DRAFT DECISION
Powerlink Queensland
Transmission Determination

2022 to 2027

Attachment 5
Capital expenditure

September 2021

AUSTRALIAN ENERGY REGULATOR

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Note

This attachment forms part of the AER's draft decision on Powerlink Queensland's transmission network revenue determination for the 2022–27 regulatory control period. It should be read with all other parts of the draft decision.

The draft decision includes the following attachments:

Overview

Attachment 1 – Maximum allowed revenue

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

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Attachment 10 – Service target performance incentive scheme

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5 Capital expenditure

Capital expenditure (capex) refers to the investment made in the transmission network to provide prescribed transmission services. This investment mostly relates to assets with long lives (30-50 years is typical) and these costs are recovered over several regulatory periods. On an annual basis, the financing and depreciation costs associated with these assets are recovered (return of and on capital) as part of the building blocks that form Powerlink's total revenue requirement.[1]

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

Powerlink has proposed $863.9 million ($2021–22) in forecast capex that it considers is required to maintain the safety, reliability and security of energy supply on its network in the 2022–27 regulatory control period. This forecast capex is primarily for the replacement of assets that are reaching the end of their life, and infrastructure that supports the delivery of electricity transmission services.

We must decide whether we are satisfied that Powerlink's forecast reasonably reflects prudent and efficient costs to maintain the safety, reliability and security of the network, and a realistic expectation of future demand and cost inputs (the capex criteria). We must make our decision in a manner that will, or is likely to, deliver efficient outcomes that benefit consumers in the long term (as required under the National Electricity Objective).

If we are not satisfied, we must set out the reasons for this decision and a substitute estimate of the total capex for the regulatory control period that we are satisfied reasonably reflects the capex criteria, taking into account the capex factors.

This attachment sets out our draft decision on Powerlink's forecast capex.

[1] NER, cl. 6A.5.4(a).

5.1 Draft decision

Our draft decision is that we are satisfied that Powerlink's proposed total forecast capex of $863.9 million ($2021–22) reasonably reflects prudent and efficient costs to maintain the safety, reliability and security of the network.

In making our draft decision we have had regard, among other things, to Powerlink's commitment to undertake a review of its approach to network asset reinvestment in 2022–23 and to implement the results of this review over the remainder of the 2022–27 regulatory control period.

Table 5.1 outlines Powerlink's forecast annual capex for the 2022–27 period.

Table 5.1 Draft decision on Powerlink's forecast capex ($2021–22, million)

	2022–23	2023–24	2024–25	2025–26	2026–27	Total
Powerlink's proposal	190.9	209.4	157.2	152.4	154.0	863.9

Source: Powerlink, *2023–27 Revenue proposal*, January 2021, p. viii.

Note: Net of disposals. Numbers may not add up due to rounding.

We do not approve a particular category of capex or specific projects, but rather an overall amount. As part of our assessment, we undertook a targeted review on specific categories of expenditure and particular projects in order to test whether Powerlink's proposed total forecast capex reasonably reflects the capex criteria.

Powerlink's capex proposal is 3 per cent lower than actual capex spending in the 2017–22 regulatory control period, and 37 per cent less than the capex spent in the 2012–17 regulatory control period.[2]

We found that Powerlink's capex forecasting methodology is a significant improvement on the methodology used for the 2017–22 period. Powerlink has moved towards using risk cost based analysis to support its economic modelling and has provided a bottom-up replacement capex forecast for over 70 per cent of its proposed capex.[3] The balance of the proposed replacement capex is based on the use of the Repex Model and trend forecasts.

Powerlink's risk cost based analysis and the supporting economic modelling are a significant step forward. We consider Powerlink's models to be well developed and that they generally provide a reasonable assessment of the expected benefits of the proposed investment.

Whilst we generally do not benchmark capex performance across transmission businesses, high-level capex metrics do not point to material inefficiencies (as detailed

[2] Powerlink, *2023–27 Revenue proposal*, January 2021, p. 5.

[3] Powerlink, *2023–27 Revenue proposal*, January 2021, p. ix.

in section 5.4). Our analysis of Powerlink's capex Regulatory Information Notice (RIN) data[4] shows that:

- Powerlink's recent capex (2014–20) is significantly lower than earlier years (2008–14)
- a key driver behind the high capex prior to 2014–15 was to meet a demand forecast that did not eventuate
- as a consequence, between 2005–14 Powerlink's regulatory asset base (RAB) grew by 91 per cent, which is significantly faster than other transmission network service providers (TNSP) at the time.

Furthermore, Powerlink's network performance is generally in line with other TNSPs in terms of outage rates, and is significantly better than most TNSPs in regard to average outage durations. However, compared to other TNSP's, Powerlink's weighted average asset age remains significantly younger, particularly the transmission lines median age, which averages around 34 years compared to over 50 years for most TNSPs.

Powerlink has undertaken excellent customer engagement and stakeholders have been positive about the consumer engagement Powerlink has delivered. Consumers have indicated support for Powerlink's engagement process and approach to the revenue proposal. However, this support was subject to the AER undertaking its technical analysis of the revenue proposal:

Powerlink's Customer Panel stated:

> "The Customer Panel considers that Powerlink's Regulatory Proposal does not represent an 'ambit claim'. Contingent upon the AER's analysis confirming that the Proposal overall is prudent and efficient, we believe that Powerlink's Regulatory Proposal is reasonable, and it has our support."[5]

Energy Users Association of Australia (EUAA) stated:

> "Importantly, unlike other network Proposals we have seen in recent years, the Powerlink Proposal is not an 'ambit claim'. They do not seem to be using it as a starting point in a negotiation to gain an otherwise higher final allowed revenue."[6]

> "While there is no real growth in opex, a 3% reduction in capex and falling nominal/real RAB, the AER still has to undertake its role under the rules to assess whether those proposed expenditures are 'prudent and efficient'."[7]

While overall, the capex proposal appears reasonable we have identified scope for further improvement in replacement expenditure asset management. In particular, we are concerned that the scope of works for some replacement projects may be

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4 Category Analysis RIN responses 2008–13, 2014, 2015, 2016, 2017, 2018, 2019, 2020; Economic benchmarking RIN responses, 2006–13, 2014, 2015, 2016, 2017, 2018, 2019, 2020; RAB has been taken from roll forward models developed as part of final regulatory decisions, as made by the AER or jurisdictional regulators, and as updated by the Australian Competition Tribunal.

5 Powerlink Customer Panel, *Submission on Powerlink's proposal and AER's issues paper*, May 2021, p. 3.

6 EUAA, *Submission, Powerlink QLD revenue proposal 22–27*, May 2021, p. 2.

7 EUAA, *Submission, Powerlink QLD revenue proposal 22–27*, May 2021, p. 3.

overstated. We consider that Powerlink's asset management approach, particularly in relation to the transmissions lines replacement expenditure, should encompass a more targeted economic risk based practice.

Powerlink's asset management practice for transmission lines adopted a compliance approach that sought to align the condition of transmission line sections so that they all reached a similar condition in 15 years' time. This practice addresses current condition issues and brings forward works to align the expected condition of the transmission line sections in 15 years' time. This practice was reflected in Powerlink's risk based economic modelling and cost estimates and drives, to a material degree, the scopes of work that we observed. Whilst we consider it reasonable to bundle works to achieve an efficient project scope, intervention earlier than required to maintain asset performance may be inefficient as it brings forward costs without matching benefits.

This category of investment accounts for $214 million ($2021–22)[8] of Powerlink's capex proposal for the five-year period, approximately 25 per cent of its total capex for the period.

Having reviewed Powerlink's approach to forecasting transmission line repex, including the adoption of an economic risk-based approach, we are concerned that Powerlink's transmission lines asset management and replacement practices may not be providing the most efficient outcome. While we have identified opportunities for improvement in Powerlink's forecasting approach that could potentially result in a lower repex forecast, it is difficult for us to construct a robust alternative forecast of transmission line expenditure that would result in significantly lower forecast for total capex. There are a number of relevant factors that would need to be taken into account such as the potential for trade-offs between capex and opex, and circumstances specific to individual transmission line sections such as access and terrain.

For this reason, we consider the review proposed by Powerlink, outlined further below, provides a further opportunity to inform stakeholders of the efficiency of the transmission line repex and enhance Powerlink's asset management and replacement strategies consistent with our 2019 Industry practice application note for asset replacement planning.

Our assessment of Powerlink's proposed transmission line repex projects, including asset management practices and economic modelling is set out in section 5.4.2.

We also have concerns with Powerlink's use of the Repex Model. We consider that the Repex Model is not well suited to use in forecasting transmission capex. This is because the model relies on large homogeneous asset populations that require significant ongoing replacement programs. We also use the Repex Model as a benchmarking tool to support our overall capex analysis, and in the transmission context, we have very limited material information on assets against which we can assess prudency and efficiency using the Repex Model.

We have discussed our concerns with Powerlink. In response, they have agreed to undertake a review of their asset reinvestment practices, report on the results of the

[8] AER analysis.

review to the public and implement the results of the review over the remainder of the 2022–27 regulatory control period. The scope of the review will address both the prudency and efficiency aspects of network asset reinvestments. They have also agreed to pass on to customers any windfall gains that are identified as part of the review.[9]

We are supportive of Powerlink's commitment because of its past improvement in asset management practices that have led to considerable reductions in capex over time, strong constructive consumer engagement that led to capex reductions for the 2022–27 period and consumer support for Powerlink's overall revenue proposal. The review and its implementation should align Powerlink's approach with industry practice, and is likely to reduce transmission line refurbishment spending during this and future regulatory periods, with consumers benefiting from the resulting RAB reduction.

With due consideration of Powerlink's overall performance across the high-level capex metrics and pending the completion of its review of asset reinvestment practices, we consider that Powerlink's capex forecast provides a reasonable basis for determining the prudent and efficient capex for maintaining the safety, reliability and security of its transmission network.

The only component that we do not support is the application of external labour cost escalators. However, as this is $4 million (0.5 per cent) of total capex, it does not make it materially different to Powerlink's proposal and we accept the proposed total forecast capex of $863.9 million ($2021–22).

Below we set out the key components of our review of Powerlink's capex forecast:

- Section 5.2 – our assessment approach
- Section 5.3 – Powerlink's proposal
- Section 5.4 – reasons for accepting Powerlink's total forecast capex, including our concerns on transmission line refurbishment capex and the use of the Repex Model.

5.2 Our assessment approach

We are guided by the National Electricity Rules (NER) in our assessment of a network service provider's capex forecasts. The NER requires us to accept the forecast of required capex included in a building block proposal if we are satisfied that the total of the forecast capex for the regulatory control period reasonably reflects the criteria set out in clause 6A.6.7(c) of the NER, taking into account the capex factors set out in clause 6A.6.7(e). In the event that we are not so satisfied, the NER guides us to substitute the service provider's forecast of required capex with one that we are satisfied does reasonably reflect the capex criteria.

[9] Powerlink – Letter to AER, *Review of Powerlink's approach to network asset reinvestments*, 8 September 2021.

The NER requires Powerlink to set out the methodology it proposes to use to prepare its forecast capex allowance before it submits its revenue proposal.[10] Powerlink must include this information in its revenue proposal.[11]

We undertook a targeted review of Powerlink's capex forecast. We focussed on repex because this was a large proportion of Powerlink's proposed capex, with transmission lines and tower refurbishment a significant part of the work over the next five years.

While we consider Powerlink's forecasting methodology is reasonable, we have some concerns with Powerlink's asset management approach and replacement strategy.

We assessed the prudency and efficiency of Powerlink's capex forecast, including the forecasting methodology, inputs and assumptions. We arranged a series of workshops to engage with Powerlink's subject matter experts and test our understanding of the material submitted, to ensure we fully understood all material matters identified by Powerlink. In response to the issues we identified Powerlink has committed to actions to improve its asset management practices.[12]

5.3 Powerlink's proposal

Powerlink's proposed forecast capex of $863.9 million ($2021–22) for the 2022–27 regulatory control period.[13] This represents a 3.1 per cent decrease compared to actual and expected expenditure for the 2017–22 period.[14] Powerlink submitted that its proposed capex decrease largely reflects:[15]

- non load-driven expenditure of $726.1 million, which is $37.5 million (4.9 per cent) lower than actual and expected expenditure for the 2017–22 period
- load-driven expenditure of $30.2 million, which is $3.4 million (13 per cent) higher than actual and expected expenditure for the 2017–22 period
- non-network expenditure of $107.7 million, which is $6.7 million (6.7 per cent) higher than actual and expected expenditure for the 2017–22 period.

Table 5.2 contains Powerlink's breakdown of its capex proposal in more detail. Replacement capex comprises the largest single category of capex accounting for $674.8 million (78.1 per cent) of total forecast capex.[16] Information and communications technology is the next largest category, accounting for $59.3 million (6.9 per cent) of total forecast capex.[17] Overall the capex forecast is $27.5 million (3 per cent) less than actual/expected expenditure for the 2017–22 period.

10 NER, cl. 6A.10.1B.
11 NER, cl. 6A.10.1.
12 Powerlink – Letter to AER, *Review of Powerlink's approach to network asset reinvestments*, 8 September 2021.
13 Powerlink, *2023–27 Revenue proposal*, January 2021, p. viii.
14 Powerlink, *2023–27 Revenue proposal*, January 2021, p. viii.
15 Powerlink, *2023–27 Revenue proposal*, January 2021, pp. 41 and 60.
16 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 60.
17 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 60.

Table 5.2 Powerlink's forecast capex categories ($2021–22, million)

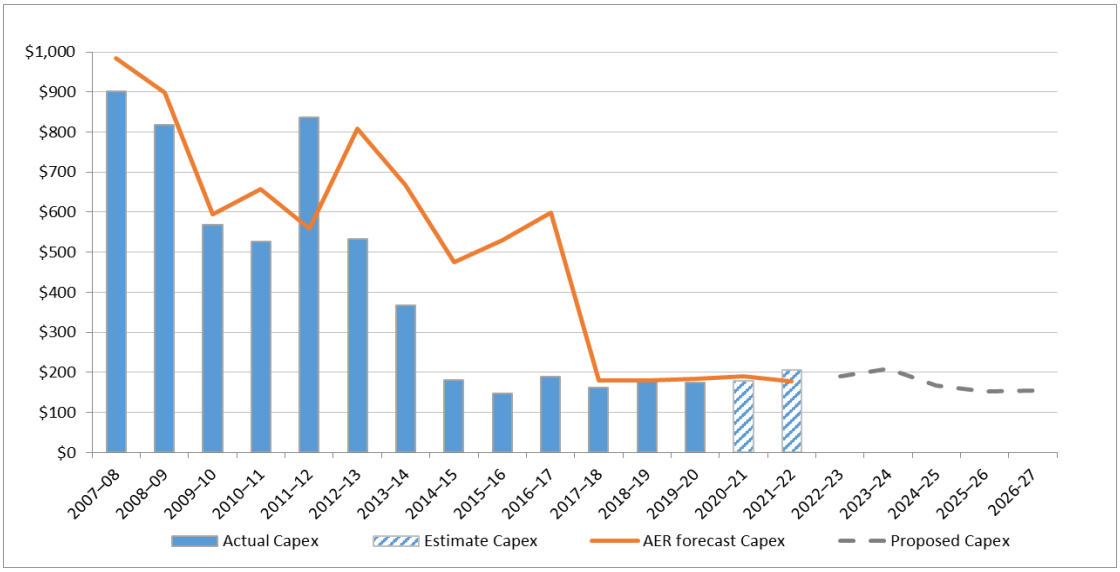
	Forecast capex ($2021–22, m)	Proportion of total capex	Change from 2017–22
Load-driven	30.2	3.5%	13.1%
Replacement	674.8	78.1%	-5.4%
System Services	22.5	2.6%	24.7%
Security/compliance	14.5	1.7%	-42.2%
Non load-driven other	14.3	1.7%	92.2%
Non-network (Information Technology)	59.3	6.9%	-17.8%
Non-network (Support the Business)	48.4	5.6%	67.5%
Total	863.9	100.0%	-3.1%

Source: AER analysis.

Note: Net of disposals. Numbers may not add up due to rounding.

Figure 5.1 shows Powerlink's proposed capex forecast compared to historic levels.

Figure 5.1 Comparison of Powerlink's past and forecast capex ($2021–22, million)



Source: AER, *Final decision*, *Powerlink transmission determination 2017–22, PTRM*, April 2017; Powerlink, *2023–27 Revenue proposal, Post-tax revenue model*, January 2021.

Powerlink attributed the reduction in proposed capex to a reduction in repex and augmentations. Powerlink's proposed capex forecast is predominantly non load-driven expenditure ($726.1 million or 84 per cent). For this category, Powerlink is proposing

$674.8 million in reinvestment in the transmission network to maintain security, reliability and quality of supply as assets continue to age.[18] Reinvestment expenditure is primarily undertaken due to end of asset life, asset obsolescence, and asset reliability or safety requirements.[19]

Powerlink's capex forecast approach involves a hybrid top-down and bottom-up method, and includes the provision of project-specific supporting justification for over 70 per cent of its forecast.[20] Powerlink's approach to forecasting replacement capex utilises a replacement expenditure (repex) model and an economic assessment framework to determine the preferred replacement options.

Powerlink submitted that its capex forecast reflects the key drivers for investment, including:[21]

- reinvestment in existing network assets, particularly to address increasing levels of corrosion across Powerlink's fleet of over 23,500 steel transmission towers
- reinvestment in cyclical replacement of digital technologies that protect and control high voltage assets due to obsolescence and lack of support and spares
- investment in network assets to meet the prescribed standards of power system technical performance as minimum demand decreases and there is greater variability in power flows across the network
- forecast load-driven capex reflecting minimal growth in peak demand. The majority of Powerlink's forecast load-driven expenditure is for easement acquisition, primarily for the Queensland/NSW Interconnector (QNI) Medium upgrade project.

Powerlink submitted that stakeholder input shaped its proposal.[22] We accept this was the case. The Consumer Challenge Panel's (CCP23) submission indicated that while Powerlink's stakeholder engagement was well received, the CCP23 has not examined the detailed costing of its capex proposals and they expect the AER to undertake this analysis.[23]

5.4 Reasons for draft decision

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

In this draft decision, we are satisfied Powerlink's total forecast capex reasonably reflects the capex criteria. Table 5.3 sets out the capex amounts by driver that Powerlink included in its total forecast capex for the 2022–27 regulatory control period.

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18 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 60.
19 Powerlink, *2023–27 Revenue proposal*, January 2021, p. viii.
20 Powerlink, *2023–27 Revenue proposal*, January 2021, p. ix.
21 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 61.
22 Powerlink, *2023–27 Revenue proposal*, January 2021, pp. 30–38.
23 CCP23, *Advice to the AER on the Powerlink transmission regulatory proposal for the regulatory determination 1 July 2022 to 30 July 2027*, May 2021, p. 46.

Table 5.3 Draft decision assessment of required capex by capex driver for the 2022–27 regulatory control period ($2021–22, million)

Category	Powerlink's proposal
Augmentation	6.7
Connection	2.4
Easements	21.1
Replacement	674.8
System Services	22.5
Security and compliance	14.5
Other non-load driven	14.3
Non-network	107.7
Labour cost escalator adjustments	-
Total capex	863.9

Source: AER analysis.

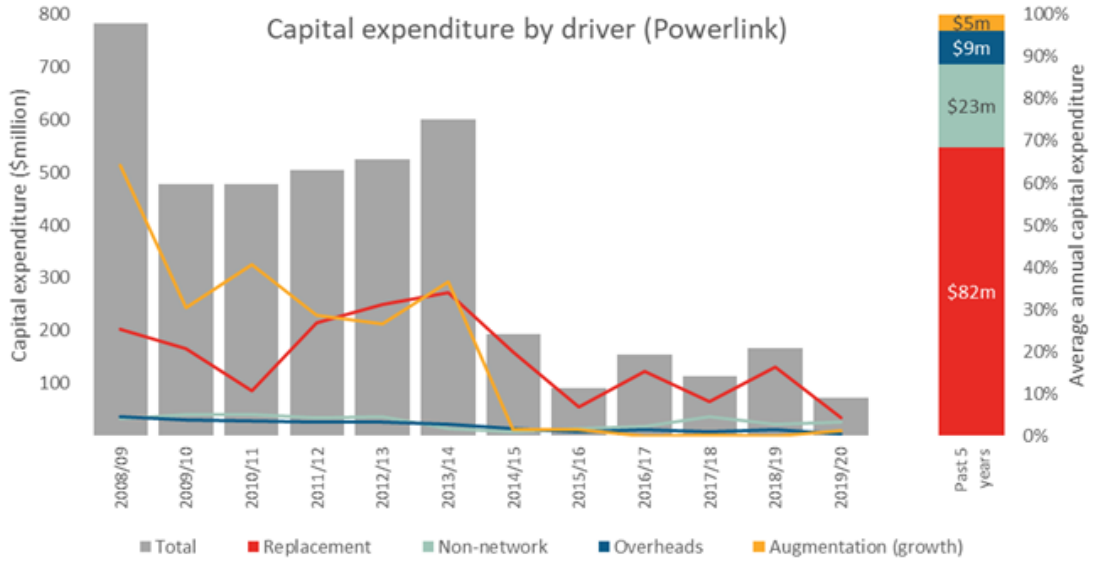
Note: Net of disposals. Numbers may not add up due to rounding.

Below are the top-down assessment of high-level capex metrics, based on RIN data[24] with other TNSPs, we considered in forming our conclusions. While we acknowledge that there are limitations in using these high-level capex metrics, we note that this supports the conclusion that on balance the overall capex forecast can be accepted given Powerlink's commitment to the review of its investment planning tools and processes.

Figure 5.2 shows Powerlink's capex profile from 2008 to 2020.

[24] Category Analysis RIN responses 2008–13, 2014, 2015, 2016, 2017, 2018, 2019, 2020; Economic benchmarking RIN responses, 2006–13, 2014, 2015, 2016, 2017, 2018, 2019, 2020; RAB has been taken from Roll forward models developed as part of final regulatory decisions, as made by the AER or jurisdictional regulators, and as updated by the Australian Competition Tribunal.

Figure 5.2 Powerlink capex profile ($2021–22, million)

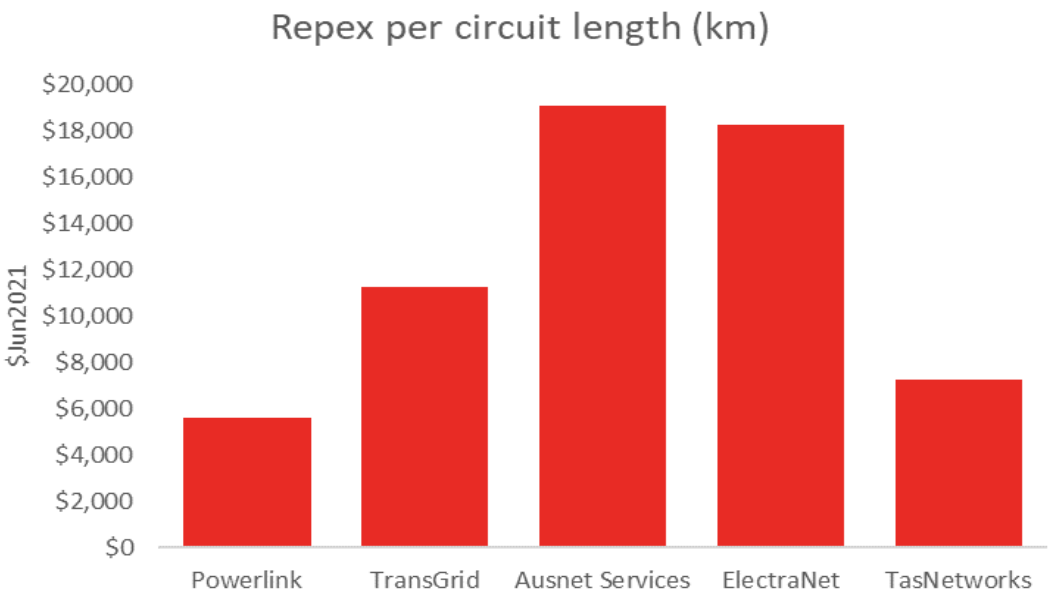


Source: AER analysis. Based on RIN data - see footnote 23.

This indicates that Powerlink's capex trend in recent years (2014–20) is significantly lower compared to previous years (2008–2014). A key driver behind the high capex prior to 2014–15 was to meet a demand forecast that did not eventuate and consequently, between 2005–14 Powerlink's RAB grew by 91 per cent, which is significantly faster than other TNSPs at the time.

Figure 5.3 shows Powerlink's repex per circuit kilometre for the period 2015–20. This indicates that Powerlink's repex per circuit length is the lowest amongst the TNSPs.

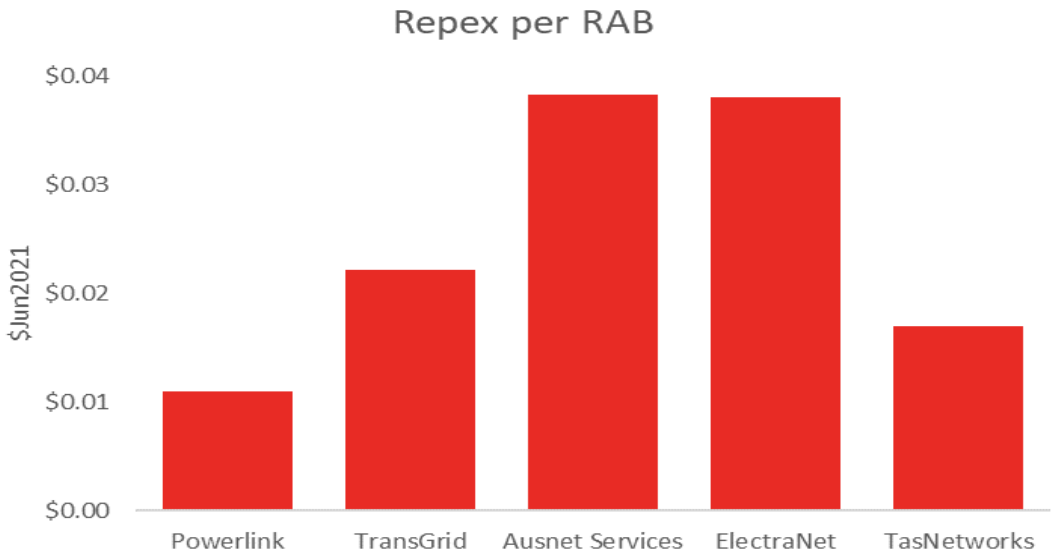
Figure 5.3 Repex per circuit kilometres for 2015–20 ($2021–22)



Source: AER analysis. Based on RIN data - see footnote 23.

Figure 5.4 shows Powerlink's repex per circuit RAB for the period 2015–20. This indicates that Powerlink's repex per RAB is the lowest amongst the TNSPs.

Figure 5.4 Repex per RAB for 2015–20 ($2021–22)



Source: AER analysis. Based on RIN data - see footnote 23.

Overall, our assessment of Powerlink's high-level capex metrics does not point to material inefficiencies and we found that Powerlink's network performance is generally inline with other TNSPs in terms of outage rates, and is significantly better than most TNSPs in regards to average outage durations.

In the sections below we set out our assessment of Powerlink's capex forecasts, reasons for accepting these (with the exception of external labour cost escalators), and concerns with the approach to transmission lines and the Repex Model.

5.4.1 Forecast non-load driven capex

Network non load-driven capex is the most significant contributor to Powerlink's forecast capital expenditure for the 2022–27 regulatory control period. Powerlink's forecast capex of $726.1 million ($2021–22) is $37.5 million (4.9 per cent) lower than the actual and estimated capex in the current regulatory period.[25] Powerlink has categorised forecast non load-driven capex into four categories: reinvestments, system services, security/compliance and other.

The majority ($674.8 million) of Powerlink's proposed expenditure is in the reinvestment category, with the remainder relating to investments to meet power system performance standards, physical security, compliance and other minor network capex.

[25] Powerlink, *2023–27 Revenue proposal*, January 2021, p. 69.

Powerlink submitted that whilst reinvestment expenditure is not as lumpy as augmentation expenditure, the reinvestment expenditure profile reflects the age profile of assets. Powerlink therefore considers that it is not recurrent in the same way as operating expenditure. Powerlink also considers that given the transmission network in Queensland developed rapidly from the late 1960's to early 1980's it expects to see a growing trend in reinvestment expenditure needs into future regulatory periods.[26]

Powerlink's reinvestment or replacement expenditure (repex) involves replacing an asset with its modern equivalent where the asset has reached the end of its economic life. Economic life takes into account the age, condition, technology or operating environment of an existing asset. In general, we classify capex as repex where the expenditure decision is primarily based on the existing asset's inability to efficiently maintain its service performance requirement.

Our role is to ensure that Powerlink's forecast capex for the 2022–27 period is consistent with the capex criteria; efficiency, prudency and a realistic expectation of the demand forecast and cost inputs required to achieve the capex objectives under the NER.

We have reviewed Powerlink's expenditure forecasting methodology for non-load driven capex, including key input assumptions, to assess whether the resulting capex forecast reasonably reflects the capex criteria. In doing so, we have drawn on our engineering and technical expertise, as well as the information provided in Powerlink's revenue proposal and submissions from stakeholders.

We consider the transmission line repex forecast requires further examination and the Repex Model is not an appropriate forecasting tool for transmission replacements. However, Powerlink are committed to addressing our concerns and will commence a review of its approach to network asset reinvestment in 2022–23.[27]

Our assessment of Powerlink's forecasting methodology and assumptions is set out below.

5.4.2 Repex bottom-up forecast

Regarding Powerlink's bottom-up repex forecast of $538.5 million ($2021–22), we assessed whether the underlying input assumptions and economic modelling were reasonable.

Our assessment found that Powerlink's capex forecasting methodology is a significant improvement on the methodology used for the 2017–22 regulatory control period. Powerlink has moved towards using risk cost based analysis to support its economic modelling and has provided a bottom-up replacement capex forecast for over 70 per cent of its proposed capex.[28]

We consider Powerlink's models to be well developed and that they generally provide a reasonable assessment of the expected benefits of the proposed investment. We

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[26] Powerlink, *2023–27 Revenue proposal*, January 2021, p. 69.

[27] Powerlink – Letter to AER, *Review of Powerlink's approach to network asset reinvestments*, 8 September 2021.

[28] Powerlink, *2023–27 Revenue proposal*, January 2021, p. 64.

submitted a number of information requests in order to clarify our understanding of Powerlink's asset management practices and repex forecasting.[29] We identified issues with Powerlink's repex forecast for transmission lines, the Repex Model and external labour cost escalators.[30]

5.4.2.1 Transmission lines

We analysed Powerlink's above-ground transmission line forecast for approximately 1,000 towers (representing 89 per cent of the transmission line repex, or $214.1 million).[31] We reviewed Powerlink's process for determining bottom-up forecasts for transmission line refits and replacements, including the asset's health index, asset management practices, risk and economic modelling.

We found that further work on asset management and replacement strategies should be undertaken, consistent with our industry practice note.[32] We identified two, related but distinct, aspects of the asset management and modelling process that could be improved. Our first concern is that Powerlink does not base its transmission line replacement scope of works on individual transmission line tower cost benefit analysis. Our second concern is that Powerlink's economic analysis does not then consider the option of a more targeted refurbishment of the individual towers. A more detailed discussion is provided below.

Health Index (HI)

The Health Index (HI) is the foundation for the evaluation of these projects from both a technical and economic perspective. The need for a project, the scope of the project, as well as the value of the risk of failure of the asset, are driven by the HI values for each of the tower structures. The HI is an 'average' of the condition of the components of the structure. It is used to determine whether components of a tower require intervention, such as replacement or refurbishment. Whilst we consider Powerlink's use of the HI is reasonable, we still have some concerns about how the HI is modelled (over time, as well as how it is calculated for transmission line structures that have been partially refurbished).

Asset management practices

Powerlink advised us that its asset management practice uses a compliance approach that 'aligns' the condition of transmission line sections so that they all reached a similar condition in 15 years' time.[33] This practice addresses current condition issues, as well as those expected within 15 years, and drives to a material degree, the scopes of work that we observed. Whilst we consider it reasonable to bundle works to achieve an

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29 AER, Information request AER IR001, 12 February 2021. AER, Information request AER IR003, 14 April 2021. AER, Information request AER IR011, 1 July 2021.

30 The two other components of repex – telecommunications and secondary systems are discussed in section 5.4.5.

31 We have used Powerlink's capex model to analyse $214 million in above-ground transmission line projects. Powerlink's transmission line reinvestment (including below-ground) is reported as $243.6 million in Table 5.7 in Powerlink of Powerlink's Revenue Proposal.

32 AER, *Industry practice application note: Asset replacement planning*, January 2019.

33 Powerlink indicated this in our meeting of 26 June 2021.

efficient project scope, intervention earlier than required to maintain asset performance is generally inefficient as it brings forward costs without matching benefits.

Modelling approach

Powerlink developed models to assess the costs and benefits of transmission line replacement capex. Powerlink's base case risk model assesses the risks associated with basic maintenance and no replacement capex for approximately 15 years. A separate model assesses the benefits of the preferred replacement capex option. In this case the preferred capex option is to bundle refurbishment needed for approximately 15 years and undertake it all at once. The benefits of Powerlink's preferred option are the risks that are avoided by undertaking the capex. A third model compares the net present value (NPV) of the preferred option against the same rebuild option with different timings.

Based on our review of Powerlink's risk and economic modelling, we consider Powerlink did not base its transmission line replacement scope of works on individual transmission line tower cost benefit analysis, but instead used a compliance based approach for all the towers in each project. That is, while Powerlink has modelled the costs and benefits of its preferred option of refitting or replacing an entire section of a transmission line, it did not utilise this information to assess or develop the scope of works for the individual towers within each project. Rather, Powerlink has chosen the lowest cost option required, based on the timing of the works, to achieve an overarching strategy of refurbishing all the towers within each project.

Risk models

Powerlink has developed quantified base case risk models that provide the counterfactual analysis essential to an informed assessment of capex. We consider that the use of this modelling in support of Powerlink's investment proposal is a notable improvement over the limited analysis provided in Powerlink's previous regulatory proposal for the 2017–22 period.

Powerlink's asset risk models assess the annual expected costs associated with unserved energy, safety, and financial risks over 30 years under a strategy of no material intervention. We consider these risk models are generally based on reasonable methods and assumptions.

Net present value (NPV) models

In response to our enquiries, Powerlink provided NPV models that consider the option of a 15 year life improvement for all towers for a transmission line project against rebuild alternatives.[34] The 15 year life improvement due to the proposed investment results in a number of towers that are already of a relatively young age being refitted. Powerlink, however, does not undertake a cost benefit analysis on a tower-by-tower basis in order to assess the efficiency of incurring the expenditure given the avoided risk cost for each tower as assessed by Powerlink.

[34] Powerlink, Response to information request AER IR001, 12 February 2021.

In light of this, Powerlink's analysis does not consider all reasonable options and specifically Powerlink has not considered the option of targeted refurbishment. That is, refurbishment that addresses the known current condition issues only, leaving the future condition issues to subsequent projects as the need actually arises. A more targeted refurbishment approach would address the known condition issues rather than bringing work forward as Powerlink proposes.

Therefore, Powerlink's models consider only its preferred option to refurbish the line now and do not provide a net benefit analysis for all the options, such as more targeted refurbishment options, against the base case.

Conclusion

Overall Powerlink's risk cost based analysis and economic modelling is a significant improvement in its forecasting approach. We consider Powerlink's transmission line models generally provide a reasonable assessment of the expected benefits of the proposed repex.

Powerlink has acknowledged our concerns and provided us with additional information in relation to a number of relevant factors that would need to be taken into account such as the potential for trade-offs between capex and opex, and circumstances specific to individual transmission line sections such as access and terrain.

While Powerlink's asset replacement practices are likely to create some inefficiencies, Powerlink is committed to reviewing its asset replacement practices.

The scope of the review, as set out by Powerlink, includes the following matters:

- the role of deterministic criteria in an economic assessment framework
- maintenance of social licence to operate over the asset life
- treatment of uncertainty, in both costs and benefits
- predictability and repeatability of the framework
- management of input quantity limits (e.g. skilled workers) in assessing prudency, including the appropriate investment timing and inclusion of compliance elements within project scopes
- the extent to which an economic risk based framework informs network asset reinvestment decisions including the identification of the efficient scope of works for reinvestment projects and of bundling works to achieve efficient delivery
- trade-offs between the ongoing costs of improved asset management systems and the available benefits that may result.

Pending the results of this review, we consider that Powerlink's transmission line repex forecast is likely to reasonably reflect its transmission line capex requirements over the next regulatory period.

5.4.3 Repex model forecast

Powerlink used a calibrated version of the AER's Repex Model to forecast $136.3 million (18.8 per cent) of their non-load driven network capital expenditure.[35] Overall, forecasts derived from the Repex Model make up approximately 15.8 per cent of Powerlink's total forecast capex for the 2022–27 regulatory control period.

Powerlink's modified version of the AER's Repex Model forecast repex requirements in the 2022–27 period for the following asset categories:[36]

- grillage foundations
- overhead transmission lines (limited use)
- substation switchgear; and
- secondary systems.

Other asset types have been excluded from the Repex Model as they have been included in the bottom-up forecasts.

Powerlink is the only TNSP using the Repex Model to forecast a significant proportion of its capex requirements. Powerlink's Repex Model has applied a range of modelling approaches, data inputs and assumptions to arrive at a capex forecast which it considers reasonably reflects a prudent and efficient forecast of required capex for the relevant asset categories.

Powerlink had previously used the Repex Model in its 2017–22 proposal. In 2015, we noted in our final Framework and Approach for Powerlink, that:[37]

- we continue to expect that the major technique used in forecasting capex will be a project based 'bottom-up' basis; and
- Powerlink may make use of the Repex Model as a basis for forecasting but if we consider it is inappropriate for a particular expenditure, Powerlink would be at risk of that proposal being rejected or substantially amended.

Our Expenditure Forecasting Assessment Guideline recognises that a range of different estimating techniques may be employed to develop an expenditure forecast.[38] Our aim is to ensure the forecasting techniques employed provide a reasonable assessment of Powerlink's prudent and efficient future capex requirements.

We reviewed Powerlink's repex forecasting methodology, including the underlying inputs and assumptions, and supporting documentation. We also drew on our own internal technical and engineering expertise as part of this assessment.

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35 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 109.

36 Powerlink, *Appendix 5.04 - Non-load driven network capital expenditure forecasting methodology*, January 2021, p. 16.

37 AER, *Final framework and approach for Powerlink – Regulatory control period commencing 1 July 2017*, 22 June 2015, p. 35.

38 AER, *Better regulation: Expenditure forecast assessment guideline for electricity transmission*, November 2013.

Regarding Powerlink's use of the Repex Model to forecast its non-load driven capex, we found:

- limitations of the model when it is applied to small asset populations where replacement volumes are disproportionately small relative to the population size
- a number of asset categories where there are no (or very few) replacements over the calibration period
- a lack of industry wide comparative data against which the model inputs and outputs can be benchmarked.

We consider the Repex Model is not suited to TNSP replacement capex forecasts. This is because the model relies on the implied statistical condition of assets within a large population of homogenous assets as revealed by a significant volume of historical replacements. Our use of the Repex Model also relies on a consistent definition of the modelled asset over a sufficient period and over a comparative cohort of network businesses to provide useful comparative benchmarking data. We consider that these conditions are not met in the context of a TNSP. For Powerlink, assessing the model inputs and outputs is further complicated by adjustments that have been made to transform the input asset data for use in the Repex Model.

Our Repex Model handbook explains that the model relies on using asset age as a proxy for the many factors that influence individual asset replacements. The timing of the replacement need must therefore be directly or implicitly linked to the age of the asset.[39] Where the timing of actual historical replacements has been driven by other factors, such as augmentation requirements, poor maintenance practices, or imprudent and inefficient asset replacement decisions, trending forward the observed asset replacement lives will perpetuate these factors into the Repex Model forecast.

We consider this can be a particular problem for electricity transmission businesses, as replacement projects tend to have a more 'lumpy' investment profile than the ongoing replacement programs more typical of distribution businesses. For example, a transmission line rebuild program may, for practical reasons, require the replacement of all towers on a particular line at the same time even though some towers are in better condition and have longer remaining useful lives than others.

We undertook analysis of Powerlink's historic repex to determine if Powerlink's repex forecast was prudent and efficient. We tested the validity of the assumption that Powerlink's historical practices represent prudent and efficient asset replacement decisions. To do this, we reviewed Powerlink's asset management replacement approaches, including a review of the health index, reliability index and condition assessments used in the risk cost modelling.

It is important to recognise that this analysis was not an ex-post review intended to determine the prudency and efficiency of historical capex, but rather a means of testing the suitability of Powerlink's Repex Model to forecast repex in the 2022–27 period.

[39] AER, *Electricity network service providers - replacement model handbook*, December 2011, pp. 6–9.

Based on our review of Powerlink's historical asset management replacement practices we have accepted the Repex Model forecast, as we are of the view that the forecast repex is in line with historic repex and the concerns we raised in relation to Powerlink using a repex model does not in itself warrant an adjustment to the overall forecast repex. However, we would like to see the use of bottom-up forecasts for transmission capex rather than a modelled approach such as the Repex Model.

5.4.4 Real cost escalation

Powerlink has applied real labour cost escalation to its capex forecast. This is to account for an expected increase in labour costs (e.g. wages) throughout the next regulatory control period. Powerlink has applied real input cost changes for internal and external labour. Internal and external labour growth is forecast at an annual average of 0.7 per cent.[40] Powerlink assumed no real growth in materials costs. [41]

The total contribution of Powerlink's real cost escalation to its proposed capex forecast of $863.9 million ($2021–22) is $7 million, of which $3 million is for internal labour and $4 million for external labour.[42]

Although we accept Powerlink's proposed internal labour escalation methodology, we used updated Deloitte forecasts for the National Utilities WPI. This is consistent with Powerlink's approach to escalating its internal labour operating expenses, which we consider in Attachment 6 of this decision. Below is our consideration of the external labour cost component that is recovered through capital expenditure in the RAB.

5.4.4.1 Powerlink's external labour cost proposal

Powerlink expects construction activity across Australia to increase consistently from 2022–23, with activity peaking in 2024–25. Powerlink submitted that this increased construction activity would result in the re-emergence of skilled labour shortages and competition for scarce labour, particularly from the mining and construction sectors, placing significant upward pressure on external labour required to deliver its capital works programme in the 2022–27 regulatory period.[43]

Powerlink's consultant BIS Oxford Economics (BIS) considers that given the growth in construction activity in Queensland is forecast to be much stronger than the national average over the next three years, Queensland construction wages are expected to outpace the national average over FY22 and FY23. Thereafter, BIS expects Queensland's construction wages will match the national average to FY27. Further, BIS expects declines in construction activity over FY26 to FY27, coupled with a general weakening across overall labour markets will then cause construction wages growth to ease in FY27.

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40 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 105.

41 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 109.

42 Powerlink, *Powerlink email response*, 12 July 2021.

43 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 107.

Powerlink's proposal is a departure from our recent distribution decisions and our AusNet Services Transmission decision.[44] Historically, we have not applied labour escalation to external contracted labour costs for distribution or transmission capex forecasts. This was because:

- there was insufficient evidence showing that existing external labour contracts included forecast escalations
- lack of bottom-up evidence to support the proposition that businesses have incurred contract price increases that align to the growth in labour price indices
- contracted services can be adjusted to address changes in the labour market and/or economic climate to manage overall contracted costs
- forecasting labour price growth for contracted services, without taking into account productivity growth, would likely overstate the growth in the price of contracted services.

Powerlink provided a number of reasons as to why it expects its external contracted costs to increase above current estimates, including growth in construction, skills shortages, and wage growth above the consumer price index.[45]

Powerlink did not provide evidence of the actual costs it expects to incur for its contracted services for transmission projects in the forthcoming regulatory period (e.g. via tendered costs for the replacement of its transmission lines and substation assets), nor evidence that these costs would increase in line with forecasts of construction industry wages. Similarly, Powerlink has not provided evidence that the forecast growth in the construction wage price index will be representative of the growth in the costs of its contracts going forward.

To the extent that some of its contracted costs are expected to increase, Powerlink could prudently mitigate these increases by adjusting its contracted services. Although we acknowledge the potential for some demand and supply pressures on suitably skilled construction workers in the near term, we consider that sufficient flexibility exists for Powerlink to manage its overall pool of contracted services to manage costs. This can involve altering the timing of individual projects and programs within its overall portfolio of works. Furthermore, Powerlink is better placed than consumers to control the price of its external contracted services. Our draft decision is to not accept the application of external labour cost escalators to Powerlink's capex forecast.

However, we have accepted the total capex because external labour cost escalation is a small component of capex, $4 million or 0.5 per cent on the overall total proposed capex of $863.9 million.

5.4.5 Telecommunications and secondary systems

We assessed whether Powerlink's proposed Telecommunications ($38.8 million) and Operational Wide Area Network (OpsWAN) ($35.6 million) repex is prudent and

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[44] AER, *Draft decision, AusNet Services transmission 2022–27, Attachment 5 – Capital expenditure*, June 2021.

[45] Powerlink, *2023–27 Revenue proposal*, January 2021, p. 108.

efficient. Powerlink reinvestment in its fleet of digital secondary systems and telecommunications assets is a significant driver of its repex.[46]

Our assessment of Powerlink's expenditure forecasts for the Telecommunications ($38.8 million) and OpsWAN ($35.6 million) repex categories is presented below.

Telecommunications

Powerlink's telecommunications network provides monitoring, control and operation of the High Voltage network.[47] This includes data communications between substations, corporate head office and the Business Continuity Centre. These networks support real time and business support services such as supervisory control and data acquisition (SCADA), protection, remote monitoring and voice services.[48]

Powerlink submitted that its equipment associated with these networks will reach the end of their manufacture and support dates between 2022 and 2029, and will become obsolete with no support from the manufacturer and limited spares available.[49]

Powerlink's preferred option is to replace current equipment with a single consolidated device to provide multiplexing, internet transport and interface requirements.[50] Based on a cost estimate from one of its vendors, Powerlink estimated a cost of $38.8 million ($2021–22) for the project.

We assessed whether the underlying input and cost assumptions for Powerlink's bottom-up repex Telecommunications forecast of $38.8 million are reasonable. Our assessment included sending an information request to Powerlink to obtain more detailed cost estimates and an understanding as to the basis of the telecommunications capex forecast.[51] We also met with Powerlink in order to further clarify our information requests.

We reviewed Powerlink's detailed costs estimates and inputs. We found that Powerlink's project procurement cost estimates provided to Powerlink by its vendors were reasonable.[52]

Operational Wide Area Network (OpsWAN)

Powerlink's OpsWAN enables data communication between its corporate head office, business continuity site, remote substations and sites, as well as being critical to the

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46 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 70.

47 Powerlink, *2023–27 Revenue proposal: CP.02771, CP.02811, CP.2812, 2813 – Telecommunications Network Consolidation – Public*, January 2021, p. 1.

48 Powerlink, *2023–27 Revenue proposal*: *CP.02771, CP.02811, CP.2812, 2813 – Telecommunications Network Consolidation – Public*, January 2021, p. 1.

49 Powerlink, *2023–27 Revenue proposal*: *CP.02771, CP.02811, CP.2812, 2813 – Telecommunications Network Consolidation - Public*, January 2021, p. 1.

50 Powerlink, *2023–27 Revenue proposal*: *CP.02771, CP.02811, CP.2812, 2813 – Telecommunications Network Consolidation - Public*, January 2021, p. 1.

51 AER, Information request AER IR011, 1 July 2021.

52 Powerlink, *2023–27 Revenue proposal*: *CP.02771, CP.02811, CP.2812, 2813 – Telecommunications Network Consolidation - Public*, January 2021, p. 23.

operation of its high-voltage network, network operation decision support and asset condition monitoring and maintenance.[53]

Powerlink's OpsWAN reinvestment project includes undertaking required work to provide functionality within the substation environment, which is currently provided by OpsWAN routers, as well as facilitating the eventual migration of all services to internet protocol.[54]

We assessed whether the underlying input and cost assumptions for Powerlink's bottom-up repex OpsWAN forecast of $35.6 million ($2021–22), are reasonable. Similar to telecommunications, our assessment included sending an information request to obtain more detailed costs estimates and explanations for the OpsWAN capex forecast, as well as meeting with Powerlink to clarify issues in relation to our information request.[55]

We were unable to determine the extent to which Powerlink was implementing a new architectural design beyond its replacement requirements. Although we had some initial concerns with Powerlink's proposed OpsWAN capex, we consider that the impact of these will not be material on the overall capex proposed. We therefore accept Powerlink's proposed OpsWAN capex.

Secondary systems

Our review of Powerlink's proposed secondary system repex forecast was based on the material provided by Powerlink, including responses to our information requests.[56] We understand that Powerlink's strategy of replacement aligns the secondary system condition at each site at a point in time, and involves limited application of a population based fleet management practice. While we had some initial reservations regarding the secondary system projects based on an age-based replacement practice, we concluded that overall the impact of these issues would not have a material impact on the capex proposed. We therefore accept Powerlink's proposed secondary system capex.

5.4.6 Security and compliance capex

Security and compliance capex is required by Powerlink to ensure compliance with amendments to various technical, safety or environmental legislation. Powerlink considers expenditure is also required to ensure the physical security (as opposed to network security) of its assets, which Powerlink regards as critical infrastructure.[57]

Powerlink forecast $14.5 million for security and compliance capex for the 2022–27 regulatory control period, compared with $25 million actual/estimated in the 2017–22

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53 Powerlink, *2023–27 Revenue proposal*: *CP.02512, CP.02513, CP.2514, 2822 – OpsWAN Replacement - Public*, January 2021, p. 1.

54 Powerlink, *2023–27 Revenue proposal*: *CP.02512, CP.02513, CP.2514, 2822 – OpsWAN Replacement - Public*, January 2021, p. 1.

55 AER, Information request AER IR011, 1 July 2021.

56 AER, Information request AER IR003, 14 April 2021, and AER, Information request AER IR011, 1 July 2021.

57 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 59.

regulatory control period, and $50.4 million actual in the 2012–17 regulatory control period. Powerlink submitted that they have maintained the same forecasting methodology for security and compliance capex as that used for the 2017–22 period. Powerlink stated that this is based on a trend of historical expenditure in this category, adjusted to remove the impact of abnormal or one-off projects.[58]

Powerlink submitted that 27 substations in its network have been assessed as requiring some upgrades to installed physical security, due to the size and importance of the load supplied, location and history of security incidents (break-ins). Powerlink noted that, where practicable, these upgrades would be progressed in conjunction with other planned works at these sites on an ongoing basis to achieve economies of scale and minimise costs.[59] We consider this may partly explain the historically low capex forecast for this category for the 2022–27 period.

Powerlink submitted that it also identified a need to improve oil containment facilities at its substations to comply with the *Queensland Environmental Protection Act 1994*, following Powerlink's notification to its environmental regulator in 2018–19 of a number of sites where oil containment facilities were inadequate to prevent hydrocarbons entering the soil.[60]

Based on Powerlink's response that provides justification for its proposed security and compliance capex, we consider that Powerlink's forecast of $14.5 million is likely to reasonably reflect its security and compliance capex requirements over the next regulatory period.

5.4.7 System services

System services capex is required by Powerlink to meet overall power system performance standards and support the secure operation of the power system. This includes the provision of system strength services and inertia services.[61] Powerlink forecast $22.5 million capex for the 2022–27 regulatory control period, compared to a forecast of $18.0 million for system services for the 2017–22 regulatory control period (including $3.5 million in 2020–21 and $14.5 million in 2021–22).[62]

Powerlink submitted capex of $22.5 million is needed to meet power system performance standards, including voltage control, inertia and system strength. Powerlink described system services as a new category of capex that was not identified at the time of its 2017–22 regulatory proposal.[63]

We requested Powerlink to provide additional information supporting its forecast for system services capex, including how the forecast was derived. In its response, Powerlink submitted that the proposed system services capex arises from two projects

58 Powerlink, Response to information request AER IR003, 28 April 2021.
59 Powerlink, Response to information request AER IR003, 28 April 2021.
60 Powerlink, Response to information request AER IR003, 28 April 2021.
61 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 59.
62 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 41.
63 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 71.

that are required to address voltage control issues in Central Queensland and South East Queensland and are expected to commence in the current regulatory period.[64]

Powerlink completed a Regulatory Investment Test for Transmission (RIT-T) on the first of these projects to address the voltage control issues in Central Queensland and is now preparing to commence the public RIT-T consultation on the investment need and proposed solution for the second of these projects to address voltage control issues in South East Queensland.

We have assessed the information that Powerlink provided to us and consider that Powerlink has justified the need for $22.5 million capex to meet power system performance standards, including voltage control, inertia and system strength.

5.4.8 Other non-load driven capex

Other non-load driven capex includes all other expenditure associated with Powerlink's network that provides prescribed transmission services, such as communications system enhancements, improvements to network switching functionality and insurance spares.[65] Powerlink forecasts $14.3 million for the 2022–27 regulatory control period, compared with $7.4 million actual/estimated in the 2017–22 regulatory control period, and $28.5 million actual in the 2012–17 regulatory control period.[66]

Powerlink's forecast is based on a trend of historical expenditure in this category, adjusted to remove the impact of abnormal or one-off projects. This category generally involves relatively low cost projects related to telecommunications and operational technologies (e.g. periodic updates/patching of the digital systems that support Powerlink's network control centre and telecommunications networks). Although Powerlink acknowledges the forecast for this category was developed without a detailed options analysis, the amount proposed is consistent with the long-term trend and is likely to be largely recurrent in nature.[67] On this basis, we consider that Powerlink's forecast of other non-load driven capex of $14.3 million is likely to reasonably reflect its capex requirements for other non-load driven capex over the next regulatory period.

5.4.9 Forecast load-driven capex

Powerlink's proposed load-driven expenditure of $30.2 million ($2021–22) for the 2022–27 regulatory control period is $3.4 million (13 per cent) higher than actual and estimated expenditure for the 2017–22 regulatory control period.[68] The majority (more than two thirds) of the forecast load-driven capital expenditure is for easement

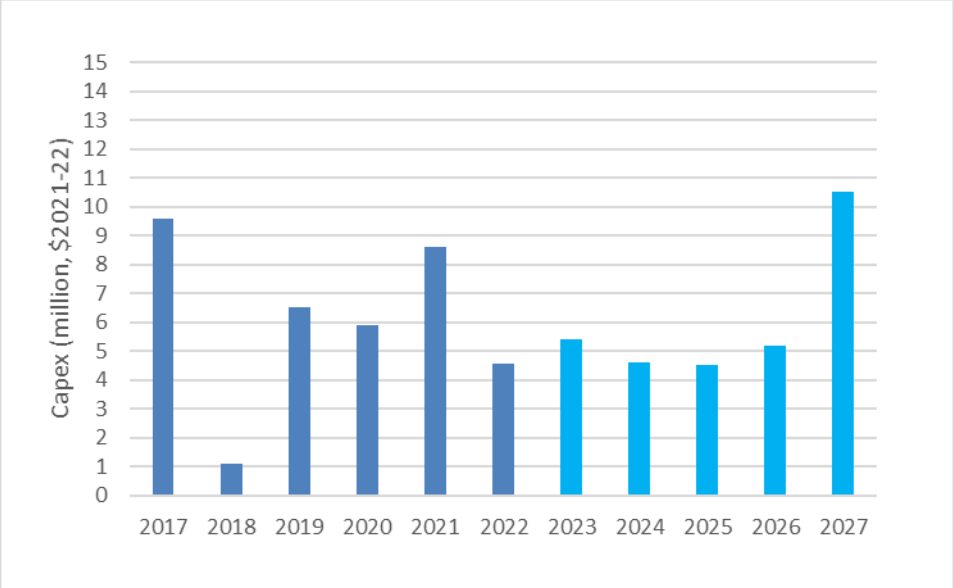
64 Powerlink, *Response to AER information request #003*, 28 April 2021.
65 Powerlink, *Revenue Proposal 2023–27*, 28 January 2021, p. 59.
66 Powerlink, *Revenue Proposal 2023–27*, 28 January 2021, p. 60.
67 Powerlink, *Response to AER information request #003*, 28 April 2021.
68 Powerlink, *Revenue proposal 2023–27*, January 2021, p. 68.

acquisition, primarily for the QNI Medium upgrade project.[69] Network augmentation expenditure remains low, reflecting minimal growth in peak demand.

Powerlink's proposed load-driven capex consists of $6.7 million ($2021–22) for augmentations, $21.1 million for easements, and $2.4 million for connections.[70] Powerlink submitted that the basis for the augex forecast is growth in maximum demand forecast is expected to be minimal over the 2022–27 period.[71]

Powerlink's trend in actual and forecast load-driven capex is shown in Figure 5.5 below. This shows that the forecast load-driven capex is similar to the load-driven capex in the current regulatory period.

Figure 5.5 Powerlink's load-driven capex ($2021–22, million)



Source: Powerlink, *2023–27 Revenue proposal*, January 2021, p. 41 and p. 60; AER analysis.

We accept the $30.2 million ($2021–22) proposed for load-driven capex on the basis that it is consistent with the historical levels and reflects the relatively flat demand trend in the current period. We consider that the forecast load-driven capex reasonably reflects the capex criteria and will enable Powerlink to achieve the capex objectives.

5.4.9.1 Augmentation capex

Powerlink requires augmentation capex for the construction of new lines, substation establishments and reinforcements or extensions of its existing network.[72] Powerlink has forecast $6.7 million for augmentation capex for the 2022–27 regulatory control period, compared to $21.3 million actual/estimated in the 2017–22 regulatory control

69 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 61.
70 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 60.
71 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 61.
72 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 59.

period, and $294.4 million actual in the 2012–17 regulatory control period.[73] Powerlink's forecast augmentation capex for the 2022–27 period is historically very low, and is based on AEMO's demand forecast of 0.7 per cent growth per annum for the next 10 years. Based on AEMO's demand forecast, Powerlink does not anticipate the need for any capital expenditure on new-shared network assets to meet increases in peak demand.[74]

Powerlink's forecast augmentation expenditure mainly relates to its ongoing program of ground clearance rectification to remove identified encroachments to its transmission lines. Powerlink submitted this would increase its network capacity and enhance the performance of an existing asset, and as such, has categorised the expenditure as augmentation.[75]

We asked Powerlink to justify this expenditure given our understanding that it is standard industry practice that it is usually the legal responsibility of the owner of the encroachment, rather than the responsibility of the owner of the easement, to remove the encroachment. Powerlink submitted that the *Electrical Safety Regulation 2013 (Queensland)* places an obligation on Powerlink to ensure the conductor clearance to ground meets the specified requirements. Powerlink submitted that following aerial laser surveys, it identified 1,699 potential non-compliances where the conductors may not meet the relevant statutory clearance. Of these, Powerlink considered that 510 were third party encroachments and have initiated actions to have these encroachments addressed by the relevant parties. This leaves 1,189 potential non-compliances with Powerlink because the non-compliances are attributable to:

- historical construction tolerances leading to encroachments. These have been identified due to improvements in survey technology since original line construction
- line creep since the original line construction.[76]

Based on Powerlink's response and its obligation to remove encroachments from power line easements, we consider that Powerlink's forecast augmentation capex of $6.7 million is likely to reasonably reflect its augmentation needs over the next regulatory period.

5.4.9.2 Connections capex

Connections capex is required by Powerlink to facilitate additional connection point capability between Powerlink and distribution network service providers or other TNSPs. Associated connection works are identified through joint planning with the relevant network service provider.[77] Powerlink has forecast $2.4 million to augment one connection point, compared to $0.1 million actual and estimated in the 2017–22

[73] Powerlink, *Revenue Proposal 2023–27*, 28 January 2021, p. 41.
[74] Powerlink, *Revenue Proposal 2023–27*, 28 January 2021, p. 69.
[75] Powerlink, *Revenue Proposal 2023–27*, 28 January 2021, p. 69.
[76] Powerlink, *Response to AER information request #003*, 30 April 2021
[77] Powerlink, *Revenue Proposal 2023–27*, 28 January 2021, p. 59.

regulatory control period, and $15.1 million actual in the 2012–17 regulatory control period.[78]

The single connection point project is to augment transformer capacity at Goodna Substation, which supplies the Springfield area south-west of Brisbane. Powerlink submitted that this area continues to experience significant residential and commercial development.[79] Powerlink provided actual and forecast peak demand data for the Goodna Substation to highlight the increase in the growth rate.[80] Powerlink's 2020 Transmission Annual Planning Report (TAPR) connection point peak demand forecasts show an average growth rate of 2.38 per cent from 2021 to 2030 for the 50 per cent probability of exceedance (PoE) peak demand forecast.[81] AEMO's Transmission Connection Point Forecasts for Queensland also forecast the area supplied from the Goodna Substation to have a large increase in load, primarily driven by projections of population growth.[82]

Based on the demand forecasting data for the Goodna Substation provided by Powerlink, we consider that Powerlink's proposed connection capex of $2.4 million is likely to reasonably reflect its connection needs over the next regulatory period.

5.4.9.3 Easements capex

Easements capex is required by Powerlink for the acquisition of transmission lines to facilitate the projected expansion and reinforcement of the transmission network. This includes land acquisitions associated with the construction of substations or communication sites.[83] Powerlink has forecast easements capex of $21.1 million for the 2022–27 regulatory control period, compared to $5.4 million actual and estimated in the 2017–22 regulatory control period, and $46.5 million actual in the 2012–17 control regulatory period. Of this, $14.3 million is for acquisition of new easements required for the QNI Medium upgrade project.[84]

Powerlink submitted that while the 2020 Integrated System Plan's (ISP) timing for the completion of the QNI Medium upgrade project is around 2032, the scale of the project is such that construction would need to commence by the late 2020s. Powerlink considers that this necessitates that line easements be acquired during the 2022–27 period.[85] We asked whether Powerlink had considered any other options to acquiring easements, including the purchase of call options on the proposed easement at a

78 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 41.
79 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 69.
80 Powerlink, Response to information request AER IR003, 28 April 2021.
81 Powerlink, *2023–27 Revenue proposal, Appendix 5.02 - 2020 Transmission Annual Planning Report - October 2020 PUBLIC*, January 2021.
82 AEMO, *Transmission Connection Point Forecasts for Queensland*, December 2020. Accessed here https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-planning-data/transmission-connection-point-forecasting/queensland.
83 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 59.
84 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 69.
85 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 69.

possible lower cost and lower risk if the actual line route has not been finalised at this early stage of QNI Medium.[86]

In response, Powerlink submitted that they have developed an approach to the use of call options that will be considered as part of any future acquisition strategy for the QNI Medium upgrade. Powerlink considers that purchasing call options may have 'possible lower cost and lower risk', but that this is not certain as it is very dependent on when call options are purchased and could potentially increase cost and risk in some cases. Powerlink submitted that purchasing call options should be delayed until after corridor approval, when the alignment and affected properties are clearly identified, but is still not certain that the project will proceed. Powerlink considers the earliest opportunity for call options would be following the approval of the corridor selection report (which confirms the basic location of the corridor and identifies likely affected properties), which may not be until 2024–25 for the QNI Medium easement. Powerlink submitted that the risk of purchasing options at an early stage (prior to detailed fieldwork) is that some properties included in the call options may not be affected, or conversely, some may be missed, with potential cost and reputational consequences.[87]

Based on Powerlink's response that supports its acquisition of new easements required for the QNI Medium upgrade, we consider that Powerlink's forecast easements capex of $21.1 million is likely to reasonably reflect its easements needs over the next regulatory period.

5.4.10 Forecast Non-network capex

Powerlink's non-network capex includes expenditure on information and communications technology (ICT), buildings and property, motor vehicles, and tools and equipment.

Powerlink proposed $107.7 million ($2021–22) for non-network capex in the 2022–27 regulatory control period, compared to $101.0 million in the previous five-year period.[88] The majority (55 per cent) of the forecast non-network capex is ICT capex of $59.3 million.[89]

We consider Powerlink's forecast for non-network capex of $107.7 million is a reasonable estimate of the efficient costs that a prudent operator would require.

Powerlink's proposed non-network capex of $107.7 million for the 2022–27 period is $6.7 million (6.7 per cent) higher than actual/forecast expenditure for the 2017–22 period.[90] Forecast ICT capex of $59.3 million is $12.8 million (17.8 per cent) lower than for the 2017–22 period.[91] The ICT capex forecast includes $30.1 million on non-recurrent and $29.2 million on recurrent expenditure.[92]

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86 Powerlink, Response to information request AER IR003, 28 April 2021.
87 Powerlink, *Response to AER information request #003*, 28 April 2021.
88 Powerlink, *Revenue proposal 2023–27*, January 2021, p. 41.
89 Powerlink, *Revenue proposal 2023–27*, January 2021, p. 60.
90 Powerlink, *Revenue proposal 2023–27*, January 2021, p. 41 and p. 60.
91 Powerlink, *Revenue proposal 2023–27*, January 2021, p. 41 and p. 60.
92 Powerlink, *Revenue proposal 2023–27*, January 2021, p. 72.

Powerlink's forecast non-network capex for the 2022–27 period is on average seven per cent higher than actual/estimated annual capex in the 2017–22 period, and on average five per cent lower than the actual annual capex in the 2012–17 period.[93] Having regard to past expenditure, we consider this indicates that Powerlink's forecast of non-network capex requirements for the 2022–27 period is likely to be reasonable.[94]

We also assessed forecast expenditure for each category of non-network capex. Analysis at this level was useful to inform our view of whether forecast capex is reasonable relative to historical levels of expenditure in each category, and to identify trends in the different category forecasts, which may warrant specific investigation. Our analysis showed that forecast expenditure for each category for the 2022–27 period is comparable to historic levels.

Our review for each non-network capex category is set out in more detail below. In summary, we are satisfied that the increase in forecast expenditure for each category of non-network capex reflects the high level drivers of expenditure in these categories and is therefore likely to reasonably reflect efficient costs. Having considered Powerlink's regulatory proposal and had regard to the capex factors,[95] we are satisfied that the total capex which reasonably reflects the capex criteria should include a forecast of $107.7 million for non-network capex.

5.4.10.1 Information and Communication Technology capex

Powerlink has forecast $59.3 million ($2021–22) for ICT capex for the 2022–27 regulatory control period.[96] This is a decrease of 17.8 per cent from the $72.1 million spent in the current period.[97]

Powerlink’s ICT capex includes $29.2 million recurrent and $30.1 million non-recurrent expenditure, and is almost entirely for periodic replacement, cyclical upgrades and non-recurrent expenditure to maintain the capability of their systems.[98]

Powerlink’s ICT capex forecast includes capex for cyber security, in order to continue to address known risks and incrementally increase its cyber security maturity level.[99] A significant driver of Powerlink’s cyber security capex is the increased maturity level requirement of the Australian Energy Sector Cyber Security Framework (AESCSF). Powerlink will extend its cyber security maturity by building on its SP-2 level and moving towards a SP-3 level based on risk and threats.[100] Powerlink submitted that its approach is to mitigate known cybersecurity risks within an appropriate managed risk profile, and prioritisation and adequate protection from threats based on the risks that these threats pose to the enterprise.[101]

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93 Powerlink, *2023–27 Revenue proposal*, January 2021, pp. 41 and 60.
94 NER, cl. 6A.6.7(e)(5).
95 Most relevantly, NER, cll. 6A.6.7(e)(5) and 6A.6.7(e)(7).
96 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 60.
97 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 41.
98 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 72.
99 Powerlink, *IT07 Cybersecurity Maturity – Public,* January 2021, p. 2.
100 Powerlink, *IT07 Cybersecurity Maturity – Public*, January 2021, p. 2.
101 Powerlink, *IT07 Cybersecurity Maturity – Public,* January 2021, p. 15

Powerlink's cost benefit analysis models indicate that there are likely benefits for the proposed ICT capex projects.[102] As Powerlink's ICT capex is decreasing, we are satisfied the trend in ICT capex expenditure is in line with the capex drivers for this expenditure category. We also accept the importance of enhancing cyber security on the network. CCP23 were also supportive of Powerlink's ICT proposal, and submitted that it is fundamental to operating a future transmission network with complex flows, constraints and supply/demand volatility.[103] For these reasons, we accept Powerlink's forecast for ICT capex. In our view, the forecast reflects the efficient costs of a prudent operator. We are satisfied that the non-network ICT capex reflects the underlying drivers of expenditure in this category.

5.4.10.2 Non-network capital expenditure – Support the Business

Support the Business capital expenditure includes all remaining non-network capital expenditure, which is broadly categorised by the following three areas; commercial buildings, motor vehicles and moveable plant (predominantly hand-held devices required to maintain the in-service assets, plant and equipment).[104]

Powerlink forecast Support the Business capex of $48.4 million ($2021–22) for the 2022–27 regulatory control period, compared with $28.8 million actual/estimated in the 2017–22 regulatory control period, and $42.2 million actual in the 2012–17 regulatory control period.[105]

Buildings

Powerlink's proposed Support the Business capex program includes a significant increase in buildings capex from the current regularity period due to deferral of its workplace accommodation strategy regarding its Virginia workplace. Powerlink determined that it was more important to defer this project in the current regulatory period and focus on enhancing its network analysis, project planning and other work practices to meet the emerging technical challenges of its energy market in the short-term. Powerlink submitted that it therefore intends to return the revenue attributable to the capital expenditure allowance for the current regulatory period for the office refurbishment project to customers in 2021–22.[106]

Powerlink's forecast capex of $28.3 million for buildings is a net figure.[107] Powerlink submitted that its forecast gross capital expenditure for buildings is $39.3 million, which is made up of:[108]

- office refit project of $36.5 million

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102 Powerlink, *IT07 Cybersecurity Maturity – Public,* January 2021, p. 3.

103 CCP23, *Advice to the AER on the Powerlink transmission regulatory proposal for the regulatory determination 1 July 2022 to 30 July 2027*, May 2021, p. 37.

104 Powerlink, *2023–27 Revenue proposal, Appendix 5.06: Guide to Non-Network Capital Expenditure - Public,* January 2021, pp. 2–3.

105 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 41.

106 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 44.

107 Powerlink, *2023–27 Revenue proposal, Appendix 5.06: Guide to Non-Network Capital Expenditure - Public,* January 2021, p. 3.

108 Powerlink, *Response to AER information request #003*, 23 April 2021.

- sustaining capital expenditure of $2.8 million.

Powerlink submitted that its analysis showed that a major refit of its office facilities would provide for more efficient use of available space. Powerlink consider that this will allow it to consolidate staff accommodation and sell the premises that are no longer required. Powerlink assessed ten options for both cost and non-cost criteria and full refurbishment was the preferred option.[109]

We consider that, given:

- similar NPVs between the three highest ranked options
- a number of benefits identified by Powerlink of a full refurbishment
- engagement of numerous external consultants to review the options
- our review of the quantity surveyors report of the cost estimate for the office refit,

Powerlink's forecast buildings capex of $28.3 million is likely to reasonably reflect its capex requirements for buildings over the next regulatory period.

Motor vehicles

Powerlink forecast $12.9 million for motor vehicles capex.[110] Powerlink's RIN shows no significant change in capex or fleet numbers for all vehicle types for the forecast period 2022–27 compared to the last two years of the current regulatory period.[111] Powerlink's Fleet Management Plan's 2020 vehicle replacement criteria are consistent with other Australian energy businesses.[112] On this basis, we consider that Powerlink's forecast motor vehicles capex of $12.9 million is likely to reasonably reflect its capex requirements for motor vehicles over the next regulatory period.

Tools

Powerlink forecast $7.2 million for tools capex.[113] Powerlink submitted that the capex for tools is predominantly for minor devices required to maintain its in-service assets, plant and equipment. Powerlink stated that this includes test kits, measuring kits, safety tools and power tools.[114]

Powerlink submitted that it forecast tools capex is based on average expenditure in previous years, which is consistent with its approach in previous revenue proposals.[115] Powerlink's Trend Based Capex Forecast model supports this claim.[116] On this basis, and given the nature of expenditure in this category, we consider that Powerlink's

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109 Powerlink, *2023–27 Revenue proposal, Future Workplace Options Analysis Report*, January 2021, p. 3.

110 Powerlink, *2023–27 Revenue proposal, Appendix 5.06: Guide to Non-Network Capital Expenditure - Public,* January 2021, p. 3.

111 Powerlink, *2023–27 Revenue proposal, RIN - Workbook 1 Forecast 2023-27, 2.6 Non-network – Public,* January 2021.

112 Powerlink, *2023–27 Revenue proposal, Fleet Management plan,* January 2021, p. 8.

113 Powerlink, *2023–27 Revenue proposal, Appendix 5.06: Guide to Non-Network Capital Expenditure - Public,* January 2021, p. 3.

114 Powerlink, Response to information request AER IR003, 23 April 2021.

115 Powerlink, Response to information request AER IR003, 23 April 2021.

116 Powerlink, *2023–27 Revenue proposal, Trend Based Capex Forecast - PUBLIC,* January 2021.

forecast tools capex of $7.2 million is likely to reasonably reflect its capex requirements for tools over the next regulatory period.

5.5 Contingent projects

Powerlink has proposed one contingent project, the Central to North Queensland Reinforcement, at an estimated capex of $52.3 million ($2021–22).[117]

Powerlink submitted that the Central West and North Queensland zones are areas where significant increases in demand and energy are plausible during the 2022–27 regulatory control period. Powerlink identified that the most significant sources for this increased load include, but may not be limited to:[118]

- development of the Copperstring transmission project to connect Mt Isa and the North West Minerals province to the National Energy Market
- development of large-scale coal mines in the Galilee Basin and associated rail and port infrastructure.

Powerlink submitted that power transfer capability into Northern Queensland is limited by thermal ratings or voltage stability limitations, depending on prevailing weather conditions and scheduled generation.[119]

Powerlink consider that as demand increases in northern Queensland, transmission congestion may occur, requiring northern Queensland generators to be constrained. Powerlink submitted that as generation costs are higher in northern Queensland due to reliance on liquid fuels, it may be economic to advance the timing of augmentation to deliver positive net market benefits. Powerlink consider that the additional load in northern Queensland that would justify the network augmentation in preference to continued network support costs is between 250 MW and 380 MW. Powerlink's lower bound assumes the out-of-merit-order generation is predominantly liquid fuelled at approximately $450/MWh, while the upper bound assumes up to 240 MW of gas-fired generation is available at approximately $60/MWh.[120]

Powerlink's proposed contingent project comprises the stringing of the second circuit of an existing double circuit line between Stanwell and Broadsound that currently has only one side strung.[121]

Powerlink proposed the following trigger events for its contingent project:[122]

- commitment of additional load in excess of 250 MW to be connected to the Central West and/or North Queensland zones that requires the dispatch of higher cost generation in northern Queensland to maintain power transfers within limits

117 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 74.
118 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 75.
119 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 75.
120 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 75.
121 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 75.
122 Powerlink, *2023–27 Revenue proposal, Appendix 5.07 – PUBLIC Contingent Projects*, January 2021, p. 6.

- successful completion of the RIT-T, including a comprehensive assessment of credible options, that demonstrates a network investment by Powerlink maximises the net market benefits while meeting Powerlink's reliability of supply obligations to North Queensland
- Powerlink Board commitment to proceed with the project subject to the AER amending Powerlink's 2022–27 revenue determination pursuant to the rules.

Contingent projects are usually significant network augmentation projects that are reasonably required to be undertaken in order to achieve the capex objectives. However, unlike other proposed capex projects, the need for the project within the regulatory control period and the associated costs are not sufficiently certain. Consequently, expenditure for such projects does not form a part of the total forecast capex that we approve in this determination. Such projects are linked to unique investment drivers and are triggered by defined 'trigger events'. The occurrence of the trigger event must be probable during the relevant regulatory control period.[123] The cost of the projects may ultimately be recovered from customers in the future if certain predefined conditions (trigger events) are met.

5.5.1 Assessment approach

We reviewed Powerlink's proposed contingent project against the assessment criteria in the NER.[124] We considered whether:

- the proposed contingent project is reasonably required to be undertaken in order to achieve any of the capex objectives[125]
- the proposed contingent project capital expenditure is not otherwise provided for in the capex proposal[126]
- the proposed contingent project capital expenditure reasonably reflects the capex criteria, taking into account the capex factors[127]
- the proposed contingent project capital expenditure exceeds the defined threshold[128]
- the trigger events in relation to the proposed contingent project are appropriate.[129]

Powerlink's revenue proposal included a description of the contingent project, proposed trigger events, project requirement, proposed capex and demonstration of

123 NER, cl. 6A.8.1(c)(5).
124 NER, cl. 6A.8.1.
125 NER, cl. 6A.8.1(b)(1).
126 NER, cl. 6A.8.1(b)(2)(i). Relevantly, a TNSP must include forecast capex in its revenue proposal which it considers is required in order to meet or manage expected demand for prescribed transmission services over the regulatory control period (see NER, cl. 6A.6.7(a)(1)).
127 NER, cl. 6A.8.1(b)(2)(ii).
128 NER, cl. 6A.8.1(b)(2)(iii).
129 NER, cl. 6A.8.1(b)(4).

rules compliance.[130] We sought additional information in respect to its proposed contingent project.[131] Powerlink's response addressed some of our concerns that its load related trigger was not sufficiently specific.

We further consulted with Powerlink and discussed our concerns that Powerlink's proposed contingent project load related trigger of 250 MW of additional load in North Queensland was too broad. Powerlink provided an amended load related trigger that included a link to a transmission flow path and addressed our concerns that the load related trigger needed to be more specifically defined.[132] We consider that this amended load related contingent project trigger is sufficiently specific and reflects the specific circumstances that would drive the need for this contingent project.

Given the uncertainty about the timing and requirements for the contingent project, at this stage, it is not necessary to assess the costs and technical scope of the project in detail. Rather, we reviewed whether the contingent project is reasonably likely to be required in the 2022–27 regulatory control period based on the materiality and plausibility of the trigger conditions. This gives us a high-level view of whether the project is reasonably required to be undertaken in the regulatory control period in order to achieve any of the capex objectives and reflect the capex criteria.

We also considered whether the proposed trigger events for the project are appropriate. This includes having regard to the need for the trigger event:

- to be reasonably specific and capable of objective verification[133]
- to be a condition or event which, if it occurs, makes the project reasonably necessary in order to achieve any of the capex objectives[134]
- to be a condition or event that generates increased costs or categories of costs that relate to a specific location rather than a condition or event that affects the transmission network as a whole[135]
- to be described in such terms that it is all that is required for the revenue determination to be amended[136]
- to be a condition or event, the occurrence of which is probable during the 2022–27 period but the inclusion of capex in relation to it (in the total forecast capex) is not appropriate because either:
    - it is not sufficiently certain that the event or condition will occur during the regulatory control period or if it may occur after that period or not at all, or

130 Powerlink, *2023–27 Revenue proposal*, January 2021, pp. 73–75; Powerlink, *2023–27 Revenue proposal, Appendix 5.07 – PUBLIC Contingent Projects*, January 2021.

131 Powerlink, Response to information request AER IR003, Question 1 Confidential, 5 May 2021.

132 Powerlink, *email response,* 30 June 2021 and Powerlink, email response, 21 July 2021

133 NER, cl. 6A.8.1(c)(1).

134 NER, cl. 6A.8.1(c)(2).

135 NER, cl. 6A.8.1(c)(3).

136 NER, cl. 6A.8.1(c)(4).

- assuming it meets the materiality threshold, the costs associated with the event or condition are not sufficiently certain.[137]

5.5.2 Draft decision

5.5.2.1 Position on contingent project

We consider that Powerlink's proposed contingent project should be classified as a contingent project for the 2022–27 regulatory control period. This project may be reasonably required to be undertaken in order to maintain the quality, reliability and security of supply, or to meet or manage the expected demand for transmission services over the 2022–27 period.[138] Although we consider that the trigger events for the proposed contingent project are generally appropriate, we consider that the load related event should be more specifically defined. Our review of the requirements for the proposed contingent project is set out below.

CCP23 also submitted that it is satisfied that the proposed contingent project may be reasonably required in order to meet expected demand for transmission services and/or reliability over the 2022–27 period, subject to the assessment of whether the trigger events are appropriate.[139]

5.5.2.2 Review of trigger events

We consider Powerlink's triggers to be appropriate because they are specific and verifiable, in particular:

- the successful completion of a RIT-T process may demonstrate that a project is reasonably necessary in order to achieve the capex objectives and reasonably reflects the capex criteria
- the commitment of additional load that will require an upgrade of capacity will likely increase costs in a specific location due to additional load requiring capacity upgrades.

However, for us to be satisfied with these trigger events, we considered that the wording of the load related trigger should be amended by referring specifically to the connection applications from spot loads which would eliminate the possibility of organic load growth acting as a trigger event.

We consulted with Powerlink on the wording of the load related trigger. Powerlink acknowledged the need to make the load related trigger more specific and agreed to the following amended load related trigger:[140]

Customer commitment for additional load in excess of 250 MW to be connected to the Central West and/or North Queensland zones that results in higher power flows on the

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137 NER, cl. 6A.8.1(c)(5).

138 NER, cl. 6A.8.1(b)(1).

139 CCP23, *Advice to the AER on the Powerlink transmission regulatory proposal for the regulatory determination 1 July 2022 to 30 July 2027*, May 2021, p. 50.

140 Powerlink, *Powerlink email response*, 21 July 2021.

275kV feeders Stanwell to Broadsound, Bouldercombe to Broadsound, and Bouldercombe to Nebo northwards from Stanwell and Bouldercombe substations and requires the dispatch of higher cost liquid fuel or gas generation in northern Queensland to maintain power transfers within limits (that is, "out-of-merit" generation either through network support arrangements or constrained/directed on by AEMO).

Our proposed amendment to the load related trigger is consistent with the CCP23 submission, which requested the AER consider whether this trigger event should be defined more specifically, such that an increase of 250 MW of demand anywhere on the network does not automatically initiate the contingent project.[141]

Our proposed amendment to Powerlink's load related trigger has three conditions:

1. a customer with over 250 MW load commits to connect in the nominated network area
2. the load on the three northern feeders increases by at least the 250 MW amount that the customer has committed to add to the network; and
3. that the more than 250 MW of additional load noted in point 2 necessitates higher cost generation in the Northern Queensland area.

The first condition excludes organic load growth from the trigger by requiring a customer commitment of at least 250 MW of additional load. The second condition ensures that this load is supplied via the three transmission lines that Powerlink considers will be constrained. This is because other sources of generation such as renewables anticipated for the Northern area may offset the constraint on those transmission lines. The third condition adds to the second by requiring evidence that this additional load has, or will, result in the dispatch of higher cost generation in the Northern area that Powerlink submitted is either gas or liquid fuel.[142]

We were also concerned that organic load growth in the Northern area as Powerlink's demand forecasts suggest could act to trigger this project. As Powerlink's purpose for the contingent project is the management of the potential connection of mine loads, rather than organic load growth[143] we have made this more explicit.

We consider that there is also a risk that any load increases in the area will be accompanied by growth in renewables. The growth in renewables may offset any additional load, such that the incremental growth in load on the three Northern feeders does not exceed 250 MW. The growth in renewables may also displace the higher cost generation in the Northern area. Whilst the impact of the growth in renewables should be assessed in the RIT-T, the RIT-T may ignore the proposed renewable generation as it is not 'committed' and so the additional renewable generation impact is not assessed. The purpose of our proposed additional wording in the trigger is to reduce this risk by requiring evidence in the trigger that higher cost generation is required in the region.

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141 CCP23, *Advice to the AER on the Powerlink transmission regulatory proposal for the regulatory determination 1 July 2022 to 30 July 2027*, May 2021, p. 52.

142 Powerlink, *2023–27 Revenue proposal, Appendix 5.07 – PUBLIC Contingent Projects*, January 2021, p. 4.

143 Powerlink, *2023–27 Revenue proposal*, January 2021, p. 75.

We are satisfied that the trigger events set out below meet the NER requirements for Powerlink's proposed contingent project:

- Customer commitment for additional load in excess of 250 MW to be connected to the Central West and/or North Queensland zones that results in higher power flows on the 275kV feeders Stanwell to Broadsound, Bouldercombe to Broadsound, and Bouldercombe to Nebo northwards from Stanwell and Bouldercombe substations and requires the dispatch of higher cost liquid fuel or gas generation in northern Queensland to maintain power transfers within limits (that is, "out-of-merit" generation either through network support arrangements or constrained/directed on by AEMO)
- successful completion of the RIT-T, including a comprehensive assessment of credible options, that demonstrates a network investment by Powerlink maximises the net market benefits while meeting Powerlink's reliability of supply obligations to North Queensland; and
- Powerlink Board commitment to proceed with the project subject to the AER amending Powerlink's 2022–27 revenue determination pursuant to the rules.

5.6 Ex-post statement of efficiency and prudency

We are required to provide a statement on whether the roll forward of the regulatory asset base from the previous regulatory control period contributes to the achievement of the capital expenditure incentive objective.[144] 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 value of the regulatory asset base.[145]

We have reviewed Powerlink's capex performance for the 2017–18 to 2019–20 regulatory years. This assessment considered Powerlink's out-turn capex relative to the regulatory allowance given the incentive properties of the regulatory regime for a transmission business to minimise costs. Where Powerlink has spent more than its capex allowance for these years, we can review the efficiency of this overspend and make a determination on the capex that should be rolled into the RAB.

Table 5.4 shows Powerlink's actual net capex against the forecast regulatory allowance for this period, including the three years of the ex post review period. This shows that Powerlink has spent less than its capex allowance. Powerlink submitted that the reason its total actual capex is forecast to be lower than our capex allowance for the 2017–22 regulatory control period is primarily due to some delays in the delivery of its capital works due to COVID-19, as well as lower non load-driven capital expenditure due to low demand growth and the emergence of system strength issues. Powerlink also submitted that this underspend has been offset, at least in part, by additional capital expenditure on ground clearance rectification works.[146] On this basis, we are satisfied that Powerlink's actual capex should be rolled into the RAB.

144 NER, cl. 6A.14.2(b).

145 NER, cl. 6A.5A(a).

146 Powerlink, Revenue proposal 2023–27, January 2021, p. 75.

Table 5.4 Powerlink's actual net capex versus capex allowance – 2017–22 regulatory control period ($2021-22, million)

Category	2017–18	2018–19	2019–20	2020–21	2021–22	Total
Total net capex allowance	175.7	176.3	179.6	186.8	174.7	893.1
Total net actual capex	158.7	175.0	172.6	178.6 (forecast)	206.4 (forecast)	891.3 (forecast)
Capex overspend / (underspend)	(17.0)	(1.3)	(6.9)	(8.3) (forecast)	31.7 (forecast)	(1.8) (forecast)

Source: Powerlink, AER.

Note: Numbers may not add up due to rounding.

A. Shortened forms

Shortened form	Extended form
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
BIS	BIS Oxford Economics
Capex	Capital expenditure
CCP23	Consumer Challenge Panel, sub-panel 23
HI	Health Index
ICT	Information and communications technology
MW	Megawatt
MWh	Megawatt hours
NER	National Electricity Rules
NPV	Net present value
NSP	Network service provider
OpsWAN	Operational Wide Area Network
PTRM	Post-tax revenue model
QNI	Queensland/NSW Interconnector
RAB	Regulatory asset base
Repex	Replacement expenditure
RIT-T	Regulatory Investment Test for Transmission
RIN	Regulatory information notice
TNSP	Transmission network service provider