident throughout Energex's capex proposal. In particular, it did not provide quantitative cost-benefit analysis, consistent with good business practice. This means that we do not have confidence that Energex has adequately tested the prudency and efficiency of

many of its forecast capex programs and projects. As a result, Energex has not satisfied us that its proposed capex reasonably reflects the capex criteria.

Distributors generally provide material to demonstrate the prudency and efficiency of their capex forecasts. This includes risk-based cost-benefit analysis with all feasible options considered, reasoning for the application of key inputs in the forecast, demonstration of a top-down challenge (or genuine testing of the forecast) and any other evidence that supports a rigorous forecasting methodology.

In cases where Energex provided business cases in support of its repex forecast, they were generally least-cost options analyses and lacked detail about how the forecast capex was calculated. In general, the options presented in Energex's business cases were underdeveloped and lacked effective sensitivity analysis that we would expect to see in an unbiased and comprehensive options analysis. In particular, Energex has generally not justified the need for a project in terms of risk mitigation or service level outcomes. It has not demonstrated that the 'do-nothing' (or business as usual) approach presents intolerable risks to network safety or reliability, or that the proposed option is economically more prudent.

There were also significant delays in receiving responses to information requests throughout the review process. We acknowledge, however, that Energex engaged with us ahead of our draft decision to discuss these information gaps. It provided additional supporting material when requested, although this material still lacked the quantitative assessment we expected to justify its forecast.

In putting together its revised proposal, we encourage Energex to have particular regard to our observations throughout this draft decision, particularly where we have noted a lack of supporting material to justify the prudency and efficiency of its capex forecasts.

Table 5.2 sets out the capex amounts by driver that we have included in our substitute estimate of Energex's total capex forecast for the 2020–25 regulatory control period.

Table 5.2 Substitute estimate by capex driver for the 2020–25 regulatory control period ($ million, 2019–20)

Category	Energex's proposal	AER draft decision	Difference ($)	Difference (%)
Repex	$643.4	$582.8	-$60.6	-9%
Augex	$301.1	$195.5	-$105.6	-35%
Gross connections	$475.0	$475.0	$0.0	0%
ICT	$193.0	$146.0	-$47.0	-24%
Property	$80.6	$57.8	-$22.8	-28%
Fleet	$101.4	$86.0	-$15.4	-15%
Other non-network	$8.9	$8.9	-$0.0	0%
Overheads	$523.5	$538.1	$14.6	3%
Gross capex	**$2326.9**	**$2090.2**	**-$236.7**	**-10%**

Category	Energex's proposal	AER draft decision	Difference ($)	Difference (%)
less capcons	$267.3	$267.3	$0.0	0%
less disposals	$39.8	$16.5	-$23.3	-59%
less modelling adjustments		$13.0		
Net capex	**$2019.8**	**$1793.4**	**-$226.4**	**-11%**

Source: AER analysis.

Notes: Numbers may not add due to rounding.

Gross capex is before modelling adjustments are applied.

Our assessment highlights that Energex's forecast for five of the seven capex drivers are likely to be higher than an efficient level and are therefore not likely to reasonably reflect the capex criteria, taking into account the capex factors and the revenue and pricing principles.

We therefore formed a substitute estimate of total capex. We test this total estimate of capex against the capex criteria (see appendix A for a detailed discussion). 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 is likely to contribute to the achievement of the NEO to the greatest degree.

Table 5.3 summarises our findings and the reasons for our draft decision by capex driver. This reflects the way we have assessed Energex's total capex forecast. 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.

Our assessment highlights that Energex's forecast for five of the seven capex drivers are likely to be higher than an efficient level and are therefore not likely to reasonably reflect the capex criteria,[5] taking into account the capex factors and the revenue and pricing principles.[6]

We therefore formed a substitute estimate of total capex. We test this total estimate of capex against the capex criteria (see appendix A for a detailed discussion). 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 is likely to contribute to the achievement of the NEO to the greatest degree.

Table 5.3 Summary of our findings and reasons

Issue	Reasons and findings

[5] NER, cll. 6.5.7(c), (d).

[6] NEL, cll. 7(a), 16(2).

Issue	Reasons and findings
Total capex consideration	Energex's governance and management framework led to an overstated total capex forecast. Energex applied its forecasting methodology inconsistently and many programs and projects lack sufficient risk-based cost-benefit analysis.
Augex	Energex proposed a number of sub-transmission growth projects to meet its Safety Net reliability obligations. For some projects we found that more efficient solutions are available or that the capex is not required for Energex to fulfil its obligations. Energex's cost-benefit analysis in support of its proposed power quality capex overstates the benefit of installing additional monitors. Energex has not been able to demonstrate the need for a number of projects.
Connections	Energex's forecast new connections volumes is consistent with two independent housing forecasts and is lower than its actual/estimated connections capex in the current period.
Repex	Energex's forecast for the modelled repex categories compares well against our repex model thresholds and its historical expenditure. For these reasons we accept this element of Energex's repex forecast. We have excluded two unmodelled repex major projects proposed by Energex where it has not established the project need on economic or legislative grounds. Energex has not demonstrated that the potential benefits of these projects sufficiently offset by the costs.
ICT	Energex's recurrent ICT programs forecast is prudent and efficient, with the exception of 'minor application upgrades and updates' where forecast capex is significantly higher than historical costs. Energex did not provide sufficient evidence to justify this higher capex. We have concerns with some ICT projects with negative NPVs and the deliverability of the non-recurrent ICT program. We have excluded contingency costs in our substitute estimate, as customers should not bear these costs.
Property	For most of the proposed major projects, Energex's supporting information does not adequately demonstrate that its forecast reasonably reflects the capex criteria.
Other non-network capex	We have concerns with Energex's application of service lives and asset life extension in its forecast of fleet capex. It has overstated its forecast unit rates, which are inconsistent with historical trends.
Capitalised overheads	We consider that capitalised overheads vary, in part, with direct capex. We have made an adjustment to capitalised overheads to reflect the lower direct costs in our substitute estimate compared with Energex's proposal. We have also corrected an error in Energex's model that it used to calculate its forecast. The correction leads to a net increase of

Issue	Reasons and findings
	capitalised overheads in our substitute estimate, compared with Energex's proposal.

A Capex driver assessment

This appendix describes our detailed analysis for each of the capex drivers and the reasons for our draft decision on Energex's forecast capex for 2020–25. We explain why we are satisfied that our substitute estimate reasonably reflects the capex criteria.

We use various qualitative and quantitative assessment techniques to assess the different elements of Energex's proposal to determine whether its proposal reasonably reflects the capex criteria.[7] More broadly, we also take into account the revenue and pricing principles set out in the NEL.[8] In particular, we take into account whether our overall capex forecast will provide Energex 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.[9]

When assessing capex forecasts, we also consider:

- that the prudency and efficiency criteria in the NER are complementary and reflect the lowest long-term cost to consumers to achieve the expenditure objectives[10]
- past expenditure was sufficient for the distributor to manage and operate its network in previous periods, to the extent that it achieved the capex objectives[11]
- 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)[12]
- the annual benchmarking report, which includes total expenditure and overall capex efficiency and considers a distributors' inputs, outputs and its operating environment
- the various interrelationships between the total capex forecast and other constituent components of the determination, such as forecast opex and STPIS interactions.[13]

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7 AER, *AER capital expenditure assessment outline*, October 2019.

8 NEL, ss. 7A and 16(2).

9 NEL, s. 7A.

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

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

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

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

A.1 Total capex consideration

Review of Energex's expenditure forecasting, governance and risk management approach

Energex's governance and management framework led to an overstated total capex forecast. Energex applied its forecasting methodology inconsistently and many programs and projects lacked sufficient risk-based cost-benefit analysis.

Overall, we observe that Energex's capex proposal lacked the necessary supporting material such as risk-based cost-benefit analysis with all feasible options considered, reasoning for the application of key inputs in the forecast, demonstration of a top-down challenge (or genuine testing of the forecast) and any other evidence to justify its forecast.

Governance approach

Energex outlined its network governance and investment approach in its regulatory proposal.[14] Energex employed bottom-up and top-down forecasting approaches to arrive at its capex forecast. It applied a risk-based approach to prioritise programs and projects and submitted that this approach "appropriately manages risks and fits within top-down constraints."[15] Energex provided a number of business cases, justification statements and other planning documents to support its forecast.

We engaged EMCa to look at some elements of Energy Queensland's (EQ's) capex forecasts. EMCa said about EQ's governance and risk framework approach:[16]

> …we consider that EQ does not consistently apply the structural elements of its investment governance and management framework and forecasting processes to a standard that would achieve a capex forecast that is prudent, efficient and reasonable in accordance with the NER capex criteria. Its forecasting processes have led to a systemic bias to over-estimation in the forecast that it has proposed.

Bottom-up methodology

Overall, we find that Energex's supporting material does not demonstrate the prudency and efficiency of its capex forecast. In most cases, there is insufficient detail in the justification statements to justify Energex's forecast.

Energex has generally not provided quantitative cost-benefit analysis or demonstrated the need for a project in terms of risk mitigation or service level outcomes. In most cases, Energex did not demonstrate that the 'do-nothing' (or business as usual) approach presented intolerable risks to network safety or reliability, or that the proposed option was economically more prudent.

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14 Energex, *7.026 Asset management, risk and optimisation strategy*, January 2019.

15 Energex, *7.026 Asset management, risk and optimisation strategy*, January 2019, p. 4.

16 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. i.

Energex's options analyses are generally inadequate. The options presented in some business cases appear to be underdeveloped and there is a lack of effective sensitivity analysis that we would expect to see in an unbiased, comprehensive options analysis.

EMCa examined Energex's ICT forecast and found that its recurrent ICT forecast was reasonable with the exception of one project. It submitted that Energex's non-recurrent ICT forecast did not sufficiently take into account the "deliverability of the proposed volume, its complexity and the inter-dependencies of the projects and programs on which it has based its forecast allowance," particularly given that key ICT projects for the current period are "already running late."[17]

In its revised proposal we would encourage Energex to provide risk quantification in support of its proposed capex, consistent with good industry practice. Most recently (in our 2019 decisions), all businesses undertook risk quantification in support of their forecasts.[18]

Top-down methodology

Energex applied resource and financial constraints to several elements of its capex forecast. We commend Energex for applying a top-down challenge to its forecast, because applying a bottom-up forecasting approach alone will generally result in an over-estimation of a business' capex requirements. This is because a bottom-up approach in isolation does not take into account the synergies and efficiencies across all projects and programs in the capex portfolio. However, we have some concerns that Energex's top-down challenge is driven by price outcome targets so may not be fit for purpose to arrive at a forecast for capex that reasonably reflects the capex criteria and objectives.

A.2 Augex

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

A.2.1 Draft decision

Energex has not satisfied us that its augex forecast of $301.1 million is prudent and efficient. We have included $195.4 million for augex in our substitute estimate of total capex. This is a reduction of $105.6 million (35 per cent). This amount is prudent and efficient, and would form part of a total forecast capex allowance that reasonably reflects the capex criteria.

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17 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. ii. ICT was Energex's only capex driver that we asked EMCa to review.

18 Please refer to Attachment 5 (Capital expenditure) of our draft decisions for the Ausgrid, Endeavour Energy, Essential Energy and Evoenergy 2019–24 Determinations.

Table 5.4 summarises Energex's proposal and our substitute estimates for each augex subcategory. Our substitute estimate is lower than Energex's forecast for subtransmission growth, network communications and power quality augex.

Table 5.4 Draft decision on Energex's forecast augex ($ million, 2019–20)

Category	Proposal	Position	Difference ($m)	Difference (%)
Subtransmission growth	74.8	28.2	-46.6	-62%
Distribution growth	96.3	96.3	0.0	-
Network communications	64.9	23.2	-41.7	-64%
Power quality	42.4	25.0	-17.4	-41%
Worst performing feeders	22.6	22.6	0.0	-
Total	**301.1**	**195.4**	**-105.6**	**-35%**

Source: AER analysis and Energex.

A.2.2 Energex's proposal

Energex forecast $301.1 million for augmentation expenditure for the 2020–25 regulatory control period. This represents a 31 per cent decrease relative to the $436.6 million that it expects to incur over the 2015–20 regulatory control period.

Energex explained that its forecast augex is required to:[19]

- address key areas of community development, population and demand growth
- support the continued connection of residential and commercial solar photovoltaic (PV) systems to the distribution network
- maintain network statutory and standard requirements and address its obligations outlined in its Distribution Authority pertaining to Service Safety Net Targets, MSS and worst performing feeder requirements
- provide additional functionality to support an intelligent grid through a range of network control and monitoring initiatives.

A.2.3 Reasons for draft decision

Energex has not sufficiently justified the capex for the sub-transmission network growth, network communications and power quality augex subcategories. To arrive at our position we assessed:

- the project documentation accompanying Energex's proposal and any further information it provided
- advice from engineering and technical experts

[19] Energex, *2020–25 regulatory proposal*, January 2019, pp. 70-71.

- stakeholder submissions including Energy Consumers Australia (ECA) and CCP14.

We have not conducted a detailed bottom-up assessment for some smaller projects.

Sub-transmission growth

Energex proposed $74.8 million for a number of sub-transmission level projects required to supply forecast loads and ensure compliance with regulatory obligations. Energex has not justified its forecast. Our substitute estimate for capex includes $28.2 million for sub-transmission growth.

ECA's economic consultant Dynamic Analysis considered there may be opportunities to defer growth-related capex and suggested areas for review, including managing local constraints through existing capacity from adjoining areas.[20]

We conducted a bottom-up review for five proposed projects, with a combined value of $53.0 million. Energex proposed three projects to satisfy Safety Net obligations, which requires Energex to restore supply within specified timeframes in the event of an outage. The Safety Net-related projects include:

- Abermain to Amberley – new 33 kV feeder ($5.8 million)
- Doboy to Queensport – new 33 kV feeder ($5.3 million)
- Establish Petrie zone substation ($5.5 million)

The other two projects we reviewed in detail are:

- Bells Creek Central zone substation ($28.4 million)
- Easement acquisition program ($8.1 million)

Safety Net-driven projects

Energex explained that the primary driver of the following projects was its Safety Net obligation, which is a regulatory requirement and therefore a least-cost analysis is appropriate.[21] It requires Energex to limit the amount of load and number of customers without supply against predefined timeframes in the event of an outage.

We have considered the projects against the Safety Net requirement to understand if there is a need to undertake augmentation.

Abermain to Amberley – new 33 kV feeder

Energex proposed to build a new 33 kV feeder from Abermain bulk supply substation to Amberley zone substation to manage line overload. We have not included the proposed capex in our substitute forecast.

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[20] Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, pp. 43, 45.

[21] Queensland Government, *Distribution authority No. D07/98 issued to Energex Limited*, June 2014, p. 16.

Load shedding would be appropriate to manage a contingency event. Further, Energex could develop operational planning procedures for restoring load for various scenarios. For these reasons there is potential to manage an outage scenario to ensure Safety Net compliance in the absence of augmentation.

Doboy to Queensport – new 33 kV feeder

Energex proposed to build a new 33 kV underground feeder from Doboy to Queensport zone substations to ensure that a failure of one of the two connecting feeders did not result in load shedding for customers at Bulimba and Queensport substations for more than three hours. We have not included the proposed capex in our substitute forecast.

We reviewed the relevant Safety Net target, and found that the relevant target is to have no greater than 12 MVA without supply for more than 3 hours.[22] Energex's outage scenario complies with this requirement and the proposed augex is not required. Furthermore, the planning proposal does not adequately establish that the alternative solutions are unfeasible as it has stated.[23]

Establish Petrie zone substation

Energex proposed to build a new 25 MVA modular substation at Petrie, decommission the existing Australian Paper Mill substation and construct new 33 kV double circuit feeder to the new Petrie substation site.[24] We have included $3.5 million in our substitute forecast for this alternative option.

Energex forecast that the Kallangur zone substation (SSKLG) would exceed its emergency cyclic capacity rating in 2025, and the loss of a single transformer at SSKLG would result in load at risk.[25] It expects the forecast load to continue increasing thereafter.[26]

Energex stated that it could not meet the Safety Network requirement in the event of loss of one power transformer at SSKLG.[27] After load transfers, forecast remaining load without supply is 2.4 MVA after eight hours in the event of an outage.[28] However, the Safety Net requires unsupplied load to be less than 12 MVA after three hours, and less than 4 MVA after eight hours.[29] Energex's outage scenario complies with this requirement and the proposed augex is not required.

We also assessed Energex's supporting net present value (NPV) analysis. Energex identified the base case option and two network augmentation options including:

- option 1 is to build the Petrie modular substation ($5.5 million)

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22 Queensland Government, Distribution Authority No. D07/98 issued to Energex Limited, June 2014, p. 16.

23 Energex, *information request 8* - Planning proposal new feeder DSB-QPT, 21 March 2019, pp. 1, 9–10.

24 Energex, *information request 8* - Planning proposal Petrie establish modular substation, 21 March 2019, p. i.

25 Energex, *information request 8* - Planning proposal Petrie establish modular substation, 21 March 2019, p. 5.

26 Energex, *information request 8* - Planning proposal Petrie establish modular substation, 21 March 2019, p. 3.

27 Energex, *information request 26*, 24 May 2019, pp. 10–11; Energex, information request 42, 28 June 2019, pp. 7–8.

28 Energex, *information request 42*, 28 June 2019, p. 8.

29 Queensland Government, *Distribution authority No. D07/98 issued to Energex Limited*, June 2014, p. 16.

- option 2 to upgrade two transformers at SSKLG, and add a new feeder at SSKLG every two to three years ($3.5 million).

Energex's preferred option does not account for the replacement cost of two transformers at SSKLG expected to reach the end of life in 2029.[30] Energex's preferred option including this extra cost is $4.5 million higher and is not the least cost option.[31]

Option 2 is a prudent and efficient option to address future load at risk and aging assets.

Other sub-transmission projects

Bells Creek Central zone substation

Energex proposed $28.4 million to construct a new 132/11 kV zone substation at Bells Creek Central by 2025.[32] We have included $1.5 million in our substitute forecast for this alternative option.

Energex has demonstrated the need for augmentation, however it has not justified that the proposed solution is the most efficient. The planning proposal lacks sufficient information regarding the load forecast and sensitivity analysis of the project costs.

We focused on two options that Energex considered:[33]

- option one is to continue construction of 11 kV feeders from Caloundra substation, with a new feeder constructed approximately every two years, until Bell's Creek Central zone substation is established in the mid-2030's ($1.5 million in the 2020–25 regulatory control period)
- option two is the preferred option to establish Bells Creek Central zone substation in 2025 ($28.4 million).

Energex's assumed cost for feeder works of $500000/km in option one is the upper-bound cost for a single feeder constructed through difficult ground conditions.[34] Carrying out civil works for multiple future feeders would greatly reduce the cost of underground feeders. Energex does not appear to have accounted for this scenario in its cost assumptions. Energex assumed feeder construction cost would increase by $0.9 million with each additional feeder, each of increasing length.[35] This cost escalation is excessive. Energex's model does not allow us to modify the cost assumptions and to test cost sensitivities to determine how significant an adjustment would be required to establish option one as the preferred option.

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30 Energex, *information request 8* - Planning proposal Petrie establish modular substation, 21 March 2019, p. 9.

31 Energex, *information request 8* - Energex RIT-D NPV for Petrie Establish Modular Substation, 21 March 2019, "stageComponents" sheet.

32 Energex, 7.081 *Planning proposal – Bells Creek*, January 2019, pp. 4–5.

33 Energex, 7.081 *Planning proposal – Bells Creek*, January 2019, pp. 14–16.

34 Energex, *information request 26*, 24 May 2019, p. 8.

35 Energex, *information request 8* - Energex RIT-D NPV for Bells Creek-20190318, 21 March 2109, tab Base case cash flow (1).

Energex stated that the project is sensitive to demand growth in the area, and included a sensitivity analysis to establish the preferred solutions under low, medium and high demand scenarios.[36] We tested the modelling and found that a strong weighting toward the low demand scenario would be required to establish option one as the preferred option. However, it is unclear how Energex has derived its forecasts, how they compare with historical loads, or what assumptions Energex has made about future energy efficiency improvements.[37]

We recognise that capacity augmentation is required and that Energex is likely to require construction of the Bells Creek Central zone substation in the medium term. However, on the information available, option one is the most prudent and efficient option.

Easement acquisition program

Energex proposed an easement acquisition program and provided information on the areas and the drivers behind the easement or other strategic property acquisitions.[38] We have included $6.6 million in our substitute forecast for this alternative option.

We have concerns with the following acquisitions:

- Yarrabilba substation site—Energex provided supporting documentation that indicated it intends to purchase this site in the current period.[39]
- Jimboomba to Beaudesert 110 kV or 33 kV Corridor—this site purchase had been previously proposed (but we did not accept) at a lower value in the 2015–20 determination.[40] Energex has not justified the higher land purchase costs in its forecast.

We have removed the proposed capex for Yarrabilba substation in our substitute forecast and adjusted Energex's forecast for the Jimboomba to Beaudesert corridor.

Distribution growth

Energex proposed capex to address constraints in the 11 kV medium voltage, SWER and low voltage networks. Energex's forecast distribution growth augex appears reasonable and we have included the proposed augex in our substitute forecast.

Energex categorises distribution level augmentation as follows:[41]

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36 Energex, 7.081 *Planning proposal – Bells Creek*, January 2019, p. 23.

37 We recognise solar PV uptake may not materially affect the load forecast because the difference between summer day and summer night peaks are minimal. Energex, information request 26, 28 May 2019, pp. 6–7; Energex, information request 26 - Load forecast attachment, 28 May 2019.

38 Energex, *information request 42*, 28 June 2019, pp. 3–5.

39 Energex, *information request 42* - Yarrabilba endorsement, 28 June 2019, p. 7.

40 AER, *Energex determination 2015–20: Attachment 6 – capital expenditure*, October 2015, p. 6-74.

41 Energex, *7.091 Strategic proposal distribution augmentation*, January 2019, p. i. Numbers revised to be consistent with $96.3 million proposal based on information provided with information request 2.

- Specified augex ($38.8 million)—consists of individual projects each of which are required to resolve an identified constraint related to demand growth, voltage control or safety on the distribution networks.
- Reactive augex ($57.5 million)—required to address unanticipated and unplanned operational constraints and issues seen on the low voltage networks. This category includes expenditure on defect rectification, bushfire mitigation, and maintenance of the network to statutory requirements.

These are business-as-usual programs of high-volume, low-value projects and past expenditure can provide a good indication of future need. We have had regard to the expenditure trend. Energex's proposed $96.3 million is 56 per cent lower than the $218.9 million it expects to incur in the current period.

Power quality

Energex proposed $42.4 million to address power quality statutory obligations and enable increased penetration of solar PV and new technology connections. Energex has not justified its forecast. Our substitute estimate for capex includes $25.0 million for power quality.

Power quality augex includes:[42]

- power quality monitoring ($17.4 million)
- customer voltage remediation ($13.1 million)
- solar PV augex ($11.9 million).

Power quality monitoring

Energex proposed to install an additional 4230 monitoring devices above the already installed 22 000 monitors.[43] It explained there are multiple benefits of the program including time savings in identifying issues, and cost and time savings of installing temporary recording equipment.[44] Energex has not justified its forecast so we have not included Energex's power quality monitoring program in our substitute forecast.

ECA's economic consultant Dynamic Analysis supported timely investment to integrate new technology into the grid, but queried whether cheaper solutions are available for Energex to achieve its objectives.[45]

Energex has not demonstrated the prudency and efficiency of the power monitoring program based on the following concerns:[46]

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42 Energex, *7.094 Strategic proposal for power quality*, January 2019, p. 2. Numbers revised to be consistent with $42.4 million proposal based on information provided with information request 2.

43 Energex, *7.094 Strategic proposal for power quality*, January 2019, p. 2.

44 Energex, *7.094 Strategic proposal for power quality*, January 2019, pp. 13–14, 22–23.

45 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 45.

46 Energex, *information request 42* - EGX PQ NPV analysis, 28 June 2019.

- Energex assumed in its cost-benefit analysis that each new monitoring device installed would deliver a $1600 annual saving by avoiding one quality of service investigation each year. Energex has not supported this assumption and it appears to also overstate the effectiveness of the monitors. Energex's strategic proposal indicates that it received approximately 0.8 power quality enquiries per month per 10 000 customers.[47] This figure appears to be based on network-wide numbers, and we note that the majority of distribution feeders do not yet contain monitors.[48] The potential for each monitor to reduce power quality enquiries is not significant. We calculate that based on the existing population of monitors, the population of distribution transformers and Energex's customer base, the average annual benefit of an individual monitor is $90, which is less than relevant costs.
- Energex treated the avoidance of voltage regulator installations, voltage regulator setting adjustments and distribution transformer tap adjustments as a power quality monitoring benefit. It is not clear how power quality devices alone could achieve these outcomes. A distributor needs to install voltage regulators where regulation is required, and monitoring devices cannot reduce this need. Similarly, a distributor needs to make voltage regulator setting changes where voltage is outside the operating envelope, and needs to undergo transformer tap change work supply voltage exceeds the relevant standard. Installation of power quality devices cannot reduce these needs.
- Energex's NPV has not included operational cost of the monitoring in its cost assessment.
- Energex compared the benefit against initial capital cost rather than the annualised capital cost.

Customer voltage remediation and Solar PV augmentation

Energex proposed capex for its customer voltage regulation and solar PV augmentation programs, respectively. These are business-as-usual programs to manage existing and ongoing power quality issues. We have included this capex in our substitute estimate.

Through its customer voltage remediation program, Energex manages audio frequency load control (AFLC) so that customer appliances would not experience loss of function or degradation of performance to AFLC signals.[49] The solar PV augmentation program addresses the effect of solar PV to maintain Energex's statutory requirement to maintain the supply voltage range of 216–253 V.[50]

We recognise that Energex has an ongoing need to manage voltage issues as its customers will continue to install solar PV systems on its network. Energex has demonstrated that the proposed expenditures are prudent and efficient as the forecast

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47 Energex, *7.094 Strategic proposal for power quality*, January 2019, p. 5.

48 Energex's 22 000 monitors cover 44 per cent of its distribution transformer population. Energex, *7.094 Strategic proposal for power quality*, January 2019, p. 6.

49 Energex, *7.094 Strategic proposal for power quality*, January 2019, p. 16.

50 Energex, *7.094 Strategic proposal for power quality*, January 2019, p. 17.

expenditure levels are broadly similar to 2015–20 regulatory control period levels. We have included the proposed capex in our substitute forecast.

Worst performing feeders

Energex proposed $22.6 million to deliver 90 Worst Performing Feeder (WPF) improvement projects under its WPF improvement program.[51] The program aims to improve the performance experienced by consistently poor performing feeders, in accordance with the Minimum Service Standards (MSS) set out in Energex's Distribution Authority.[52] We have included this capex in our substitute estimate.

ECA's consultant Dynamic Analysis queried the scope of Energex's WPF program, which appeared disproportionate to Ergon's proposal.[53] We found this is because the respective Distribution Authorities set differing requirements.[54]

Energex's data showed that 87 feeders either display a declining reliability performance, or an improvement that is yet to meet the respective reliability targets.[55] Energex's proposal to deliver 90 WPF improvement projects is of reasonable scope to address the feeders that do not currently meet targets, recognising also that other feeders not currently classified as WPF may fall into this category in the future.

Energex's proposed expenditure is 16 per cent lower than the $26.9 million it expects to incur during the current regulatory control period.[56] The proposed reduction in expenditure is similar to the proposed reduction in scope relative to the 2015–20 regulatory control period.[57] The WPF is efficient because the proposed unit rates are broadly consistent with current period levels.

Network communications

Energex proposed $64.8 million for network communications, and network control projects to ensure compliance with regulatory obligations and provide additional network functionality. Energex has not justified its forecast. Our substitute estimate for capex includes $23.2 million for network communications.

Energex's forecast is significantly higher than the $13.8 million it expects to incur in the 2015–20 regulatory control period. We conducted a detailed bottom-up analysis on the two higher-value programs: the intelligent grid enablement program and the back-up protection program. Energex has not demonstrated that these projects are prudent and

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51 Energex, *7.094 Strategic proposal - power quality*, January 2019, p. i.

52 Queensland Government, *Distribution Authority No. D07/98 issued to Energex Limited*, June 2014, p. 15.

53 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 45.

54 Queensland Government, *Distribution Authority No. D07/98 issued to Energex Limited*, June 2014, pp. 10, 15 and Queensland Government, *Distribution Authority No. D07/98 issued to Ergon Energy Corporation Limited*, June 2014, pp. 9, 16.

55 Energex, *Distribution Annual Planning Report 2018-19 to 2022-23*, December 2018, p. G2.

56 Energex, *information request 2*, 18 February 2019, p. 3.

57 Energex's proposal to undertake approximately 18 WPF projects per year is proportionately lower than the 22 WPFs currently targeted annually.

efficient, and we have excluded them from our substitute estimate. We invite Energex to provide further material in support of these projects in its revised proposal.

Intelligent grid enablement (IGE)

IGE is a combination of complementary operational software systems, customisations and integration mechanisms that will facilitate proactive management of the LV network. It consists of six components which allow for data collection and analytics, load control and DER management. IGE is complementary to the two other functional areas identified by Energex to proactively manage power flows on the network: the Advanced Distribution Management System (ADMS) and Low Voltage Network Monitoring and Visibility (LV monitoring).[58]

We received submissions from CCP14 and EnergyAustralia referencing Energex's proposed programs associated with managing the effects of DER.[59] CCP14 indicated that the amount of capex proposed for the IGE program appeared reasonable given the high level of DER installation. However, it supports the AER in reviewing the value of the program in recognition of other proposed programs. EnergyAustralia considered that the AER and Energex should have a view beyond the value of DER arising from the customer-distributor relationship.

Energex has not justified the IGE program for the following reasons:

- Energex has not demonstrated the need for this program under the NER or compliance with other regulations. It has not provided an NPV analysis to demonstrate that the benefits would exceed the proposed costs.
- Energex's business case for the IGE program is underdeveloped, and it has provided little information regarding each of the intended capabilities. As such, we are not satisfied that the forecast is prudent and efficient.
- Energex states that augmentation may be required to address future capacity and voltage constraints.[60] However, it has not set out the current performance levels or quantified the risks of constraints in the next regulatory control period. As such, the delivered benefits and the required scale of the IGE program is unclear.
- We have concerns with some of the assumptions Energex has made in presenting the 'business as usual' or base case—that is, addressing capacity and voltage constraints through traditional augmentation. We are therefore not satisfied that the IGE program is the most prudent option.
- Energex has not explained in detail any interdependencies between the IGE program and the ADMS and LV monitoring programs. It needs to show what impact the scope and deliverability of each program has on the benefits and risks of the IGE program.

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58 Energex, *7.055 Intelligent grid enablement strategic proposal*, January 2019, p. i.

59 CCP14, *Advice to the AER on the Energex and Ergon Energy 2020-25 regulatory proposals*, May 2019, p. 14; EnergyAustralia, *Submission on Energex's regulatory proposal 2020-25*, p. 3.

60 Energex, *7.055 Intelligent grid enablement strategic proposal*, January 2019, pp. 1–2.

Back-up protection

Energex proposed to install backup protection at 84 sites that it has determined are non-compliant with NER S5.1.9 and presents a safety risk.[61] Energex has not justified its forecast so we have not included Energex's back-up protection program in our substitute forecast.

Energex explained that in accordance clause S5.1.9(c), it is required to have two independent forms of protection that can detect and clear all credible fault scenarios.[62]

It is our view that clause S5.1.9 requires that primary and back-up protection are available to clear a fault of any fault type within a time that would not damage any part of the power system other than the faulted element. This requires consideration of the relevant fault clearance time and reach of both the existing primary protection systems and the existing back-up protection systems.

Energex has not justified the program for the following reasons:

- Energex determined the scope of investment based on desktop analysis only. A field test is required to validate the desktop assessment and demonstrate the prudency of the proposed expenditure.
- Energex did not provide evidence that any shortfall in its existing protection systems reach has led to protection failure. It has therefore not demonstrated that a material risk exists, such that damage to the power system could reasonably occur.
- Energex's preferred option is to provide duplicate protection relays on individual feeders.[63] This would create redundancy in protection arrangements. It is our view that S5.1.9(d) and S5.1.9(e) only requires redundancy for the primary protection system to ensure that the power system does not become unstable for any fault that constitutes a credible contingency event. It is not applicable to distribution feeder protection systems that do not have any relevance to power system security.
- While Energex noted that low-cost solutions such as downstream protection devices may not work in a limited number of situations, it has not explained why it has not considered those solutions for the majority of the proposed augmentation work.[64]

A.3 Connections

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 the new customer demand.

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61 Energex, *7.104 Strategic scope – back up reach program*, January 2019, pp. 2, 5.

62 Energex, information request 42, 28 June 2019, p. 9.

63 Energex, *7.104 Strategic scope – back up reach program*, January 2019, pp. 2–3.

64 Energex, information request 42, 28 June 2019, pp. 10–11.

A.3.1 Draft decision

We are satisfied that Energex's net connections capex forecast of $207.7 million and capital contributions forecast of $267.3 million would form part of a total capex forecast that reasonably reflects the capex criteria. We have included these amounts in our substitute estimate of total capex.

A.3.2 Energex's proposal

Energex proposed $207.7 million for net connections capex. This represents a 3 per cent decrease on current regulatory period net connections. Energex also proposed $267.3 million in capital contributions, which is 19 per cent lower than capital contributions in the current period of $329.0 million.

Energex based its connections and contributions forecasts on a simple top-down methodology. It derived 2018–19 connections expenditure using actual connections capex from the first few months of 2018–19 and estimated expenditure for the balance of the year. This estimated expenditure level was then trended over the 2020–25 period.[65] It justified using the single year, rather than a range of years, because historical connections capex was heavily influenced by the residential construction boom in South East Queensland, which is winding down.

A.3.3 Reasons for draft decision

The Queensland Council of Social Services highlighted that although Energex's forecast a decrease in connections capex, it was coming off a high base and there may be scope for further savings.[66] ECA's economic consultant Dynamic Analysis considered that Energex's approach to rely on actual connections capex was reasonable, but had shortcomings as changes in economic activity will impact future volumes of connections.[67]

Energex did not provide evidence supporting its customer connection volumes forecast. However, we had regard to two independent housing forecasts that support Energex's figures: one from the National Institute of Economic and Industry Research (NIEIR) and another from the Queensland Government.[68] Figure 5.3 shows the three forecasts.

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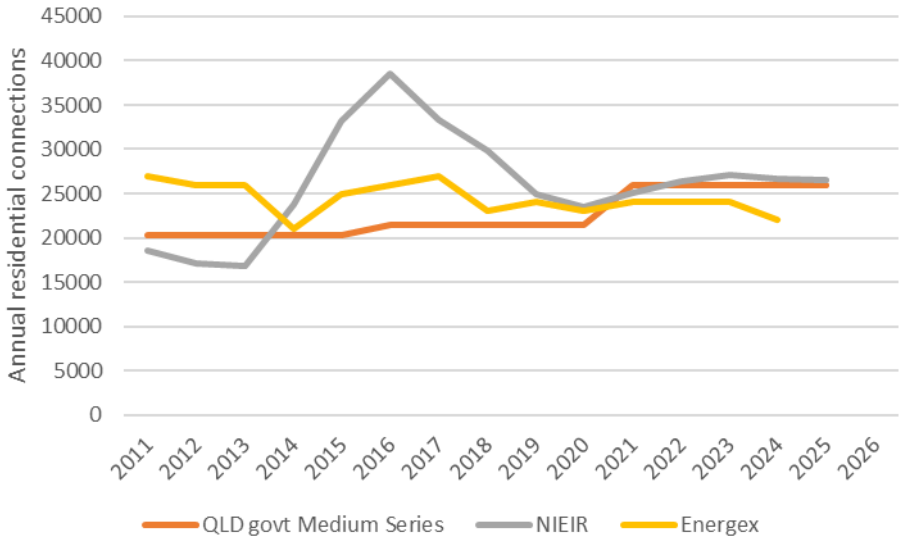
65 Energex, *information request 8* - connections, 3 April 2019, pp. 2–3.

66 QCOSS, *QCOSS submission to AER issues paper on EQ proposal for 20-25*, May 2019, p. 15.

67 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 46.

68 NIEIR, *Queensland region construction supply and demand analysis: 1995-2028 and quarterly indicators to June 2020*, p. 137, table A.19, http://www.hpw.qld.gov.au/SiteCollectionDocuments/NIEIRConstructionUpdateJun18.pdf; Queensland Government, *Projected dwellings, by series, by statistical area level 4, Queensland, 2011 to 2036*, http://www.qgso.qld.gov.au/subjects/demography/household-dwelling-projections/tables/proj-dwlgs-series-sa4-qld/index.php.

Figure 5.3 Energex customer connections compared with NIEIR and Queensland Government dwelling completions, historical and forecast



Source: Energex, NIEIR and Queensland Government forecasts.

Figure 5.3 shows that the historical series' were not entirely consistent, suggesting some differences in the methodology used to determine actuals; however, all forecasts suggest a similar trend for future dwelling construction.

We also found that forecast residential connections unit rates are around current period levels.

We are satisfied that both connections and capital contributions forecasts are reasonable and have included Energex's forecast amounts in our substitute estimate of total capex.

A.4 Repex

Replacement capital expenditure (repex) must be set at a level that allows a distributor to meet the capex objectives. 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 of the asset 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[69]
- the asset does not meet the relevant jurisdictional safety regulations, and can no longer be safely operated on the network

[69] 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.

- 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 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. Our assessment of repex seeks to establish the proportion of Energex's assets that will likely require replacement over the 2020–25 regulatory control period and the associated capital expenditure.

A.4.1 Draft decision

Energex has not satisfied us that its forecast of $643.3 million ($2019–20) is prudent and efficient. Our substitute estimate is $582.8 million, which is a 9 per cent reduction. We are satisfied that our substitute estimate forms part of a total capex forecast that reasonably reflects the capex criteria.

Table 5.5 summarises Energex's proposal and our draft decision.

Table 5.5 Draft decision on Energex's forecast repex ($ million, 2019–20)

	2020–21	2021–22	2022–23	2023–24	2024–25	Total
Energex's regulatory proposal	144.0	124.5	124.7	126.6	123.7	643.4
Draft decision	142.3	116.1	109.5	109.7	105.1	582.8
Difference	-1.7	-8.4	-15.2	-16.9	-18.6	-60.6

Source: AER analysis and Energex.

Note: Numbers may not add up due to rounding.

A.4.2 Energex's proposal

Energex proposed $643.4 million ($2019–20) for repex for the 2020–25 regulatory control period. This forecast is $194.1 million, or 23 per cent, lower than its actual/estimated repex of $837.5 million in the 2015–20 period.

Energex submitted that it has "focused on the sustainable removal of aged, poor condition assets to maintain expected network performance for our customers and safety to the community."[70] It said that its forecast repex is necessary for "meeting our reliability and security of supply targets in our Distribution Authority, as well as safety, environmental, and regulatory obligations." It takes a "no compromise approach to community and staff safety" which has "been well supported by customers."[71]

[70] Energex, *2020–25 regulatory proposal*, January 2019, p. 65.

[71] Energex, *2020–25 regulatory proposal*, January 2019, p. 67.

Table 5.6 shows Energex's forecast repex by asset group for 2020–25. The largest asset group by forecast expenditure is poles ($120 million or 19 per cent of total repex), followed by transformers ($111 million or 17 per cent).

Table 5.6 Energex's forecast repex by asset group, 2020–25 ($ million, 2019–20)

Asset group	Forecast	Percentage of total repex
Poles	120.0	19%
Overhead conductors	65.0	10%
Underground cables	22.2	3%
Services lines	40.4	6%
Transformers	110.6	17%
Switchgear	70.0	11%
Pole-top structures	60.6	9%
SCADA	67.1	10%
Other	87.5	14%
Total Repex	**643.4**	

Source: AER analysis and Energex.

Note: Numbers may not add up due to rounding.

A.4.3 Reasons for draft decision

We have applied several techniques to assess Energex's repex forecast against the capex criteria, including:

- trend analysis of Energex's past expenditure
- predictive repex modelling based on Energex's assets currently in commission when compared with its industry peers
- consideration of bottom-up and top-down methodologies, such as business cases and top-down challenges or constraints.

We have also had regard to stakeholder submissions. We received submissions on Energex's repex from the Consumer Challenge Panel 14 (CCP14), Energy Consumers Australia (ECA), the Queensland Council of Social Services (QCOSS) and the Queensland Electrical Safety Office (ESO).

The results of our predictive modelling informs our position on Energex's repex forecast. We have assessed $428.3 million, or 67 per cent of Energex's forecast repex using our predictive model. We have also looked at expenditure trends and economic bottom-up builds of Energex's major programs and projects. Additionally, we have had regard to technical advice and stakeholder submissions.

In the following sections, we discuss our assessment of total repex, and then examine modelled repex and unmodelled repex separately.

Total repex

We must have regard to actual and expected capital expenditure during any preceding regulatory control period.[72] Trend analysis of a distributor's past expenditure allows us to draw general observations about how a business is performing and provides a sanity check against our predictive modelling results. For some repex categories, where past expenditure was sufficient to achieve the capex objectives, this can be a reasonable indicator of whether the forecast repex is reasonable.[73]

We have had regard to Energex's annual repex and replacement volumes for each asset category for the 2020–25 regulatory control period relative to its actual/estimated spend in the 2015–20 regulatory control period. We also considered trends at the asset group level for the 2010–15 regulatory control period.

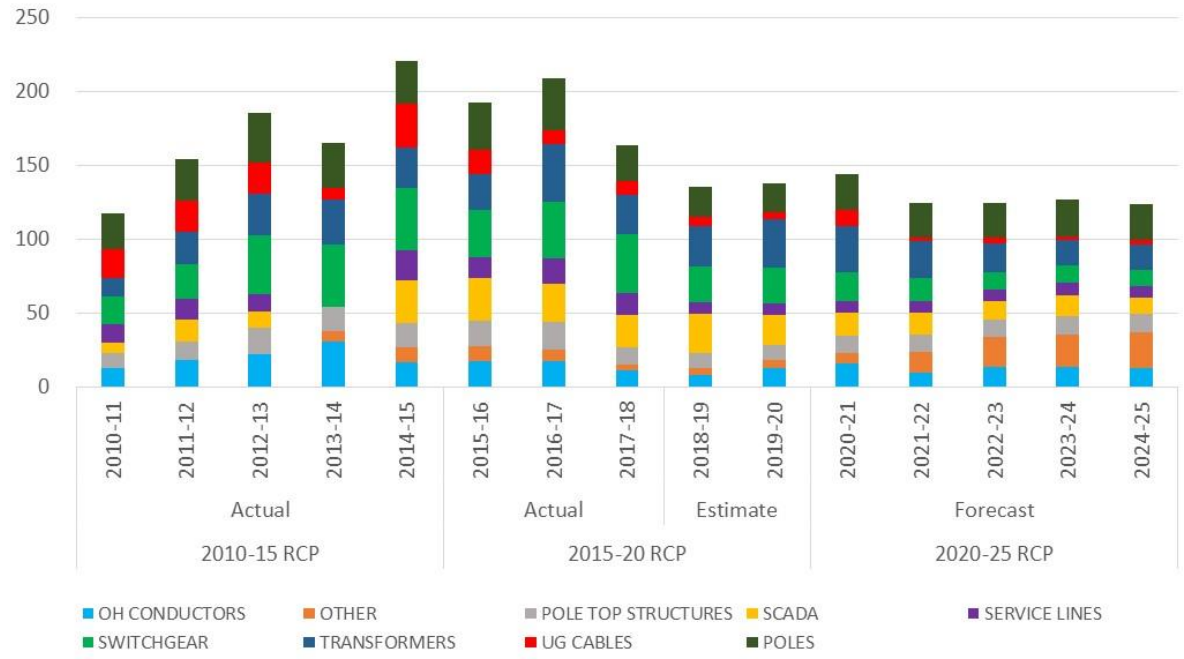
Repex trends

Figure 5.4 shows annual repex by asset group. Energex's total forecast for repex is 23 per cent lower than its actual/estimated repex for 2015–20 and 24 per cent lower than its actual repex for 2010–15. Annual forecast repex is lower than the current period average and broadly in line with its estimated repex spend in 2018–19 and 2019–20. Energex has forecast a decrease for all repex asset groups except for 'other repex'. The increase in other repex is $56 million; this is mainly due to its proposed LV network safety program ($52 million).

[72] NER, cl. 6.5.7(e)(5).

[73] AER, *Expenditure Forecast Assessment Guideline for Electricity Distribution*, November 2013, pp. 7–9.

Figure 5.4 Energex's historical and forecast repex by asset group ($ million, 2019–20)



Source: AER analysis and Energex.

Energex's repex increased from 2010–11 and reached a peak of $221 million in 2016–17. Energex estimates repex of around $135 million per year for the last two years of the current period. It forecasts repex to be on average less than $130 million per year in the 2020–25 regulatory control period.

In the 2010–15 period Energex's repex was around $486 million (35 per cent) lower than the AER allowance. Energex estimates its repex spend in the current period will be around $201 million (19 per cent) lower than the AER allowance.[74]

QCOSS submitted that when we assess Energex's forecast repex we should consider that Energex's current period spend was historically high:[75]

> In assessing Energex's repex, it needs to be noted that currently:
>
> - Energex's network displays low utilization levels compared to comparable networks, making it more difficult to justify replacement of like-for-like… [therefore] there is likely to be scope for further savings, particularly in repex and customer connections.
>
> - While Energex's repex is down by 26 per cent from the 2015–20 regulatory control period, it is important not to overlook the very high starting point in 2015–20. In fact, the higher the repex spending allowance during 2015–20, the stronger the justification for a lower allowance in 2020–25.

74 Energex, *2020–25 regulatory proposal*, p. 66.

75 Queensland Council of Social Service, *QLD electricity distribution determinations – Energex and Ergon 2020 to 2025 – QCOSS Submission: AER Issues Paper*, May 2019, p. 15.

Asset categories

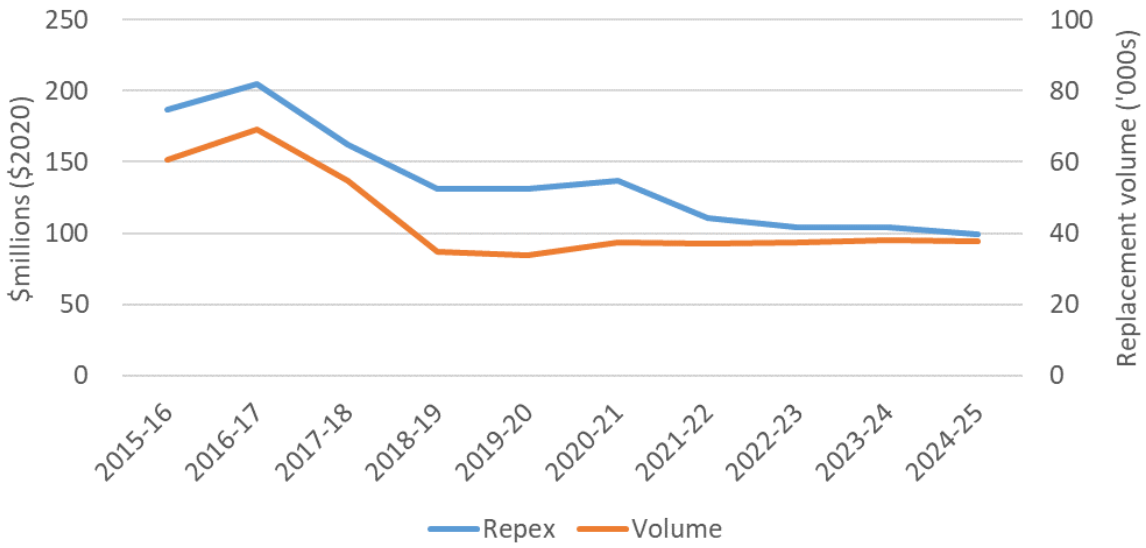
Energex forecast a decrease in repex for more than 80 per cent of asset categories. We looked at the largest repex categories by expenditure for 2020–25. Energex forecast 14 asset categories to be greater than $20 million in 2020–25; only two of these forecasts are higher than the current period. 22–66 kV overhead conductors—which is a modelled repex category—is forecast to increase by around $19 million in 2020–25, and unmodelled reactive work is forecast to increase by around $3 million. We have considered the 22–66 kV overhead conductors asset category in the context of our overall modelled repex analysis, which we discuss below. We have looked at the reactive work asset category specifically as part of our assessment of unmodelled repex.

We have found that forecast unit costs are the same or lower than actual unit rates in the current period for most asset categories.

Volume trends

Energex is forecasting lower replacement volumes compared with the current period. Figure 5.5 shows the replacement volumes for current and forecast periods compared with current and forecast repex. The chart excludes 'other repex' because this asset group includes a number of large, non-recurrent projects that may obscure the underlying repex trends.

Figure 5.5 Energex's annual historical and forecast repex by asset group ($ million, 2019–20)



Source: AER analysis and Energex.

Figure 5.5 shows a strong relationship between repex and replacement volumes. While there is variation between asset groups, overall Energex has not forecast any significant changes to its unit costs for the 2020–25 regulatory control period.

Assessment of top-down and bottom-up methodologies

We have had regard to its forecast methodology, business cases and justification documents. We have concerns that Energex has not used quantitative risk assessment or adequate cost-benefit analysis to arrive at its forecast. These concerns are similar to those discussed in section A.1.

Bottom-up methodology

Energex's justification statements broadly outlines the bottom-up methodology for each asset group.[76] The repex forecast includes condition-based, targeted and reactive (replace-on-fail) programs. Condition-based programs include identification, inspection and prioritisation of at-risk assets using a range of criteria. Targeted programs include the replacement of assets identified as problematic or pose a relatively high risk consequence if they fail. Reactive programs include the replacements of assets where failure has occurred or is imminent. Historical replacement volumes generally form the basis for forecast volumes. Energex used the Condition Based Risk Management model to forecast some asset classes.

We have a number of concerns with Energex's approach, including:

- Energex does not fully quantify risks. Instead, Energex has relied on risk matrices which assign a qualitative value to risk likelihood and consequence to arrive at a semi-quantitative risk score. In many cases, it is unclear how Energex has determined its risk scores. While these risk scores might go some way to prioritising its capital expenditure program, it is not evidence of the need to undertake the proposed program (relative to, for instance, the 'business as usual' or base case) or that the proposed expenditure is efficient.
- The justification statements used to support its forecast repex lack sufficient detail to justify Energex's forecast.
- The options analyses are generally presented either with no or insufficient consideration of the base case counterfactual. In a number of cases, Energex provided a least cost analysis to support its forecast. This is insufficient evidence in the case where there has been no change to regulatory obligations and/or substantiated change to the operating environment.

Submissions, such as from the ECA, also noted that the lack of risk quantification reduces confidence in Energex's cost and risk decisions.[77] We also observe that in our previous 2015–20 review, EMCa reported that a "risk assessment that has been undertaken at too high a level to assist meaningful decision making both within and across the program" undermines the prudency and efficiency of Energex's repex forecast.[78]

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[76] Refer to Energex's justification statements 7.057 to 7.078.

[77] Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, pp. 40–42.

[78] Energy Market Consulting associates and Strata Energy Consulting, *Review of Proposed Network Augmentation and Replacement Capital Expenditure in Energex's Regulatory Proposal 2015 – 2020*, April 2015, p. 87.

Top-down methodology

For a number of repex asset group forecasts, Energex noted that it has applied resource and financial constraints. For example, for underground cables it said:[79]

> The proposed program is reflective of the commitment to constrain customer price impacts and continue to look for efficiencies in program delivery. It reflects a tolerable risk position which balances the achievement of asset management objectives and customer service levels…

We commend Energex for applying a top-down challenge to its bottom-up repex forecast. However, it is not clear how Energex applied these constraints or how they related to Energex's desired network performance or safety targets. This makes it difficult to assess the reasonableness of the top-down challenge, and whether the constraint is too great or too little when considering the extent that the repex forecast might achieve the capex criteria and objectives.

Importantly, we are concerned that a top-down challenge based on tariff targets—and not a consideration of efficiencies and interrelationships across the capex portfolio—do not reflect the needs of the network and therefore may lead to a capex forecast that does not reasonably reflect the capex criteria.

Stakeholder feedback on Energex's forecast approach

The ECA observed that Energex's forecasting approach may be too conservative. It observed that Energex appears to be replacing assets at an earlier age than its peers, and submitted that:[80]

> We consider that extending asset age as long as possible is the best strategic choice. This not only gives greatest value for past investment but also gives time for DER to grow and provide alternatives to 'like for like' investment in the future.

- Further to this, the ECA submitted that extending asset age is not likely to expose Energex to excessive risk:[81]

> …we think repex could be delayed without increasing probability of risks to customers. Other networks have significant proportions of aged distribution assets without exposing customers to safety or reliability issues.

The ESO submitted that Energex's asset management plans lacked specific and measurable activities and outcomes for its safety-related obligations.[82] For example, Energex identified a large number of potential conductor clearance non-conformances

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79 Energex, *7.078 Justification statement – Underground cables*, p. 5.

80 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 40.

81 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 42.

82 Queensland Electrical Safety Office, *Feedback on Energex and Ergon Energy regulatory submissions 2020–25*, p. 3.

using LiDAR technology.[83] However, the forward work plan is not clearly outlined nor has forecast repex or replacement volumes been identified. The ESO raised similar issues regarding neutral failures, ageing overhead conductors, bushfire management and vegetation maintenance.[84]

Modelled repex

Energex proposed $428.3 million ($2019–20) for modelled repex for the 2020–25 regulatory control period. Modelled repex makes up 67 per cent of its total repex forecast. This forecast is $186.9 million, or 30 per cent, lower than its actual/estimated modelled repex of $615.2 million in the 2015–20 period.

Repex model results

Figure 5.6 shows the outcomes from the scenario analysis. The predicted repex under the:

- historical scenario is $786 million
- cost scenario is $667 million
- lives scenario is $254 million
- combined scenario is $179 million.[85]

Energex's forecast of $428.3 million for modelled repex is 36 per cent lower than our repex model threshold—the cost scenario—of $667.4 million.

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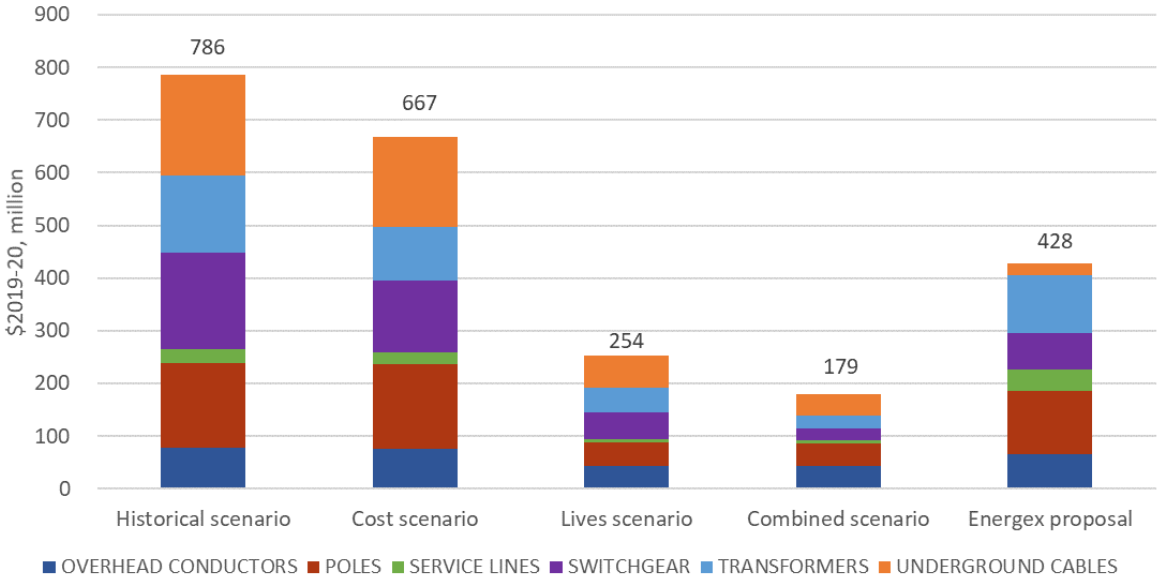
[83] Energex, *7.035 – Asset management plan – Overhead conductors – January 2019*, p. 23.

[84] Queensland Electrical Safety Office, *Feedback on Energex and Ergon Energy regulatory submissions 2020–25*, pp. 1–4.

[85] See AER, *Draft decision – Energex distribution determination 2020–25 – Repex model*, October 2019.

Figure 5.6 Output of the repex modelling scenario comparison ($ million, 2019–20)



Source: AER analysis.

Notes: Historical Scenario uses historical unit costs and calibrated expected replacement lives.
Cost Scenario uses comparative unit costs[86] and calibrated expected replacement lives.
Lives Scenario uses historical unit costs and comparative expected replacement lives.[87]
Combined Scenario uses comparative unit costs and comparative expected replacement lives.

The large difference between the cost and lives scenarios is because Energex's historical unit costs, on average, compare favourably with other distributors. However, Energex's historical repex suggests that, on average, it has replaced assets much earlier over the last four years when compared with other distributors. This results in relatively short expected asset lives which leads to relatively high historical and cost scenario outcomes.

The high repex forecast given by the historical and cost scenarios reflects the very high replacement expenditure and volumes in the 2014–15 to 2017–18 calibration period (i.e. the period from which we take historical data to make assumptions about future repex requirements). Because of this, we would expect Energex's repex requirements for the 2020–25 regulatory control period to be lower than the historical and cost scenario thresholds.

Energex's forecast is higher than our modelled threshold for service lines and transformers, and lower than our modelled threshold for overhead conductors, poles, switchgear and underground cables.

Energex's forecast for underground cables is substantially lower than the modelled threshold. Energex has not clearly explained the reasons for this. It reactively replaces

[86] Minimum of a distributor's historical unit costs, its forecast unit costs and the median unit costs across the NEM.

[87] Maximum of a distributor's calibrated replacement life and the median replacement life across the NEM.

the majority of its underground cables.[88] Given the relatively young age profile of this asset group we would expect relatively low failure rates over the forecast period. Energex also plans an increase in risk exposure in the 2020–25 regulatory control period, finding that the higher costs required to maintain current risk levels are not justified.[89] Finally, Energex has applied a budget constraint "which balances the achievement of asset management objectives and customer service levels."[90]

Trend and bottom-up analysis of modelled repex

Table 5.7 shows Energex's forecast modelled repex compared with the current period. Overall, its forecast modelled repex is 30 per cent lower than actual/estimated repex for the 2015–20 period. Energex forecast the largest decreases for the switchgear and underground cables asset groups.

Table 5.7 Energex's current and forecast modelled repex asset groups ($ million, 2019–20)

Asset group	2015–20 ($2019–20, million)	2020–25 ($2019–20, million)	Difference (%)
Poles	130.9	120.0	-8%
Overhead conductors	66.7	65.0	-2%
Underground cables	46.4	22.2	-52%
Services lines	61.9	40.4	-35%
Transformers	149.9	110.6	-26%
Switchgear	159.5	70.0	-56%
Modelled Repex	**615.2**	**428.3**	**-30%**

Source: AER analysis and Energex.

Despite our concerns with Energex's forecasting methodology, we acknowledge that Energex has forecast a significant decrease compared with the current period, and has applied an aggressive top-down constraint. We also acknowledge that Energex's lower forecast compares favourably with our repex model results, suggesting improvements in efficiency compared with the current regulatory control period. On balance, we are satisfied that Energex's forecast modelled repex of $428.3 million forms part of a forecast for total capex that reasonably reflects the capex criteria.

Unmodelled repex

Energex proposed $215.2 million ($2019–20) for repex for the 2020–25 regulatory control period. This forecast is $7.1 million, or 3 per cent, lower than its actual/estimated repex of $222.3 million in the 2015–20 period.

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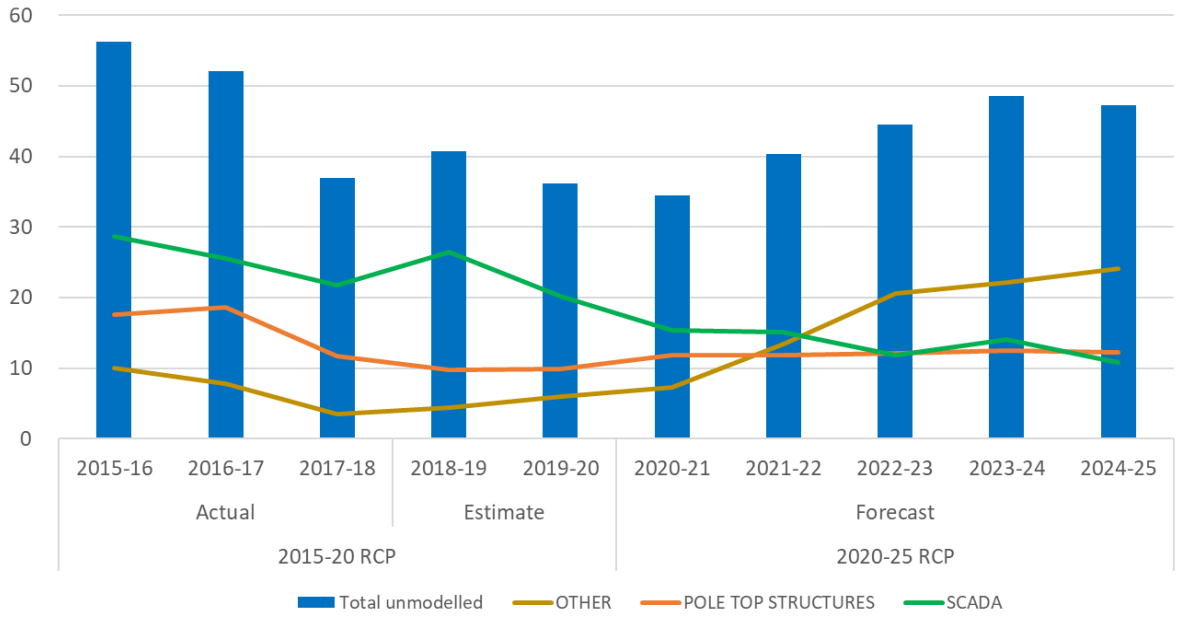
88 Energex, *Justification statement – underground cables*, January 2019, p. 5.
89 Energex, *Justification statement – underground cables*, January 2019, p. 5.
90 Energex, *Justification statement – underground cables*, January 2019, p. 5.

Unmodelled repex trends

Figure 5.7 shows annual unmodelled repex by asset group. Energex forecast a 45 per cent decrease in SCADA, network control and protection systems (collectively known as SCADA) and an 11 per cent decrease in pole-top structures. It has forecast a 174 per cent increase in other repex, largely due to two new safety-related projects proposed for the 2020–25 regulatory control period.

Figure 5.7 Energex's historical and forecast unmodelled repex – total, and by asset group ($ million, 2019–20)



Source: AER analysis.

Unmodelled repex by asset group

Our concerns about Energex's overall forecasting methodology also apply to its unmodelled repex forecast. However, as with modelled repex we propose to accept Energex's forecast for pole-top structures and SCADA because they perform well against historical trends. We do not accept Energex's forecast for other repex.

Pole-top structures

Energex's forecast for pole-top structures is $60.6 million, which is 11 per cent lower than the current period. Energex noted that it funds the majority of pole-top structure replacements through opex. For the capex program, the conductor and poles replacement programs drive around 84 per cent of replacements. The remaining 16 per cent will be through a targeted replacement of high-risk assets.[91]

Given Energex is forecasting lower repex for pole-top structures compared with the current period—and in the context of its lower repex forecast overall—we are satisfied

[91] Energex, *7.066 Justification Statement – Pole Top Structures*, January 2019, p. 2.

with Energex's forecast for this element of its repex. Secondly, given that we are accepting the conductor and poles forecasts, we do not find it necessary to adjust the forecast pole-top structures volumes.

SCADA

Energex's forecast for SCADA is $67.1 million, which is 45 per cent lower than the current period. We have included this amount in our substitute estimate.

Energex provided business cases for a number of proposed SCADA projects for the forecast period. The business cases do not sufficiently justify the proposed capex. This is because they lack key details to demonstrate the need or the optimum timing of the projects. Energex states that the proposed projects are required to maintain network reliability and security and to facilitate rapid fault detection and response in a cost-effective manner[92]; however, Energex needs to quantify the costs and benefits for each of these programs. For example, it is unclear how, why and to what extent the network is currently inadequate; hence, it does not justify why additional repex (or how much) is required at this time. In particular, Energex has not justified the proposed repex for protection relays ($27.5 million): it estimates a reactive replacement program to be only $3.8 million. We would like to see a quantified risk assessment for the proactive and reactive options for protection systems (and for other programs) to help us determine the most prudent option.

Despite these concerns, we accept Energex's forecast for SCADA because it is substantially less than what it has incurred in the current period and reasonably reflects efficient costs.

Other repex

Energex's forecast for other repex is $87.5 million, which is 174 per cent higher than the current period. Energex has not justified its forecast for other repex. Our substitute estimate is $26.9 million. This is 69 per cent lower than Energex's forecast and 16 per cent lower than Energex's other repex expenditure in the 2015–20 period.

Table 5.8 shows the main drivers of Energex's other repex forecast.

[92] Please refer to the rationale/benefits section in the relevant strategic scope documents (7.100–7.133).

Table 5.8 Components of Energex's forecast other repex ($ million, 2019–20)

Asset category	2020–25 ($2019–20, million)	Percentage of other repex
LV network safety	52.3	60%
Reactive Work	20.7	24%
Asbestos	8.3	9%
Other	6.2	7%
Total other repex	87.5	

Source: AER analysis and Energex.

Our analysis focused on the three largest components of other repex.

LV network safety

Energex has not demonstrated the prudency and efficiency of the proposed capex for this program and therefore we have not included it in Energex's allowance for the 2020–25 regulatory control period.[93]

We acknowledge the importance of funding to address safety risks and we have approved safety-related capex in previous decisions. However, based on the information provided the costs of this program are grossly disproportionate to the benefits of mitigating the health and safety risks and this expenditure is not justified on economic or legislative grounds.

Energex proposed $52.3 million for the installation and monitoring of network monitoring devices (NMDs) to reduce the safety risks caused by degradation or failure of neutrals (broken neutrals).[94] Broken neutrals in customer service lines can cause tingles or electric shocks. Energex receives on average 85 reports of tingles or shocks per year resulting from broken neutrals.

Energex said that it has a "very low appetite for risks that negatively affects the safety of our people and the community," therefore "it is apparent that more proactive and efficient risk mitigation measures are required."[95] Consequently, it has proposed to install NMDs at 155 000 customers' premises on the low-voltage (LV) network that it deems are at high risk of electric shock. The NMDs actively monitor the LV network and can identify faults caused by broken neutrals in customers' service lines or at the connection points. This allows for quick detection and rectification of faults and minimises shock risks to customers.

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93 Ergon Energy proposed a similar program of works. See AER, *Draft decision – Ergon Energy distribution determination 2020–25, Attachment 5 – capital expenditure*, September 2019, section A.4.3.

94 Energex has also forecast opex of $6.4 million for this project. We understand that Energex has not included this in its opex proposal.

95 Energex, information request 057 – *Energex AER IR029_EQL SASP Business Case LV Network Safety-Final Version PUBLIC*, 9 August 2019, pp. 5–6.

Energex currently carries out inspection and maintenance programs to periodically monitor and assess the condition of its LV assets, as well as programs to maintain, repair, or replace LV equipment when it identifies a safety risk.

Energex submitted that this new program of actively monitoring service lines will substantially reduce safety risks compared with its current program of proactive and reactive replacement of service lines. It also submitted that:[96]

> This system of neutral fault detection provides evidence that the current EQL program of service inspection and replacement no longer represents a reduction in safety risk SFAIRP.

Energex contends that its current practices no longer adequately reduce safety risks so far as is reasonably practicable (SFAIRP), because dynamic monitoring of the LV network is capable of reducing the risks further. Under the *Work Health and Safety Act 2011* (Cth), Energex is required to eliminate risks to health and safety, SFAIRP. Where it is not reasonably practicable to eliminate risks it must minimise those risks SFAIRP.[97]

We do not agree with Energex's contention for the following reasons:

- We acknowledge the importance of funding to address safety risks and have approved safety-related capex in previous decisions; however, Energex has not provided sufficient material by way of different cost options, including consideration against its current practices, to demonstrate that its proposed new capital program is required over and above its current program.
- Stakeholders have also expressed similar concerns about the lack of options analysis in support of the program.
- Energex's current program that addresses broken neutrals appears to be consistent with industry best practice and there is no evidence that it is not compliant with the relevant regulatory obligations. Furthermore, there has not been a change to regulatory obligations to necessitate changes to the current program.
- Our own consideration of the costs and benefits of the program based on the information provided suggests that the costs of the program are grossly disproportionate to the benefits of mitigating the health and safety risks.

Testing of prudency and efficiency of the proposed capex under the NER

Energex provided a least-cost analysis in support of its proposed capex for the LV safety program. The analysis assumes that compliance with its health and safety obligations establishes the need for the program. Energex's supporting material identifies what it considers to be the lowest cost option to deliver the program.

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96 Energex, information request 057 – *Energex AER IR029_EQL SASP Business Case LV Network Safety-Final Version PUBLIC*, 9 August 2019, p. i.

97 Queensland Government, *Work Health and Safety Act 2011*, s17.

Energex presented the options for addressing the safety risks of broken neutrals in its proposal.[98] Following consultation with the AER Energex provided a revised business case which considered different options to those presented in the proposal.[99] In both of these documents, Energex provided risk assessments for each option. The risk assessments showed that Energex consider that only the preferred option would reduce safety risks relative with the "do nothing" (or, business as usual) option. Quantitative analysis or any other evidence do not support this conclusion. In addition, Energex has not shown how it has determined the scope of work for each option. Therefore, we are not satisfied that Energex has reviewed and tested all credible options. CCP14 raised similar concerns in its submission, saying that Energex has not made a "full and fair assessment" of the options for managing health and safety risks.[100]

We provided early feedback to Energex about the lack of evidence around the prudency of the program and encouraged Energex to provide risk based cost-benefit analysis to support the capex associated with this program.[101] Consistent with our previous decisions, we typically expect businesses to provide this material to support its forecast.

Despite a number of information requests, Energex has not provided a quantitative risk analysis for this project, nor does it intend to ahead of this draft decision.[102]

To support its position that a quantitative risk analysis is not required, Energex provided advice from MinterEllison. The advice explored the safety legislation—the *Electrical Safety Act (QLD) 2002* (ES Act) which mirrors the overarching *Work Health and Safety Act 2011* (Cth)—including a discussion on how the issue of cost is relevant to what is 'reasonably practicable' in risk management.[103]

These Acts state that, when assessing what is reasonably practicable, a business should consider all relevant matters. This includes the likelihood and degree of harm of a risk, what the person would reasonably know about the risk, and ways to eliminate or reduce the risk. After assessing these factors, a business should consider the costs of eliminating or minimising the risk, including "whether the cost is grossly disproportionate to the risk."[104]

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98 Energex, *7.093 Strategic Proposal – LV Network Safety 2020-25*, January 2019.

99 Energex, information request 057 – *Energex AER IR029_EQL SASP Business Case LV Network Safety-Final Version PUBLIC*, 9 August 2019.

100 Consumer Challenge Panel 14, *Advice to the AER on the Energex and Ergon Energy 2020-25 Regulatory Proposals*, May 2019, p. 11.

101 We held a meeting with Energy Queensland to discuss its capex proposal for 2020-25 on 4 June 2019.

102 See Energex, *7.026 Asset Management, Risk and Optimisation Strategy 2020-25*, and *information request 011 - AER EGX IR011,* March 2019. Energex reiterated at a meeting on 4 June 2019 that it considered it inappropriate to quantify risks with respect to serious injury or death.

103 Energex, information request 055 – MinterEllison, *LV network safety – advice to Energy Queensland (private and confidential) - PUBLIC,* 9 August 2019.

104 Queensland Government, *Work Health and Safety Act 2011*, s18.

MinterEllison submitted that, based on the evidence that "the likelihood of an electric shock from a neutral issue is significant" and "the potential consequences can be fatal":[105]

> Any finding by the AER, which discounts Ergon and Energex's forecast expenditure of the Neutral Program on the basis that it was unsupported by a cost-benefit analysis, would be a flawed finding, based on an incorrect understanding of the nature of the obligations created by safety legislation in the relevant jurisdiction.

We disagree with MinterEllison's contention for a number of reasons.

MinterEllison highlighted that the risk of a public shock is significant, and that the consequence can be fatal. It concluded that "the costs as set out in the Ergon and Energex CAPEX proposal are unlikely to be regarded as a significant factor in relation to addressing this particular risk and ensuring compliance with obligations under the safety legislation." This conclusion does not give proper regard to the fact that in the event of a public shock, the likelihood of a serious consequence (i.e. a serious injury or a fatality) is extremely low. Energex's historical public shocks data shows that there were no instances of serious injury or death in Energex's network caused by broken neutrals for the period 2011–12 to 2016–17.[106]

We conclude that when considering both the likelihood of an electric shock and the likelihood that the shock will cause a significant degree of harm, the current health and safety risks posed by broken neutrals are very low. Therefore, the costs of reducing this risk are a relevant consideration when assessing whether this program is reasonably practicable under the ES Act.

In its proposal Energex has not provided a risk assessment to show that the risk is at least moderate, or that the costs of the LV safety program are not grossly disproportionate to the benefits of mitigating these risks.

Secondly, MinterEllison has not had regard to the relevance of the NER requirements for the AER to assess whether this capex reflects efficient costs and "the costs that a prudent operator would require" to achieve the capital expenditure objectives.[107] The AER has an economic regulatory role under the NER in assessing Energex's capex proposal in making a revenue determination. This means that a cost-benefit analysis—namely, a quantitative weighing up of all feasible costs and benefits—is an important factor to demonstrate that the proposed capex satisfies the capex criteria of the NER.

MinterEllison also stated that a cost-benefit analysis is not required to assess prudency and efficiency of a business' proposed capex except where the proposed expenditure might be grossly disproportionate to the risk:[108]

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105 Energex, information request 0*55* – MinterEllison*, LV network safety – advice to Energy Queensland (private and confidential) - PUBLIC,* 9 August 2019, p. 5.

106 Energex, *information request 011* – Energex OH services shock data*,* March 2019.

107 NER, cll. 6.5.7(a), 6.5.7(c)(1).

108 Energex, information request 055 – MinterEllison*, LV network safety – advice to Energy Queensland (private and confidential) - PUBLIC,* 9 August 2019, p. 5.

> Only if there is reason to believe that forecast expenditure would be grossly disproportionate to the risk involved would the absence of a cost-benefit analysis be a material consideration in determining that the expenditure was not prudent or efficient.

We do not agree with MinterEllison's interpretation of the AER's role when assessing proposed capex under the NER. The NER does not set the restriction that MinterEllison implies. In fact, the NER sets out several factors the AER must have regard to when assessing the prudency and efficiency of a business' proposed capex, as well as any additional factors that the AER considers to be relevant.

It is insufficient for MinterEllison to point to compliance with the safety legislation as justifying Energex's proposed capex. If that were the case, then compliance with the safety legislation would be sufficient to include the proposed capex for its LV safety program in Energex's allowance despite the requirements set out in clause 6.5.7 of the NER. Instead, Energex must demonstrate that it can be reasonably concluded that the proposed capex is a necessary, and the most prudent and efficient, response to its safety obligations.

The Australian Competition Tribunal has commented that quantitative assessment is a general requirement when testing whether the chosen cost option satisfies the capex requirements:[109]

> Ultimately, it is not so important whether the label "cost-benefit" is used to describe what is needed to demonstrate the economic efficiency directives required to demonstrate compliance with r 79(1)(a). What is more important is that the process employed be robust, and it must critically assess all available options for achieving the desired outcome, even if those options may not have been ones that were originally contemplated. There must be a dispassionate, objective and open mind brought to bear. The process must also examine the consequences of embarking on an option (or of not doing so), the costs attached to each option, and the ultimate return from them over their life, in present value terms. Although the process will have some qualitative features, it must invariably be a quantitative process.

In many previous decisions we have acknowledged that where capex is proposed to meet health and safety risks, it is reasonable for forecast costs to be higher than the benefits of mitigating those risks, although not disproportionately so. In these cases we reviewed the robustness of the analysis, including the disproportionality factors. As a result, we accepted costs which were higher, but not grossly disproportionately higher, than the benefits of mitigating the health and safety risks.

The CCP14 submitted that it supports public safety initiatives generally, particularly where there is evidence that the risks to safety are increasing. However, it expressed concerns about how Energex has characterised its legislative requirements and its options analysis:[110]

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109 Australian Competition Tribunal, *Application by ATCO Gas Australia Pty Ltd [2016] ACompT 10*, [278].

110 CCP14, *Advice to the AER on the Energex and Ergon Energy 2020-25 Regulatory Proposals*, May 2019, p. 11.

> Our concern is around the way the risk and the prudent reaction has been portrayed, without some context around the meaning of 'as low as reasonably practicable'. In addition, we believe that the solution proposed – installing new-technology network monitoring devices at a customer's premises, does not represent a full and fair assessment of the options available.
>
> We believe this example highlights what may be a missed opportunity in the narrative and business cases for asset replacement generally, where the counterfactuals and 'compromise' solutions may not have been fully considered.

The ESO submitted that "neutral failure is an important issue to be addressed as current rates of failure are not acceptable."[111] It submitted that it supported network monitoring, but improved preventative practices were required in the first instance, including:[112]

- engineering solutions to address causes of higher failure rates, such as in coastal areas
- increased standards, such as double-clamping
- increased and improved inspection practices
- determining safe service life in different environments and reducing average service line age.

The ESO submitted that a holistic approach focused on prevention "should address other failure modes such as insulation integrity, line clearances and service line attachment strength which will not be detected by LV monitoring."[113]

The ESO also considered that a reactive maintenance program may not be the most cost-effective approach to addressing LV safety risks:[114]

> A reactive program driven by monitoring to detect failures may not be the most cost-effective way to address risks; i.e. bulk replacing old service lines street by street as a proactive maintenance activity is surely more cost effective then returning multiple times to address individual failures.

Lack of justification for additional capex over and above its current program of works

Energex's current practices to address public shock risks include a program of ongoing monitoring, proactive and reactive replacement of LV services, which is typical of

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111 Queensland Electrical Safety Office, *Feedback on Energex and Ergon Energy regulatory submissions 2020–25*, p. 1.

112 Queensland Electrical Safety Office, *Feedback on Energex and Ergon Energy regulatory submissions 2020–25*, p. 2.

113 Queensland Electrical Safety Office, *Responses to AER questions regarding Energy Queensland's Strategic Proposal 7.093 LV Safety and Network Visibility*, 28 June 2019, p. 3.

114 Queensland Electrical Safety Office, *Responses to AER questions regarding Energy Queensland's Strategic Proposal 7.093 LV Safety and Network Visibility*, 28 June 2019, p. 3.

standard accepted industry practice. Energex is proposing a capex program that is in addition to these existing programs and this new program seeks to further reduce network safety risks. Energex has not provided information to date that sufficiently justifies the need for an additional $52.3 million in capex to reduce safety risk further.

We came to the position having regard to the following information:

- There has been no change to Energex' safety obligations that would require a further reduction to safety risk on Energex's LV network.
- Energex did not provide evidence that its existing inspection, maintenance, repair, or replacement programs are failing to maintain compliance with its safety obligations.
- There have been no incidents of fatalities or serious injuries over the six years to 2016–17.[115] This suggests that the current approach is effective in mitigating fatalities and serious injuries. In other words, Energex's current practices have reduced the likelihood of serious injuries or fatalities to the point that they are very unlikely to occur.

Assessment of costs and benefits

In the absence of quantitative risk analysis from Energex we have considered the historical shock data that Energex provided to better understand its current risk exposure. We asked Energex to provide a list of historical public shocks, including the cause and the extent of harm caused. Energex provided data for the period 2011–12 to 2016–17. It showed that over this period, there was an average of 85 reports of shocks or tingles per year. There were no incidents of serious injuries or fatalities reported in the Energex network.[116] Over the period broken neutrals contributed to around 10 per cent of shocks in the EQ network.[117]

The current risk costs are the multiple of the likelihood of the risk and degree of harm. Note that the likelihood and degree of harm are relevant matters when considering if a course of action is reasonably practicable.

Given that there have been no incidents of serious injuries or fatalities over the period for which data are available (i.e. 2013–14 to 2017–18) we determine that the likelihood of fatality or serious injury is extremely low. This means that, while the degree of harm is very high, when considered along with the likelihood of the risk, the risk cost is low. Conversely, while the likelihood of receiving a shock or tingle is comparatively higher, the degree of harm is minimal. Again, the risk cost is low.

Further to this assessment, we attempted to quantify Energex's risk assessment that it presented in its proposal, where it assigns a qualitative value to risk likelihood and

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115 Energex, information request 011 – Energex OH services shock data, March 2019.

116 Energex, information request 011 – Energex OH services shock data, March 2019.

117 Queensland Electrical Safety Office, *Responses to AER questions regarding Energy Queensland's Strategic Proposal 7.093 LV Safety and Network Visibility*, 28 June 2019.

consequence to arrive at a semi-quantitative risk score.[118] In our analysis we considered that it is prudent, and in line with legislative obligations, that the costs of eliminating or mitigating risks can reasonably be multiples higher than the benefits achieved; that is, the project may be considered reasonably practicable even when the costs are disproportionate to the benefits. Despite this consideration, we found that the proposed costs of the LV safety program exceed the benefits to such a degree that it is not reasonably practicable to undertake this investment.

Our analysis, based on the information we have, leads us to conclude that the costs for the LV safety program is likely to be grossly disproportionate to the benefits of eliminating or mitigating the health and safety risks. This is further evidence that Energex's proposed capex is not prudent and efficient and therefore should not form part of a total capex forecast.

Asbestos prioritised removal plan

Energex proposed $8.3 million to proactively remove asbestos-containing material (ACM) as part of its corporate goal of being asbestos free (as far as is reasonably practicable) by 2030. We do not include this capex in our substitute estimate as Energex has not demonstrated the need for this project on economic, safety or legislative grounds.

In line with legislation and industry best practice, Energex's current practices are to remove ACM and contaminated soil during demolition or refurbishment work. It also maintains an inspection and monitoring program of all known ACM in its network. Energex reactively removes degraded or disturbed ACM.

The proposed asbestos prioritised removal plan, however, includes removal of ACM that is undisturbed and in good condition. Energex submitted that a proactive removal program aligns with key government legislation and guidelines.[119]

Based on the information before us, Energex has not established its current risk exposure, the need to undergo this project or the costs and benefits compared with current practices. It has also not provided any evidence of a legislative requirement to carry out this program. As noted below, existing practices relating to undisturbed ACM are consistent with jurisdictional norms.

In particular, we understand that the proactive removal of ACM that is undisturbed and in good condition does not reflect industry best practice.

Work Safe Australia recommends leaving undisturbed ACM in place:[120]

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[118] Refer to Energex, information request 057 – *Energex AER IR029_EQL SASP Business Case LV Network Safety-Final Version PUBLIC*, 9 August 2019 and *7.026 Asset Management, Risk and Optimisation Strategy 2020-25*, January 2019.

[119] Energex, *Stakeholder information request – EGX ERG AER IR June04 capex*, 28 June 2019, p. 7.

[120] Work Safe Australia, *Code of Practice: how to manage and control asbestos in the workplace*, December 2011, p. 17.

> If asbestos or ACM is in good condition and left undisturbed, it is unlikely that airborne asbestos will be released into the air and the risk to health is extremely low. It is usually safer to leave it and review its condition over time.

Further, the Queensland Government states that undisturbed ACM presents a very low health risk and advocates removal only when necessary:[121]

> Where the asbestos containing material is in good condition and left undisturbed…the risk to health is extremely low. Removal of asbestos containing material from homes and workplaces should only occur if the material is in poor condition, likely to sustain damage or during renovations.

Based on the recommendations of Work Safe Australia and the Queensland Government, it is prudent to monitor undisturbed ACM and remove ACM only when there is a risk of exposure. This is in line with Energex's current practices. Energex has not demonstrated that the benefits of the asbestos prioritised removal plan outweigh the additional costs.

Lastly, Ergon Energy has undergone a proactive asbestos removal program in its network. Energex provided material in June 2019 exploring the costs and benefits of this program.[122] We encourage Energex to provide similar cost-benefit analysis to demonstrate that the proposed asbestos prioritised removal plan is likely to be more prudent and efficient than continuing with its current asbestos management practices. To the extent that it cannot demonstrate that it is more efficient than its current practices, the additional capex is not justified; however, this does not preclude Energex from embarking on this program if it determines that it is prudent to do so.

Reactive work

Energex's forecast for reactive work includes replacement of substation assets that have failed in-service. Energex has based its forecast on historical expenditure. This is a reasonable approach for this asset category, particularly in the context of the lower forecasts for the switchgear and transformers asset groups, which may expose Energex to an increased risk of in-service failures in the medium term.

A.5 ICT

Information and communications technology (ICT) refers to all devices, applications and systems that combined allow for interaction with the digital world. Expenditure for ICT 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 business need.

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121 Queensland Government, *Statewide Strategic Plan for the Safe Management of Asbestos in Queensland 2014–2019*, March 2013, p. 4.

122 Asbestos Safety and Eradication Agency, *Asbestos: the next national plan*, presentation, June 2018.

Background

Until July 2016 SPARQ Solutions, a jointly-owned subsidiary of Energex and Ergon, provided ICT services. SPARQ recovered costs for this service through an “asset usage fee”, comprised of depreciation of the assets constructed and interest based borrowing required to fund the asset construction.

SPARQ became a 100 per cent subsidiary of EQ following the creation of the merged entity. EQ continues to use the asset usage fee established by SPARQ for the current regulatory control period. This treats ICT costs as an overhead for the distributors, which it allocates across capex and opex.

For the 2020–25 regulatory control period, EQ will allocate assets in SPARQ to the fixed asset register and regulatory asset bases (RABs) of each business. EQ allocates costs associated with shared assets in accordance with the businesses' cost allocation method (CAM).

In this attachment, our ICT capex assessment only describes our draft decision for Energex. However, for the reasons outlined above, we have assessed EQ's total ICT capex forecast together. Energex's proposal also presents forecast ICT capex including associated indirect costs. We have assessed these indirect costs as part of capitalised overheads and this section therefore discusses our direct capital costs assessment only.

Overall, EQ has proposed $403.1 million (direct, $2019–20) for non-network ICT capex across both networks for the forecast regulatory control period. Many stakeholders including CCP, QCOSS and ENA have requested us to closely examine Energex's proposed ICT expenditure. These stakeholders have considered that the proposed investment is 'significant' and have asked for clarity on the prudency and efficiency of the proposed amount.

A.5.1 Draft decision

Energex has not satisfied us that its forecast ICT capex of $193.0 million forms part of a total capex forecast that reasonably reflects the capex criteria. We have included an amount of $146.0 million for ICT capex in our substitute estimate, a 24 per cent reduction to Energex's forecast. Table 5.9 summarises Energex's initial proposal for ICT capex and our draft decision.

Table 5.9 Draft decision on Energex's forecast ICT capex ($ million, 2019–20)

Category	Proposal	Draft decision	Difference
Recurrent ICT capex	60.8	51.4	-9.5
Non-Recurrent ICT capex	132.1	94.7	-37.5
Total ICT capex	**193.0**	**146.0**	**-47.0**

Source: Energex, *Response to AER Information Request 058*, 13 August 2019; AER Analysis.

A.5.2 Energex's proposal

Energex's initial proposal includes an ICT capex forecast of $193.0 million ($2019–20).[123] This is $6 million higher than Energex's total actual and estimated ICT capex in the current regulatory control period. Energex forecast ICT capex is comprised of $60.8 million for recurrent ICT programs and $132.1 million for non-recurrent ICT projects.[124]

Energex's recurrent ICT forecast includes cyclical replacement of ICT devices and infrastructure, minor ICT changes to support safety initiatives, risk assessments, network growth to support new customers, electricity market changes and audit recommendations and other minor application upgrades to maintain EQ's systems for continued serviceability.[125]

Energex's non-recurrent ICT capex forecast comprises 18 projects to consolidate Energex and Ergon's separate ICT systems. Some major systems replacement and consolidation projects include the Geographic Information System and the Network Operations, Field Force, and Customer Market systems.

A.5.3 Reasons for draft decision

Consistent with our ICT expenditure assessment guideline consultation paper,[126] we have assessed recurrent ICT capex separately to non-recurrent ICT capex.

Recurrent ICT capex

Energex proposed $60.8 million (as part of a forecast of $121.6 million across EQ) for recurrent ICT capex. Energex has not justified its forecast. Our substitute estimate for capex includes $51.3 million for recurrent ICT capex. This reflects the advice we received from EMCa that Energex has not justified the proposed increase in expenditure for 'other minor application upgrades and updates' from the current regulatory control period expenditure.

Top-down assessment

Given the nature of these investments, historical costs are a likely indicator of future costs for this category of ICT capex.

We looked at EQ's historical expenditure for each recurrent ICT program.[127] EQ's total forecast expenditure is in line with current period expenditure for these programs. From a top-down perspective, recurrent ICT capex appears to be a reasonable forecast of the prudent costs for this category of capex.

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123 Energex, *Reset RIN*, January 2019.

124 Energex, information request 003, 13 February 2019. For the purposes of our assessment, we have treated the 18 projects for which Energex provided supporting business cases and cost-benefit models as non-recurrent ICT capex. We have treated all remaining capex as recurrent ICT capex.

125 Energex, *7.007 – ICT Plan*, January 2019, p. 45.

126 https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/ict-expenditure-assessment-review.

127 Energex, information request 012 and Ergon Energy, information request 011.

EMCa's review

While we acknowledge our top-down results, we have also had regard to the advice provided by EMCa.

EMCa considers that the entire recurrent ICT program proposed by Energex was reasonable, except the proposed 'other minor application upgrades and updates' capex. EMCa observes that the proposed capex for these programs was significantly higher than current period expenditure.[128] EMCa expects that Energex would adopt a risk-based approach to upgrading/updating its applications. This includes deferring upgrades beyond the reference lifecycle which it assumes that EQ has applied, particularly given the other activities underway that are changing the ICT landscape considerably. However, Energex has not provided any indication in the information provided that it has done so. EMCa therefore considers that Energex had not justified this proposed increase.[129]

Having regard to EMCa's advice and, in the absence of additional evidence from Energex, we have reduced Energex's forecast for the 'other minor application upgrades and updates' by 50 per cent to align the forecast to current period actual levels.

Non-recurrent ICT capex

Energex proposed $132.1 million (as part of a forecast of $281.6 million across EQ) for non-recurrent ICT capex. Energex has not justified its forecast. Our substitute estimate for capex includes $94.7 million for non-recurrent ICT capex. Our substitute estimate removes additional contingency costs from project forecasts ($20.8 million) and adjusts the forecast (by $16.7 million) to account for the likelihood that the proposed program will not be deliverable by Energex over the forecast regulatory control period.

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

While we endorse the overall objectives of the non-recurrent ICT program overall, Energex's non-recurrent ICT capex forecast is not a reasonable forecast of prudent and efficient costs for the 2020–25 regulatory control period. It is also unlikely that it can deliver the program under the timeframe proposed. A prudent and efficient operator would undertake such a portfolio of work over a longer timeframe to reduce delivery and resourcing risk.

Energex has not justified several aspects of its forecast ICT capex program, including:

- including additional contingency costs

[128] EQ has forecast these costs to increase by 49 per cent from its average actual current period spend.

[129] EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. 86.

- the likelihood that Energex's ICT program can be delivered successfully in the time proposed
- aspects of the ICT capex forecast where its business case and other supporting information does not demonstrate prudency and efficiency.

Contingency costs

Energex submitted that to obtain its final cost estimate included in the business case, it multiplied the baseline estimated project costs by "the capital estimation accuracy factor."[130] The capital estimation accuracy factor was based on the forecast confidence rating, and was:

- 1.1 (i.e. 1 + 10%) for projects with a 'High' estimated confidence rating
- 1.2 (i.e. 1 + 20%) for projects with a 'Medium' estimated confidence rating
- 1.3 (i.e. 1 + 30%) for projects with a 'Low' estimated confidence rating.

For Energex, these additional costs account for $20.8 million, or 16 per cent of the proposed non-recurrent ICT capex forecast.

The inclusion of contingency costs are unlikely to result in the forecasts reflecting prudent and efficient costs. We also note that the estimation accuracies identified by Energex imply that there is an equal probability that a given project will go below or above budget. This means that, over the entire portfolio of 18 projects, we might expect the overall over/underspend to be close to zero. EMCa concurred with our findings and recommended to remove contingency costs from the capex forecast.[131]

Program deliverability

Overall, the strategy of consolidation via replacement by EQ is prudent. Given the age of the systems, it would be reasonable to assume that most systems will need to be replaced in the medium term. Consolidating the disparate systems to single EQ-wide systems will deliver multiple real benefits (i.e. avoid the 'double-up' of costs) and lead to future costs. EMCa supports our findings and concludes that "it is reasonable to assume that it will be operationally and commercially prudent to replace the nominated systems in the next RCP or shortly thereafter given the age of the systems and the cost reduction and efficiency benefits of consolidation or unification."[132]

However, Energex is unlikely to deliver the program as proposed. To reduce delivery risks, a prudent and efficient distributor would not include all of the ICT projects Energex has proposed for completion within the 2020–25 regulatory control period. The proposed program is large scale, complex and an interdependent program of works impacting on a number of core IT systems and business processes. There is a significant risk that Energex will be unable to deliver the program in the timeframe proposed.

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130 Energex, information request 023, 10 May 2019, p. 14.

131 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. 97.

132 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. 97

Submissions from CCP[133] and ECA's economic consultant Dynamic Analysis[134] raised concerns with Energex's ability to effectively deliver the proposed program of works over the forecast regulatory control period.

Energex's ICT Plan shows the indicative schedule of its proposed ICT program.[135] Its non-recurrent ICT portfolio is comprised of five streams where each is generally categorised as a series of interdependent projects delivered in sequence. It is evident from this figure that Energex has forecast a large and complex series of works.

Each business case outlines the programs, projects or business activities for which the project is dependent on. It is clear how interdependent this program of works is from review of these sections. However, as EMCa notes, not all of the interdependencies are apparent from the available information.[136]

The delay of one project would likely lead to corresponding delays to subsequent projects. In particular, delays to projects early in the regulatory control period would lead to delays to the remaining program of work, pushing planned work in the final years of the period into the 2025–30 regulatory control period. Energex's assumption that some projects will start before necessary projects are completed (i.e. the Customer and Market Systems stream) further exacerbates this risk.

EMCa highlighted delivery risk as a significant issue. It considered that:[137]

- with a number of large, complex, dependent projects the phasing becomes critical; however, the phasing adopted by Energex is back-to-back, which dramatically increases the risk profile associated with delivery
- the Roadmap view does not show evidence of Hypercare windows between dependent projects to allow for any re-work or settling in of the new technologies
- in a number of dependent projects, Energex has assumed an overlap of project-and project-start times than can considerably increase the risk of a total portfolio overrun
- Energex has not adequately considered, or factored in time contingency for the above effects
- given the complexities, dependencies and what EMCa would consider to be the aggressive phasing and schedules for the 2020–25 portfolio, it is likely there will be material program slippage.

Our analysis of Energex's current ICT program suggests that it does not consistently deliver its ICT programs as forecast. For example, it has underspent by nearly $72 million (39 per cent) overall for the first four years of the current period. Furthermore, in

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133 CCP14, *Submission on Energex's Regulatory Proposal 2020-25*, 31 May 2019, p. 19.

134 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 48.

135 Energex, *7.007 ICT Plan*, January 2019, figure 4, p. 17.

136 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. 79.

137 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, pp. 80–82.

the four month period between January and May, Energex revised its estimated ICT capital spend for 2018–19 by 32 per cent. This is a significant variation in such a short period of time and highlights the difficulties associated with forecasting a deliverable ICT program, even in the short term.

EMCa highlighted evidence from the current regulatory control period that Energex underestimates project schedule requirements. EMCa noted that five of the 13 projects related to Energex's current enterprise resource planning-enterprise asset management renewal are behind schedule as of May 2019.

EMCa also noted that based on Energex's performance in the 2015–20 regulatory control period, and its understanding of the complexities involved in the in-flight projects, there is a material risk that Energex will not be able to complete its 2015–20 program of work in this period. If there is slippage, EMCa notes that this is likely to increase delivery risk for its 2020–25 ICT portfolio.[138]

Business case review

Overall, the business cases generally provide the information we would expect. However, aspects of the business cases that are lacking include:

- Energex has not adequately demonstrated the need for replacement by the time proposed. It has not provided evidence of increased costs, reduced performance, or arising capacity/functional limitations from the current system. Dynamic Analysis also questioned whether Energex's assumed timings were optimal:[139]

  > Our review of the ICT plan suggests that a key driver of renewal is to transition existing systems onto a unified enterprise platform. This raises the question of whether the assets are being replaced before the end of life to further this strategy.

- Energex's counterfactual option 'do-minimal' has not adequately considered and the costs of this option have not given.
- The options analysis is insufficient for many projects. Because of this, Energex may have overlooked opportunities to prudently defer aspects of the program and therefore implement a program which is more likely to be deliverable over the period.

Benefits of the non-recurrent ICT program

In the NPV models provided, Energex outlines the currently identified and directly attributable financial benefits forecast for each ICT project. Our review of these models shows that Energex has forecast cost saving benefits for 17 of the 18 non-recurrent projects (all except the cyber security project). Overall, Energex is forecasting $15.9 million of directly attributable savings over the 2020–25 regulatory control period.

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138 EMCa, *Review of aspects of Ergon Energy and Energex's forecast capital expenditure*, September 2019, p. 81.

139 Dynamic Analysis Pty Ltd, *Technical regulatory advice to the ECA – review of 2020–25 regulatory proposals – Energex and Ergon Energy*, June 2019, p. 49.

Energex has not provided evidence to demonstrate the benefits quantified are reasonable forecasts of the likely outcomes of these projects. Further, we have found that while Energex has made a 'top-down' productivity adjustment to its overall expenditure forecast to reflect the benefits of the ICT program, Energex has not demonstrated a tangible link between these adjustments and its ICT forecast.

Benefit calculation

Energex provided a spreadsheet that outlined the assumptions underpinning the claimed financial benefits for each project.[140] It explained that it quantified the forecast yearly cost saving benefit for each project through a calculation of forecast productivity areas and the financial value for each saving area. Energex forecast that these benefits will lead to savings in capex, opex and total overheads.

Although Energex provided some further information to support its savings[141], it has not provided sufficient evidence to demonstrate that the assumed cost-savings benefits are reasonable forecasts of the likely outcomes of these projects. Information such as consultant report, or identified benefits from similar previous historical projects, could help to quantify benefits. In the absence of sufficient evidence to demonstrate that these assumptions underlying the benefit calculations are reasonable, we have no confidence that these are reliable estimates of the likely savings these projects can achieve.

Notwithstanding these issues we discuss below the timing of, and the incorporation of, the forecast savings as quantified into the overall expenditure forecast.

Timing of the benefits identified from the non-recurrent ICT program

Energex submits that the timing realisation of the forecast savings is dependent on the sequencing, dependencies and delivery timeframes of each benefit. Energex states that they have assumed that it will achieve 50 per cent of the forecast per annum savings in the year following completion of the project, after which it will achieve 100 per cent of the saving will be achieved. This is a reasonable assumption.

Energex's calculations show that it will deliver the majority of the cost savings forecast from the ICT program in the 2025–30 regulatory control period. Over this period, Energex forecasts $64 million in savings. We expect that Energex will incorporate benefits from the completed program into its proposed forecast expenditure for the 2025–30 regulatory control period.

Incorporation of claimed benefits into the overall expenditure forecast

We asked Energex to show how it had accounted for the forecast cost savings attributable to the ICT program. Energex submitted that its forecast 10 per cent savings

[140] Energex, information request 017, 15 April 2019.

[141] Energex, information request 025, 14 May 2019.

for overheads and 3 per cent improvement to its program of works delivery reflect these ICT program benefits, plus further savings.[142]

We have investigated the extent to which Energex correctly accounts for these benefits in the expenditure forecasts.

While we recognise that Energex has made these 'top-down' adjustments to the forecast, it is unclear from the information available what contribution the non-recurrent ICT program makes to these productivity targets. We are not satisfied that Energex's proposal reflects all of the claimed benefits of the non-recurrent ICT program.

Energex's analysis shows that the benefits from the ICT program do not become material until the second last year of the 2020–25 regulatory control period, with the majority of benefits occurring in the 2025–30 regulatory control period. This comes in contrast with the assumed timing of the adjustments made to the forecast, which apply equally from the beginning of the 2020–25 regulatory control period. For example, Energex has proposed a 1.72 per cent opex productivity in each year of the regulatory control period. As such, there appears to be disconnect between the scheduling of the non-recurrent ICT program and the realisation of the proposed productivity adjustments.

It is not clear that the proposed ICT program is a fundamental input to these productivity benefits. We anticipate that in its revised proposal, EQ will more clearly demonstrate the link between its ICT program and these productivity benefits.

Arriving at our substitute estimate for non-recurrent ICT capex

EMCa advised that a prudent and efficient level of investment in non-recurrent ICT capex represents a reduction of 10 to 15 per cent to Energex's forecast (after removing contingency costs). Based on this advice, our substitute estimate applies a 15 per cent reduction to forecast non-recurrent capex, as this is the number within EMCa's range that aligns the forecast closest to EQ's combined historical expenditure.

A.6 Property

Property expenditure for Energex relates to the development, relocation, consolidation, maintenance, refurbishment and optimisation of offices, operational depots, warehouses, training facilities and other specialist facilities.

A single entity, responsible for optimising and maintaining the combined property portfolio in Queensland, undertakes property services for both Ergon and Energex. The property capex proposals for Ergon and Energex are therefore comprised of common projects allocated across each business.

[142] Energex, information request 017, 15 April 2019, p. 3, and Energex, *Supplementary Information Provided to AER*, 28 June 2019.

We have assessed the indirect costs associated with the provision of property assets as capitalised overheads. The costs discussed in this section refer to 'direct' capital costs only.

A submission from ECA expressed that they considered there are aspects of the proposal that required further review.[143] In particular, ECA requested that we review the basis for the proposed re-build of the training facility compared to refurbishment. ECA considered that Energex has not demonstrated that the existing facility is non-compliant, and considered that the costs of refurbishing should be lower than re-building. Origin Energy also encouraged us to scrutinise the property expenditure forecast.[144]

A.6.1 Draft decision

Energex has not satisfied us that its forecast property capex of $80.6 million forms part of a total capex forecast that reasonably reflects the capex criteria. We have included an amount of $57.8 million for property capex in our substitute estimate, which is a 28 per cent reduction to Energex's forecast.

Table 5.10 summarises Energex's forecast property capex and compares this with our draft decision.

Table 5.10 Draft decision on property capex ($ million, 2019–20)

Category	Proposal	Draft Decision	Difference ($)
General property programs	**$47.6**	**$47.6**	**-**
Base Capital	*$28.7*	*$28.7*	*-*
Minor Capital Works	*$18.9*	*$18.9*	*-*
Major Projects	**$24.9**	**$2.1**	**-$22.8**
Brisbane Training Facilities	*$6.8*	*$0.3*	*-$6.5*
Townsville Training Facilities	*$2.4*	*$0.1*	*-$2.3*
Banyo	*$6.9*	*$0.0*	*-$6.9*
Data Centres Strategy	*$5.2*	*$0.0*	*-$5.2*
Brisbane Office	*$3.6*	*$1.7*	*-$1.9*
Carry-over work	**$1.8**	**$1.7**	**-**
Greenslopes Depot	*$1.8*	*$1.7*	*-*
Other programs	**$6.4**	**$6.4**	**-**
Security Program	*$4.8*	*$4.8*	*-*
Control Centre Strategy	*$0.7*	*$0.7*	*-*

[143] Energy Consumers Australia, *Submission on Energex's Regulatory Proposal 2020-25*, 5 June 2019.

[144] Origin Energy, *Submission on Energex's Regulatory Proposal 2020-25*, 31 May 2019.

Category	Proposal	Draft Decision	Difference ($)
Asbestos Removal Program	*$0.9*	*$0.9*	-
Total	**$80.6**	**$57.8**	**-$22.8**

Source: AER analysis and Energex, *Response to AER Information Request 058*, 13 August 2019.

A.6.2 Energex's proposal

Energex's initial proposal includes a property capex forecast of $80.6 million.[145] This represents a 3 per cent increase from Energex's actual and estimated property capex of $78.3 million over the 2015–20 regulatory control period.

Energex has submitted that its property strategy is to deliver a safe and efficient, fit-for-purpose and customer-centric property portfolio and aims to ensure Energex has facilities in the right locations to enable the operation of a safe and efficient network. The objective is to consolidate the merged Energex and Ergon property portfolios with a particular focus on leased office space and specialist functions to deliver further savings, put downward pressure on opex costs and achieve performance efficiencies.[146]

A.6.3 Reasons for draft decision

Energex provided business cases and cost-benefit analyses for each major property project. In support of the other programs, Energex provided its Property Services Strategy document. We have reviewed this document and where required, sought further information from Energex through information requests.

General property programs

Energex proposed:

- $28.7 million for Base Capital (capital works required to address safety, compliance and operational issues" at depots, offices, residences and other sites)[147]
- $18.9 million for Minor Capital Works (replace, upgrade and renew aged, dilapidated minor and regional depots with fit-for-purpose, efficient minor facilities).[148]

Energex has submitted that it made its forecasts based on analysis of historical spend with several efficiencies implemented to ensure the minimum expenditure required to maintain a safe and compliant portfolio.

We reviewed Energex's forecasting methodology and governance arrangements for this expenditure.

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145 Energex, *Reset RIN*, January 2019.

146 Energex, *7.143 – Property Services Strategy*, January 2019, p. 12.

147 Energex, *7.143 – Property Services Strategy*, January 2019, p. 41.

148 Energex, *7.143 – Property Services Strategy*, January 2019, p. 32.

We also asked Energex to provide historical expenditure for these two programs.[149] Our analysis of this data has found that the proposed expenditure is significantly lower than historical expenditure for these programs (91 per cent reduction for Energex relative to average historical expenditure from 2011–12).

We are satisfied from our review that Energex's forecasts reasonably reflect the efficient costs of a prudent operator.

Major projects

Energex proposed $24.9 million for five major projects.

We have uncovered a number of issues consistent across the major project proposals, particularly in regard to meeting the capex criteria.

Incorrect present value cost calculation

For each project, Energex undertook an assessment of each option's present value. In doing so, Energex estimated the likely capex and opex costs required under each identified option. This analysis generally considers the trade-off between higher capex, but resulting in a forecast reduction to opex and other costs at these sites. Energex did not quantify the other benefits it expects each option to deliver.

However, in doing this analysis, Energex did not calculate present values correctly. Energex calculated the present value of each option by summing costs in nominal dollars, rather than summing the costs as their discounted values (i.e. future costs in 'present day' terms). Table 5.11 shows the present values claimed in the business cases and the present values obtained after discounting costs. The highest present value (or least cost) option is bolded under each calculation method.

Table 5.11 Claimed and actual present values for major projects

	Option	Brisbane Training	Townsville Training	Banyo	Data Centres Strategy	Brisbane Office
Claimed	Base Case	-$27.5	-$9.8	-	-$39.1	-$739.7
	Option 1	**-$24.8**	**-$9.5**	-$34.5	**-$21.7**	-$716.6
	Option 2	-$29.2	-$15.0	**-$23.7**	-	**-$685.8**
Actual	Base Case	**-$14.0**	**-$5.0**	-	-$23.5	-$426.5
	Option 1	-$18.1	-$6.6	-$25.3	**-$15.3**	-$417.4
	Option 2	-$14.5	-$10.1	**-$24.3**	-	**-$409.1**

Source: AER analysis and Energex, *Response to AER Information Request 003 - Question 15*, 27 March 2019.

After discounting expenditure values, the options with the lowest present value cost change for the Brisbane and Townsville Training Facilities projects. For these projects,

[149] AER, Information Request 009, 27 March 2019.

the 'business as usual' or base case is the identified lowest present value cost option. As such, Energex has not demonstrated that its chosen option for these sites represents the most prudent and efficient outcome. Instead, Energex's analysis would appear to demonstrate that the base case would instead be the lowest cost option.

Without quantifying the benefits for each option at these sites, Energex's cost analysis alone does not demonstrate a net positive consumer benefit from those investments, and cannot be used as the basis for its proposed investment decisions. Energex appears to undertake its benefit assessment by providing a ranking of each option against its critical operational criteria on a scale of one to five. Energex did not provide any information to support the ranking outcomes. This analysis is insufficient to adequately demonstrate the relative benefit of each option. Without quantification, the true value of the incremental benefits of the options are unknown.

Opex savings have not been evidenced to have been incorporated into forecast opex

Each of the five projects identify opex savings resulting from the proposed expenditure. This includes forecast reductions to ongoing maintenance costs, rent costs, land tax, etc. Analysis of each business case identifies that Energex is forecasting opex to reduce by a total of $13.1 million over the forecast regulatory control period.

We asked Energex to explain how it accounted for these savings in the opex forecast. It said that:[150]

> There were no step changes in opex identified in our forecasts and therefore no step changes included in the Base Step Trend modelling used to prepare our opex forecast. However, the top down management savings that we have committed to have been applied to our opex forecast through a productivity adjustment of 1.72% for Energex.

However, Energex gave no explanation as to how these opex reductions arising from the proposed investments contribute to this 1.72 per cent reduction.

We understand that these reductions are a result of a capex-opex trade-off[151] and do not relate to productivity improvements that the 1.72 per cent adjustment represents. For example, under the Brisbane Office project, Energex proposes capex to enable the disposal of the Ann Street depot, which allows for the avoidance of the associated opex costs at this site. This opex cost saving is not a productivity improvement.

We expect that if Energex reproposes each major property project as part of its revised proposal, it will adjust its forecast opex by including a negative step-change to account for the expected opex savings these projects will generate.

Training facilities

[150] Energex, information request 009, 27 March 2019, p. 17.

[151] NER, cl. 6.5.7(e) (7).

After we make corrections to the present value calculations, the data shows that the continuing current operations is the most prudent and efficient option for the Brisbane and Townsville training facilities. Further to this issue:

- Energex has stated drivers relating to safety and compliance, reduction in operational and maintenance expenditure and property asset optimisation. However, it has not provided evidence to support its claims such as quantifying the business costs and risks.
- Energex has not identified low cost solutions to address those identified issues as part of its option development, as we would expect in a robust and unbiased business case.
- We have concerns with some modelling assumptions, including:
    - the escalation rate applied to opex costs and annual preventative maintenance costs in the base case are unreasonably high
    - the opex reduction in both its cost and benefit assumptions in the preferred option for Townsville have been double-counted, which incorrectly inflates the present value of the preferred option relative to the base case.
- Energex generally does not quantify or provide supporting evidence of the expected costs and benefits.

In our view, Energex's base case is the most prudent and efficient option for both projects. We have included $0.4 million in our substitute estimate, as the base capital and upgrade programs cover most of the capital cost items included in the Townsville base case.

Banyo

Energex has not demonstrated the prudency and efficiency of this project and therefore we do not accept the proposed amount.

Energex has not undertaken an economic assessment of a 'business as usual' or base case option. Energex submits:[152]

> Due to the extent of non-compliances of the current site, no amount of capital investment will rectify and address them. Due to the significance of the non-compliances and possible safety, operational and compliance risks and potential consequences the base case is not considered a feasible option.

However, we expect Energex would list the issues, present evidence to support its claims and quantify the business cost and risks. Energex also failed to provide the quantified benefits associated with addressing the operational issues[153], however, it has not provided further information. As such, Energex has not demonstrated that the operational efficiency benefits justify the cost of the proposed investment.

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[152] Energex, *7.137 Business Case Property – Banyo Workshop*, January 2019, p. 12.

[153] Energex submitted that it would provide this analysis by 21 June 2019 in Energex, *information request 027*, 6 June 2019, p. 7.

We asked Energex whether the timing for this project is set to achieve the best economic outcomes.[154] Energex has submitted that the proposed phasing is indicative only, which suggests that it has not optimised the timing to maximise economic benefit.

Lastly, Energex has not demonstrated that maintaining the manufacturing facility within a network's core business—in contrast to common industry practice—is the most effective way to support its operations.

Data centres strategy

Energex has demonstrated the prudency and efficiency of this project and therefore we do not accept the proposed amount. We note:

- Energex states that its data centre is required to comply with the Telecommunications Infrastructure Standard for Data Centres (ANSI/TIA-942). However, the security level chosen by Energex is consistent with common industry practice. Further, we are not aware that a distributor's data centre is required to meet this standard.
- Energex has not provided quantitative assessment to demonstrate a need for the investment.
- Energex's options analysis has only considered internal solutions. It has not considered the cost and benefit of other viable options such as outsourcing. As such, there may be more prudent and efficient alternatives to those put forward by Energex.
- Energex also appears to have bundled the SCADA facility requirement and data centre expenditure together. These two facilities provide different functions and the expenditure requirements are different. This approach makes it difficult to assess the merits of individual option components for the two separate and different business needs.
- The Life Cycle Plan shows that the asset condition assessment and planned asset renewal and replacement was prepared in 2012.[155] It is not prudent to forecast a major investment based on a seven-year old asset condition assessment.
- Energex has not provided evidence to support its assumed $13.6 million capital cost for the base case option, which was forecast seven years ago and may no longer be a reliable estimate. Energex has also not included the ongoing capital cost of the building in its preferred option, which biases the options analysis.

Brisbane Office

Energex has not demonstrated the prudency and efficiency of this project. In particular, Energex has not demonstrated that the scope of works included in the cost forecast is required to meet the capex objectives.

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[154] AER, information request 027.

[155] Energex, *Response to AER Information Request 027*, 06 June 2019.

The only benefit included in the present value assessment is the avoided opex costs at Anne St. While we anticipate that other claimed benefits such as a more efficient floor space and improved team interactions should lead to efficiency gains and therefore opex reductions, Energex has not assessed and quantified these additional benefits against anticipated costs. Furthermore, Energex has not demonstrated the need or benefit of the 'Newstead capital works' costs.

Energex's cost model includes costs up to year 2035. However, if years 2036 to 2038 are included as is done for some other property projects, then additional cost would occur in the preferred option, and therefore Energex's chosen option would cost materially more than the base case.

Our substitute estimate includes an allowance of $1.7 million to enable staff to relocate from Anne St to Newstead.

Carry-over work

Energex has proposed $1.8 million for completion project work currently underway in the current period. Given the nature of this work, we accept this expenditure as part of our draft decision.

Other property programs

Energex proposed $6.4 million for other property programs. This amount appears reasonable and have included the proposed augex in our substitute forecast.

A.7 Other non-network capex

Other non-network capex includes fleet, tools and equipment. The largest component of this category is fleet, which covers expenditure for purchasing new vehicles and related items, including mounted plant. This includes light fleet (passenger and light commercial vehicles) and heavy fleet (elevated work platforms (EWPs), crane borers and other heavy commercial vehicles).

A.7.1 Draft decision

Energex has not satisfied us that its other non-network forecast of $110.2 million would form part of a total capex forecast that reasonably reflects the capex criteria.[156] We have included an amount of $94.9 million in our substitute estimate. This is a reduction of $15.4 million (14 per cent). We are satisfied that our substitute estimate would form part of a total capex forecast that reasonably reflects the capex criteria.

Table 5.12 summarises Energex's proposed other non-network capex forecast and compares this to our draft position.

[156] This excludes indirect costs as presented in Energex's proposal.

Table 5.12 Draft decision on Energex's other non-network capex ($ million, 2019–20)

Category	Proposal	Draft decision	Difference
Fleet	101.4	86.0	-15.4
Tools and equipment	8.9	8.9	-
Total	110.2	94.9	-15.4

Source: AER analysis and Energex.

A.7.2 Energex's proposal

Energex's initial proposal included $110.2 million other non-network capex.[157]

Over the current regulatory control period, Energex's actual and estimated underspend for other non-network capex relative to its allowance is 38 per cent.[158] Despite this underspend, Energex forecast fleet capex to be stable over the coming regulatory period against our current allowance.[159] It also submitted that on a 'like for like' basis (after adjusting for its changed CAM) it would not have underspent its allowance.[160]

Given Energex's changed CAM and treatment of indirect costs, we compared Energex's forecast against its estimates for 2018–19 and 2019–20. On an average yearly basis, Energex has forecast a 2.8 per cent increase.[161]

Energex identified factors influencing its forecast as the large proportion of EWPs and generators requiring replacement, offset by its decision to lengthen the replacement cycle for light commercial vehicles and to continue to extend life for its plant.[162]

A.7.3 Reasons for draft decision

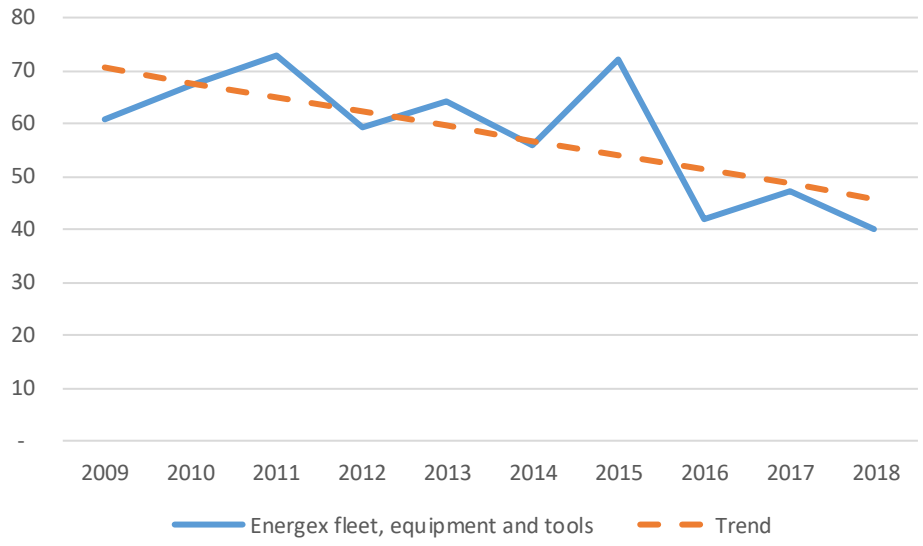
Other non-network capex trends

There has been a downward trend in overall other non-network capex for Energex over time (see

157 Energex, *Reset RIN,* January 2019.
158 On an 'as reported' basis. Energex, Information request 003 - Q21, February 2019.
159 Energex, *2020–25 regulatory proposal,* January 2019, p.79.
160 Energex, *2020–25 regulatory proposal,* January 2019, p.80.
161 Energex, *Reset RIN,* January 2019.
162 Energex, *2020–25 Regulatory Proposal,* January 2019, p.79.

Figure 5.8).

Figure 5.8 Energex other non-network capex, trend ($ million, 2019–20)



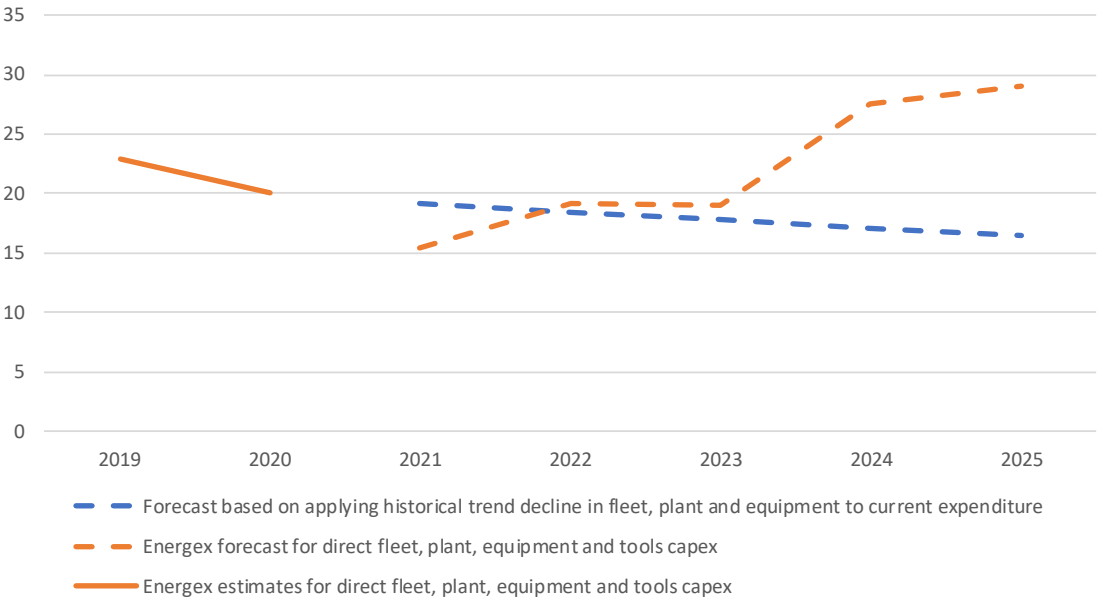
Source: AER analysis and Energex.

Note: As reported capex, using the previous CAM.

Figure 5.9 applies this trend to Energex's estimated other non-network capex from 2019–20. The capex amount shown in this chart differs from Figure 5.8 because it uses the new and current CAM and treatment of indirect costs.

Compared with the long-term trend, Energex's forecast is 19 per cent higher. This raises the concern that Energex has overstated its fleet, tools and equipment capex requirements for the 2020–25 regulatory control period.

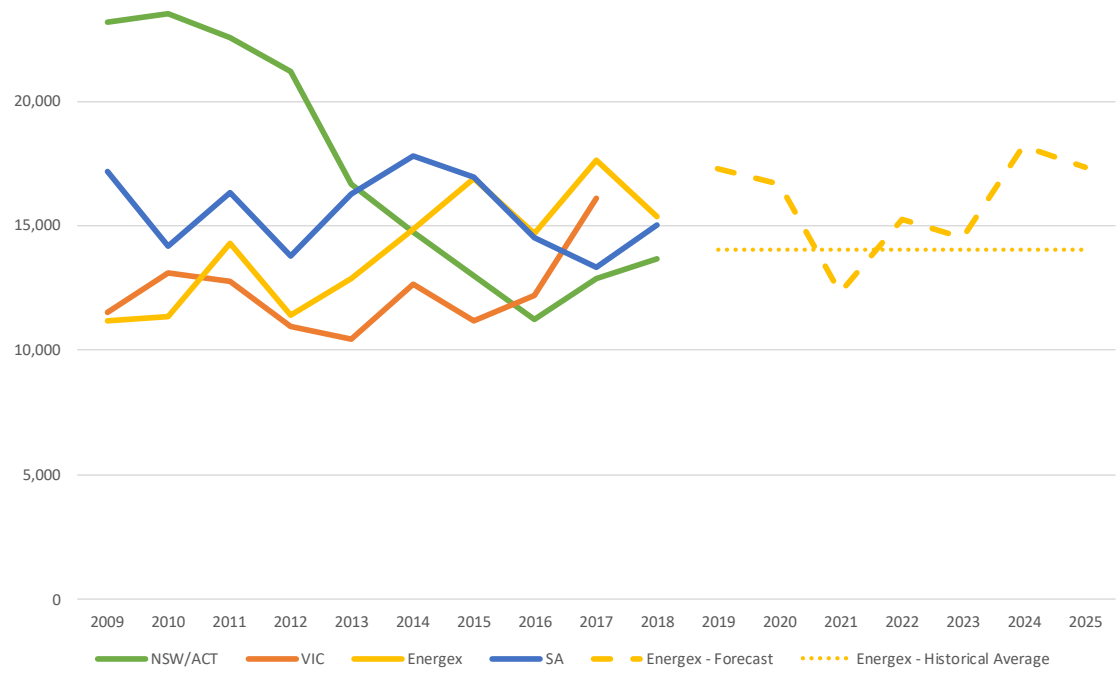
Figure 5.9 Energex forecast other non-network capex compared with trend (using new CAM and treatment of indirect costs) ($ million, 2019–20)



Source: AER analysis and Energex.

Stakeholders including CCP and Origin Energy identified the forecast increase in this category, or asked us to investigate it.[163] Dynamic Analysis considers a 20 per cent reduction is appropriate and asked us to compare fleet per field worker with other distributors.[164] On a per employee basis, Energex's motor vehicles totex in the current period is relatively high, and it has forecast an increase (see Figure 5.10 below).

Figure 5.10 Motor vehicles totex per employee by state compared with Energex ($2019–20)



Source: AER analysis and Energex.

Note: Year refers to calendar year for Victoria and financial year for the other states.

Fleet capex

We examined the model Energex used to forecast its fleet capex and found that the fleet service life and unit rate assumptions do not reflect efficient costs.

Our substitute forecast of $86.0 million reflects our changes to these assumptions:

- least cost crane borer service lives (leading to a reduction of $3.8 million)
- unit rates aligned with Energex's identified forecasting method (historical cost) (-$4.4 million)
- service lives consistent with those stated and achieved historically (-$5.5 million)

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163 CCP, *Advice to the AER on the Energex and Ergon Energy 2020-25 Regulatory Proposals,* 31 May 2019, p.8 and Origin Energy, *Letter Re: QLD Regulatory Proposal*, 31 May 2019, p.2.

164 Dynamic Analysis, *Technical regulatory advice to the ECA Review of 2020-25 regulatory proposals Energex and Ergon Energy* ,31 May 2019, p. 50. Dynamic analysis also asked us to review unit rates.

- private use of vehicles excluded from standard control services (SCS) capex (-$1.6 million).

Crane Borer Life Extension

Energex's forecast assumes replacement of its crane borers after 10 years. However, Energex's analysis indicates savings from extending life to 20 years.[165]

Energex considers its crane borers "would not likely pass engineering assessment."[166] However, Energex has not provided evidence in support of this. SA Power Networks stated that it achieves life extension in 97 per cent of cases, and the age profile of crane borers owned by another network indicates high rates of life extension.[167] It is unlikely that all crane borers would fail inspection, so a 10 year replacement cycle for all units is unlikely to reflect efficient and prudent costs.

Energex could perform inspections for a sample of crane borers to determine the percentage likely to pass.[168] Without this evidence, the most reasonable substitute estimate includes costs based on 97 per cent refurbishment (the rate achieved by SA Power Networks).

Unit Rates Adjustments

Energex stated that unit rates are “based on average historical fleet and plant replacement costs”, and submitted a transactions ledger in support.[169] We found applying unit rates based on this ledger (and Energex's updates) reduced our forecast by $4.4 million. Energex has not applied historical data to estimate unit rates to produce an unbiased forecast of future unit rates.

Our substitute uses data matching to extract unit rates information from the ledger Energex submitted, screened for outliers and escalated for CPI inflation. We have also reflected feedback provided by Energex on the application of these unit rates.[170] This more accurately reflects Energex's proposed method of basing unit rates on historical averages.

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165 Energex estimates an NPV of $183,323 per unit. Energex, *Information request 18 (part 2) - Q8 (c) NPV Analyses for Life Extensions / Replacements*, 7 May 2019, p. 6.

166 Energex, information request 36 - Q1a (i) Replacement scheduling, 1 July 2019, p. 4.

167 SA Power Networks, information request 23 (B) - Q4 (C), 1 May 2019, p.5. Our substitute also assumes refurbishment takes place at the refurbishment unit rate identified in Energex's fleet model, which excludes re-trucking costs. SA Power Networks does not include re-trucking costs in its forecasts, and Energex has not supplied evidence that re-trucking is likely to be necessary or specified a percentage of cases in which this is likely. Energex, *Fleet Modelling Response,* 3 July 2019, p. 5.

168 We asked Energex for evidence in support of its service life assumption for crane borers in two information requests (including the percentage it considered likely to pass inspection) and during a subsequent briefing. AER, information request 18 (part 2), 16 April 2019; AER, information request 36, 7 June 2019, p.1.

169 Energex, information request 3 - Q7 (A), 20 February 2019, p.13; Energex, information request 3 - Q7 (A), 20 February 2019, p.13; Energex, information request 10 - Q5 Historical Fleet Model, 27 March 2019, p.4.

170 Energex, information request 36 - Q6 Unit Rates, 28 June 2019, p. 7; Energex, *Fleet Modelling Response,* 3 July 2019, pp. 7-9.

We note the higher unit rate Energex assumes for cars incorporates its decision to purchase some electric vehicles. However, Energex's analysis indicated that electric vehicles are higher cost than others.[171] Hence we have used historical unit rates.

Consistent service lives and lead times

Energex's fleet model includes beginning of service dates and replacement quantities over 2020–25. We found inconsistencies between stated service lives and service lives implied by Energex's forecasts, so these forecasts exceed efficient costs.

Our substitute applies stated service lives consistently.[172] This includes the lead time Energex identified for heavy fleet (6 months) and forecasts of kilometres travelled.[173]

We also found that Energex's fleet model does not assume a refurbishment rate consistent with historical practice for generators, which our substitute applies.[174]

Private use accounted for

Energex permits significant private use of some vehicles. It does not adjust SCS capex for the percentage of private use: employee contributions only offset running costs.[175] It is more appropriate that Energex fund the private use capex component of these vehicles through salaries.

Energex stated that it used the statutory formula Fringe Benefits Tax method (20 per cent) to estimate private use.[176] Our substitute reduces forecast capex by 20 per cent for these vehicles, to align capex with SCS use.

Fleet stock volumes

Similar to many networks, Energex's fleet volumes have been declining.[177] In response to our information request, Energex stated that its proposal included a reduction of 79 assets, applied on a top-down basis.[178]

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171 Energex submitted a graph indicating that its chosen electric vehicle was higher cost than all other passenger vehicles until 11 years of service life, when the cost becomes similar. As it considers the efficient life for its other passenger vehicles to be 7 years, this indicates electric vehicles are higher cost when cost per year is compared between optimal service lives. The graph submitted did not include NPV analysis. Energex, information request 36 - Appendix D, 28 June 2019.

172 Energex, *Fleet Asset Management Strategy,* January 2019, pp. 15-17.

173 Energex, *Fleet Modelling Response,* 3 July 2019, p. 2.

174 Energex identifies a 38 per cent rate of generator refurbishment; see Energex, *Fleet Modelling Response,* 3 July 2019, p. 4. Refurbishment is also forecast in line with Energex's stated target percentage (90 per cent) for EWPs 14 metres or larger; see Energex, information request 3 - Q8 (B), 20 February 2019, p.14. All refurbishment rates are applied on a probabilistic basis (e.g., at 10 years, the refurbishment rate is multiplied by 90 per cent, and the replacement unit rate by 10 per cent; but at 15 years full replacement is assumed).

175 Energex, information request 36 - Q2 (b), 28 June 2019, p.5.

176 Energex, information request 36 - Q2 (b), 28 June 2019, p.5.

177 Energex, *7.002 Fleet Asset Management Strategy,* January 2019, p.7.

178 Energex, information request 18 - Q2 (B) Fleet Volumes, 30 April 2019, p. 2; Energex, information request 3 - Appendix B Energex Strategic Fleet Initiatives, 25 February 2019, slide 2.

Our substitute retains this reduction in percentage terms (7 per cent across 2020–25), which likely reflects a forecast of efficient fleet volume requirements.[179]

Tools and equipment

Energex's forecast tools and equipment capex of $8.9 million reflects prudent and efficient costs and is lower than annual average actual spend over 2015–18.[180] We have included this as part of our substitute estimate of capex.

A.8 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 (CAM) determine the allocation of overheads.

A.8.1 Draft decision

Due to calculation errors we found in Energex's modelling, and our lower estimate of direct capex, we are not satisfied that Energex's capitalised overheads forecast of $523.5 million would form part of a total capex forecast that reasonably reflects the capex criteria. We have included an amount of $538.3 million in our substitute estimate of total capex. This is an increase of $14.7 million (3 per cent). We are satisfied that our substitute estimate would form part of a total capex forecast that reasonably reflects the capex criteria.

A.8.2 Energex's proposal

Energex proposed $523.5 million ($2019–20) in capitalised overheads. This consists of:

- network overheads—indirect costs incurred in activities such as network planning and project governance that are directly related to the network
- corporate overheads—related to finance, regulation and people and culture
- non-network overheads—indirect costs incurred to operate and maintain vehicles, property occupancy and information communication and technology costs.[181]

Energex has allocated 48 per cent of its total forecast overhead costs to capex. Energex applied a base step trend methodology to arrive at its forecast, involving:

- adopting its 2018–19 estimate for capitalised overheads as the base year

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[179] After reviewing our fleet model, Energex argued that the savings it identified under this category should not be additional to our bottom-up reductions. However, as Energex originally identified these savings as a volume-based reduction, and our substitute does not adjust fleet volumes, we are not satisfied that excluding these volumetric savings as originally proposed would form part of an efficient fleet capex forecast. See Energex, *Fleet Modelling Response*, 3 July 2019, p.10.

[180] Energex, *Reset RIN (resubmit)*, April 2019.

[181] Energex, *2020–25 regulatory proposal*, January 2019, p. 81.

- step decreases in the base year, including a decrease to reflect savings expected to be delivered in 2019–20
- applying the output growth and price growth trends used in its opex forecasts, and applying a targeted 10 per cent savings for overheads over the 2020–25 regulatory control period.[182]

Energex's regulatory proposal document presented network overheads and corporate overheads as part of its capitalised overheads proposal. It included non-network overheads in the relevant non-network capex categories.[183] However, Energex's capex model treats these non-network overheads the same as capitalised overheads.

A.8.3 Reasons for draft decision

We have assessed Energex's base and trend methodology and compared it with historical overheads. We have taken a holistic approach taking into account both the trend in capex overheads and total overheads.

We have also considered Energex's goal that the productivity component reflects a 10 per cent reduction in Energex overheads over the 2020–25 regulatory control period.[184]

To arrive at our substitute we have adjusted the overheads to reflect our lower substitute of direct capex. We have also corrected a calculation error which overstated the impact of annual reductions in forecast overheads. The net impact of these adjustments results in a substitute estimate of capitalised overheads that is $14.8 million higher than Energex's forecast.

Rate of change calculation error

We have assessed Energex's base and trend methodology. Energex's base and trend methodology are reasonable. However, due to a calculation error in Energex's capex model, Energex's trend overstates the expected decrease in forecast overheads.

Table 5.13 below shows Energex's proposed overheads rate of change.

Table 5.13 Forecast overhead rate of change by component (per cent)

	2020–21	2021–22	2022–23	2023–24	2024–25
Output	1.17	1.06	0.93	0.99	0.85
Price	-0.19	0.05	0.28	0.31	0.31
Productivity	2.85	2.85	2.85	2.85	2.85
Intended rate of change	-1.90	-1.76	-1.66	-1.57	-1.71

[182] Energex, *2020–25 regulatory proposal*, January 2019, p. 81.
[183] Energex, *2020–25 regulatory proposal*, January 2019, p. 82.
[184] Energex, *2020–25 regulatory proposal*, January 2019, p. 81.

	2020–21	2021–22	2022–23	2023–24	2024–25
Actual rate of change used in forecast calculation	-1.90	-3.62	-5.22	-6.71	-8.31
Opex productivity	1.72	1.72	1.72	1.72	1.72

Source: AER analysis Energex capex model.

We identified a calculation error in Energex's capex model which resulted in an exponentially decreasing annual rate of change. For example, Energex's 2024–25 capitalised overheads is 8.3 per cent lower than its 2023–24 overheads even though its forecasting methodology indicates it should be 1.7 per cent lower. Adjusting for this error increases Energex's forecast overheads from $523.5 million to $561.1 million, an increase of $37.5 million.[185]

In its proposal Energex highlighted that it is targeting a 10 per cent decrease in overheads over the 2020–25 regulatory control period. After we have adjusted the modelling error, Energex's forecast for capitalised overheads no longer meets this objective. While we are satisfied that our substitute estimate is prudent and efficient, Energex may wish to decrease this amount for its revised proposal to reflect its forecast productivity targets.

Adjusting for our lower estimate of direct capex

In addition to the capex model correction, we also consider that there is a relationship between the quantity of direct capex and overheads. As our substitute direct capex forecast is lower than Energex's capex proposal, we would expect Energex will require less overheads for this lower volume of work. It follows that we would expect some reduction in the size of capitalised overheads.

We accept that some capitalised overheads do not vary with changes in direct capex in the short term. In response to our information request for the historical relationship between direct expenditure and overheads, Energex noted that it could not identify the proportion of capitalised overheads that are fixed or vary with direct capex. It also considered that if this information were available it would likely be consistent with our previous determination of adopting a 75 per cent fixed and 25 per cent variable ratio.[186]

In the absence of alternative information we have adopted this ratio. As our forecast of non-overhead capex categories is 13.9 per cent lower than Energex's proposal, this results in a 3.5 per cent reduction in Energex's capitalised overheads.

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[185] We have also applied the same corresponding adjustment to Ergon Energy which results in a $22.1 million decrease in overheads to Ergon Energy.

[186] Ergon Energy, information request 20, May 2019, p. 2. EQ made this comment in reference to our question about Ergon Energy's forecast; however, it is applicable to Energex as both businesses incur and allocate capitalised overheads in the same way.

B Engagement process

Information requests

To gain a better understanding of Energex's capex proposal, we requested further material through our request for information process. Between 3 May 2018 and 18 September 2018, we sent Energex 26 information requests related to its total capex forecast. Energex responded to the majority of these information requests, although there was a delay of up to three weeks for some responses.

In our information requests to Energex we have asked for cost-benefit analyses, historical data, any models used, options analysis, and quantification of costs and benefits of specific repex projects and programs.

There were some significant delays in receiving responses to information requests during the review process, although Energex did address this issue and improved its engagement with us later in the process.

Engagement

We attended a repex deep-dive session during the pre-proposal stage on 7 November 2018. We raised our concerns with Energex that its forecasting methodology did not satisfactorily quantify risks or benefits.

Following its initial proposal we engaged with Energex on an ongoing basis. The purpose of our engagement was to seek further information on the capex proposal and to provide timely feedback to Energex about our concerns. We outlined what information was required from Energex to justify its forecast.

On 16 April 2019 the General Manager of Distribution Networks emailed Energex to outline our preliminary views on its capex proposal. The email highlighted a number of concerns we had including inadequate cost-benefit analysis, lack of risk quantification, insufficient or lack of options analysis and data reconciliation issues.

On 4 June 2019 the capex team met with Energex staff to discuss our current position and existing information gaps in detail. We went through each capex driver, focusing on those areas we had concerns about, and invited Energex to provide further information or to contact us directly to talk through any issues.

Following the meeting on 4 June 2019 Energex provided additional information to address our concerns. It also requested follow-up meetings to further clarify any outstanding issues on specific capex drivers on 18 June 2019, 31 July 2019 and 7 August 2019.

C Forecast demand

Maximum demand forecasts are fundamental to a distributor's forecast capex and opex and to our assessment. We must determine whether the capex and opex forecasts reasonably reflect a realistic expectation of demand forecasts and cost inputs required to achieve the capex objectives.[187] Accurate demand forecasts are therefore important inputs to ensure efficient network investment.

C.1 Draft decision

We are satisfied that Energex's forecast reflects a realistic expectation of demand for the 2020–25 regulatory control period. Energex's forecast peak demand growth of 0.3 per cent per annum is within the range of AEMO's forecast of 0.2 to 0.4 per cent per annum over the 2020–25 period.[188]

C.2 Energex's proposal

Energex forecasts system peak demand to grow at 0.3 per cent per annum in the 2020–25 period.[189] Peak demand reached record levels in the summers of 2017 and 2018 (4814 MW and 4920 MW, respectively). Energex forecast the temperature corrected peak demand at 50 per cent probability of exceedance (POE) to grow from 4939 MW in 2018–19 to 5037 MW in 2024–25.[190] Figure 5.11 shows Energex's historical coincident summer peak demand actuals and forecast.

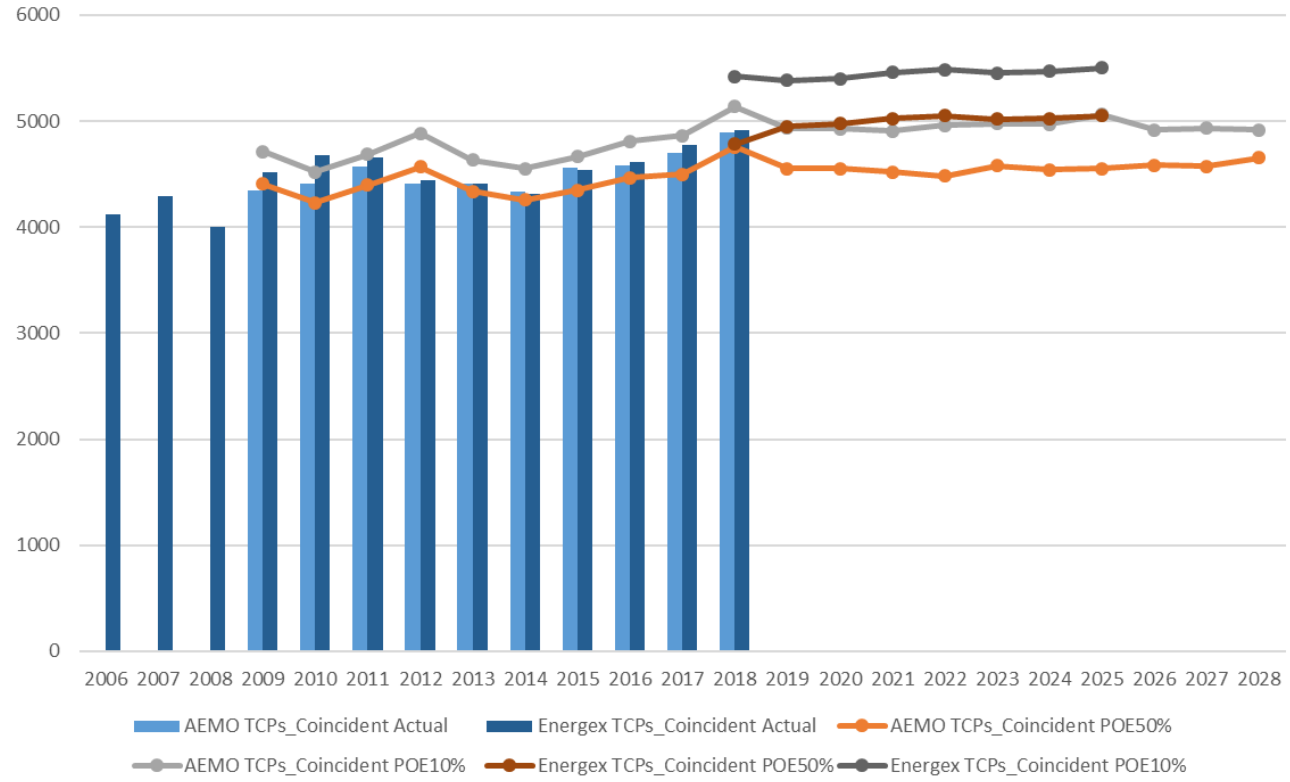
187 NER, cll. 6.5.6(c)(3), 6.5.7(c)(1)(iii).

188 AEMO's 2018 Electricity Statement of Opportunities forecast on the Energex network is 0.2 percent per annum at POE50% (coincident and non-coincident), and 0.4 per cent per annum at POE10% (coincident and non-coincident).

189 The historic and forecast demand data presented in Energex's regulatory proposal seem to be different from those reported in Reset RIN or EB RINs. They are most consistent with coincident peak demand at the transmission connection point figures in the RINs.

190 POE demand is the probability or likelihood that actual demand will meet or exceed the forecast demand. The 10% POE forecast is likely to be met or exceeded one year in 10, so considers more extreme weather conditions than a 50% POE forecast, which is expected to be met or exceeded one year in two.

Figure 5.11 Energex and AEMO coincident summer peak demand (MW)



Source: Energex, AEMO forecasting data panel.

C.3 Reasons for draft decision

To assess Energex's peak demand forecast, we have had regard to:

- AEMO's transmission connection point forecasts, which we have used as a point of comparison
- Energex's peak forecasting methodology.

Comparison between AEMO forecast and Energex forecast

While the AEMO and Energex forecasts measure coincident system peak demand for the Energex network, they are not directly comparable.[191] However, the same set of demand drivers will influence both forecasts and we expect both to show similar annual growth rates. We found that Energex's forecast of 0.3 per cent annual peak demand

[191] The Energex measure is the aggregated demand at the transmission connection point level (on the distribution side) at the time of the Energex network peak. The AEMO measure is the aggregated demand at Energex's transmission connection points with Powerlink, at the time of the Queensland-wide Energex/Ergon system peak. The Energex approach could lead to a higher forecast because it would not need to account for constraints outside its own network as may be the case with AEMO's approach. The Energex approach can also lead to a lower forecast as it is measured on the distribution side and thus subject to distribution energy losses.

growth is within the range of AEMO's forecasts (between 0.2 and 0.4 per cent per annum).

Review of Energex's peak demand forecasting methodology

Energex use a top-down econometric modelling approach to forecast system peak demand forecasts. It engaged ACIL Allen to review its forecasting methodology with respect to system maximum demand and energy delivered.[192] We agree with ACIL Allen that Energex's econometric approach to peak demand forecasting is reasonable.[193] We also found that Energex's forecasting approach is broadly in line with the AEMO's top-down approach to econometrically modelling state-wide system peak demand.[194]

We have some concerns with Energex's methodology:

- Energex's peak demand forecast for 2019 may be overstated. We expect that data on 2019 actuals will help inform the accuracy of Energex's forecast
- It is unclear that the sample period chosen for summer peak demand modelling (2008–09 to 2017–18) provides for a sufficiently robust forecast
- Energex's new approach for accounting for network demand management (NDM) initiatives and energy efficiencies does not appear to account for future impacts of NDM.

Despite these concerns, we are satisfied with Energex's methodology and its demand forecast overall.

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192 ACIL Allen Consulting, *Review of Energex's and Ergon Energy's approach to system maximum demand and energy delivered*, May 2018.

193 ACIL Allen Consulting, *Review of Energex's and Ergon Energy's approach to system maximum demand and energy delivered*, May 2018, p. 57.

194 Both Energex and AEMO consider a similar set of key drivers for demand, such as economic factors that determine demand in the long run and weather and calendar-related drivers for short-term variations in demand. Energex sources historic and forecast data on economic drivers from multiple sources including the ABS, AEMO and economic consultants, but uses forecasts from NIEIR. As with AEMO, Energex also incorporates post-modelling adjustments for some distributed energy resources (such as solar PV generations and battery storage), and block loads.

D Ex-post prudency and efficiency review

We are required to provide a statement on whether the roll forward of the regulatory asset base from the previous period contributes to the achievement of the capital expenditure incentive objective.[195] The capital expenditure incentive objective is to ensure that, where the regulatory asset base 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 regulatory asset base.[196]

The NER require that the last two years of the current regulatory control period (2018–19 and 2019–20) are excluded from past capex ex-post assessment. Accordingly, our ex-post assessment only applies to the 2015–16, 2016–17 and 2017–18 regulatory years.

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

1. the distributor has spent more than its capex allowance
2. the distributor has incurred capex that represents a margin paid by the distributor, where the margin is referable to arrangements that, in our opinion, do not reflect arm's length terms
3. where the distributor's capex includes expenditure that should have been treated as opex.[197]

D.1 Draft decision

We are satisfied that Energex's capital expenditure in the 2015–16, 2016–17 and 2017–18 regulatory years should be rolled into the RAB.

D.2 Reasons for draft decision

We have reviewed Energex's capex performance for the 2015–16, 2016–17 and 2017–18 regulatory years. This assessment has considered Energex's actual capex relative to the regulatory allowance given and the incentive properties of the regulatory regime for a distributor to minimise costs. Energex's incurred total capex below its forecast regulatory allowance in 2015–16, 2016–17 and 2017–18. Therefore, the 'overspending' requirement is not satisfied.[198] The 'capitalisation' requirement is also not satisfied.

When considering whether the 'margin' requirement has been satisfied, we had regard to Energex's relationship with SPARQ Solutions Pty Ltd (SPARQ), its ICT services provider in which it had a 50 per cent stake and hence a related party. This relationship continued until 1 July 2016 when SPARQ's ICT services were transferred to Energex.

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195 NER, cl. 6.12.2(b).
196 NER, cl. 6.4A(a).
197 NER, cl. S6.2.2A(b) to (i).
198 NER, cl. S6.2.2A(c).

SPARQ charged Energex a number of different fees for its services, including asset service fees, service level agreement and telecommunications charges. However, in our preliminary decision for the 2015–20 regulatory control period we found no evidence to suggest that this arrangement did not reflect arm's length terms.[199] Therefore, the 'margin' requirement is not satisfied.

We have also had regard to some measures of input cost efficiency as published in our latest annual benchmarking report.[200] While we recognise that there is no perfect benchmarking model, 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 shows that Energex has retained its position as the fifth most efficient distributor out of the thirteen NEM distributors with a multilateral total factor productivity score of 1.156 for 2017.[201] 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.

For the reasons set out above, we are satisfied that Energex's capital expenditure incurred in the 2015–16, 2016–17 and 2017–18 regulatory years should be rolled into the RAB.

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199 AER, *Preliminary decision – Energex determination 2015–16 to 2019–20, Attachment 6 – capital expenditure*, April 2015, p. 6-97.

200 AER, *Annual benchmarking report: Electricity distribution network service providers*, November 2018.

201 AER, *Annual benchmarking report: Electricity distribution network service providers*, November 2018, pp. 13.