Regulatory Proposal 2024-2029

Supporting document to Attachment 21 – Distribution pricing methodology

Powering a Bright Future

Contents

Note:

This supporting document forms part of TasNetworks' regulatory proposal for the 2024-2029 regulatory control period. This document supports Attachment 21 - TasNetworks' Tariff Structure Statement (TSS) and should be read in conjunction with that attachment.

21. Distribution pricing methodology

Introduction

The purpose of this document is to provide information on TasNetworks' forecasting and pricing methodology that underpins the development of our distribution network tariffs.

21.1. Document structure

Section	Title	Purpose
A	**Customer connection forecasts**	Describes how TasNetworks derived its customer connection forecasts for the 2024-2029 regulatory control period and outlines the economic drivers behind the residential and commercial projections.
B	**Long run marginal cost**	Describes TasNetworks approach to calculating its long run marginal costs, including a review of different long run marginal cost methodologies and assessments of our program of work.

TasNetworks’ connection forecasts

Customer connection forecasts

21.2. Background

TasNetworks requires forecasts of new network connections to assist with forecasting and planning processes for future Programs of Works (**POW**) and as an input into consumption and demand forecasts which are used for pricing purposes. For past revenue resets, TasNetworks projected new customer connections using an econometric model based on linear regressions between customer connections and annual changes in the Tasmanian Gross State Product (**GSP**). TasNetworks has reviewed its modelling approach and enhanced the model for the upcoming 2024-2029 regulatory control period.

21.3. Forecasting methodology

21.3.1. Modelling approach

TasNetworks has retained a linear regression approach for R24. However, several refinements were implemented in the current forecasting model:

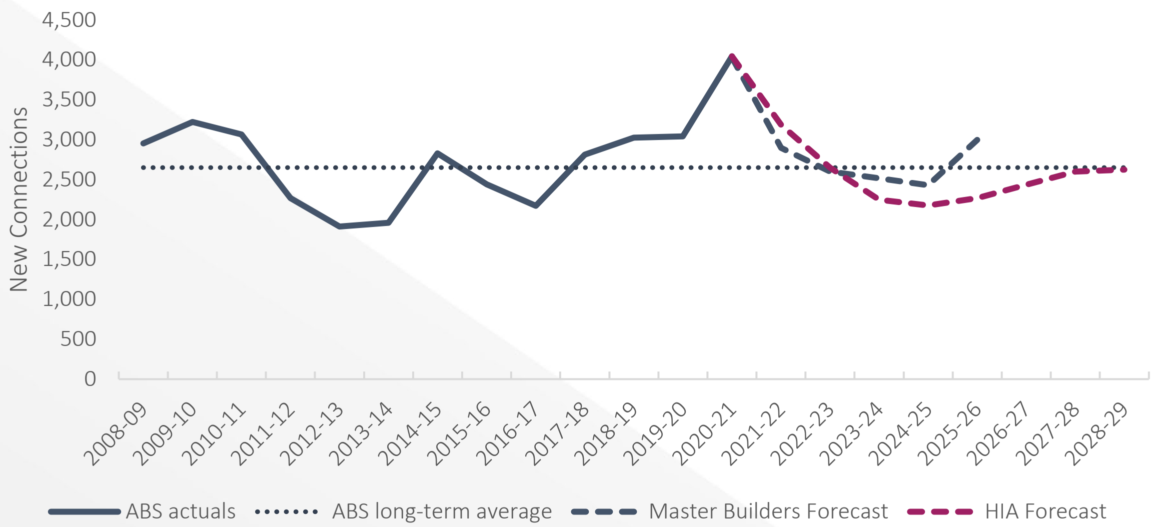
- The forecasts were aggregated into total residential and total commercial connections respectively.
- Economic forecasts from the Master Builders Association (**MBA**) were used as a consistent data source for both residential and commercial forecasts:
  - residential forecasts were based on MBA's dwelling start forecasts; and
  - commercial forecasts were based on MBA's forecasts of non-residential building activity.

The forecasting models were derived by correlating economic data from the Australian Bureau of Statistics (**ABS**) and historical customer connections from TasNetworks' annual Regulatory Information Notices (**RIN**). The external forecasts from MBA were then used to calculate the customer connection forecasts, and further criteria were applied to select suitable models (as outlined in section 21.3.3).

21.3.2. Industry Forecasts

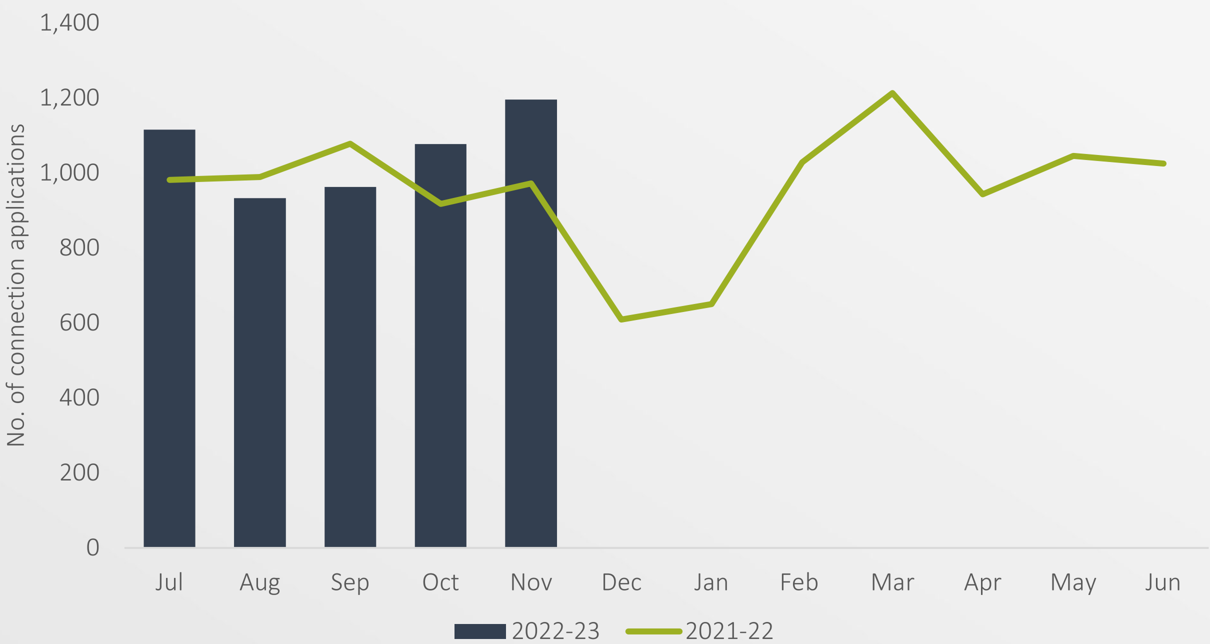
TasNetworks considered two possible sources for the dwelling start projections that underpin the residential customer connection forecasts: the Housing Industry Association (**HIA**) and MBA. Both forecasts consider that the Federal Government's *HomeBuilder* stimulus measures implemented during the pandemic have brought forward a significant amount of building demand and agree that the recently observed historical highs of new connections are unlikely to be sustained. Both industry groups consequently project a decline in new connections, but HIA historically projected this decline to be deeper and longer lasting than MBA (Figure 1).

Figure 1 – Comparison of residential connection forecasts from Master Builders Association and the Housing Industry Association



TasNetworks agrees that the historic highs observed during the pandemic will not be sustained. However, it is our view that the MBA projections, which remain closer to historical averages, appear more plausible than the lower forecasts from HIA. This view is reinforced by the fact that the volume of recent connection applications remains comparable to the number of applications we received during same period last year (Figure 2). In addition, the MBA forecasts include both residential and commercial projections and therefore can be used as a consistent source for both categories[1].

Figure 2 –TasNetworks' connection applications



[1] The HIA forecasts only include residential projections, which would require using additional input variables from other external sources to derive the commercial connection forecasts.

21.3.3. Model test and selection

The modelling uses moving averages of up to five years combined with lags of up to three years for each economic input variable. To ensure statistical soundness, several tests and thresholds were applied, and only models that passed these tests were considered further:

- A minimum threshold of 0.7 was set for the models' correlation coefficients (R). This ensures a sufficiently strong correlation between customer connections and the economic input variables.
- A maximum threshold of 0.05 was set for the models' p-values. This ensures that the modelling results are statistically significant, that is, that changes in the output variable (number of customer connections) are attributable to changes in the economic input variables.

The models for the current customer connection forecasts provided the following statistical results:

Table 1 – Model output

Connection type	Residential	Commercial	Threshold
Timeframe	No Average, No Lag	4 Year Average, 1 Year Lag	
Input variables	Total Dwelling Starts	Non-Residential Building Activity	
Correlation coefficient	0.72	0.82	0.7 (min)
p-value	0.006	0.01	0.05 (max)

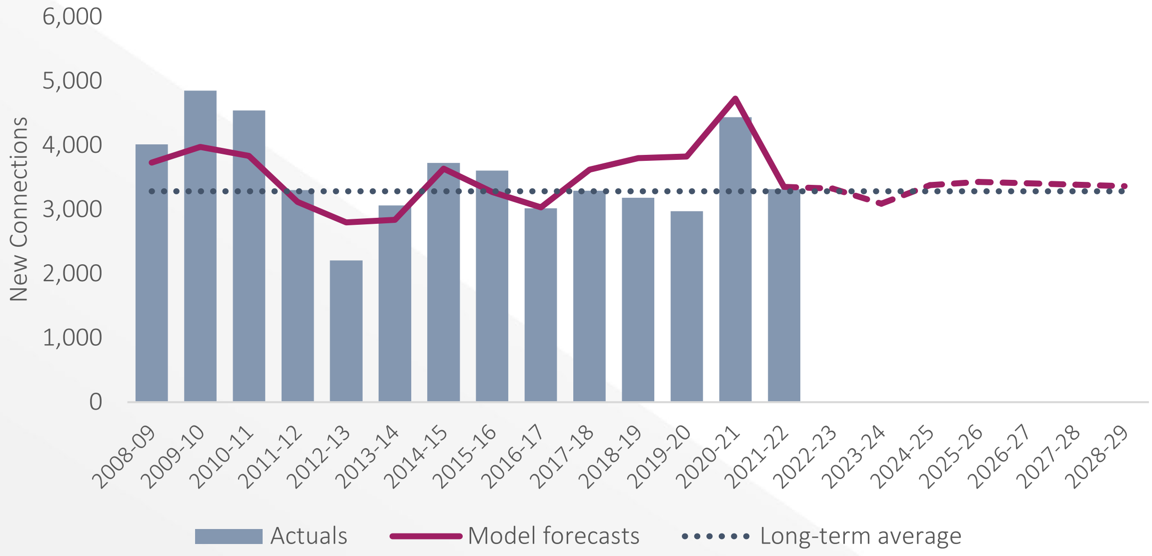
21.4. Residential forecasts

Residential customer connection forecasts are based on the annual dwelling start projections from MBA. This approach provides the soundest statistical outcomes and ensures that TasNetworks' connection forecasts broadly follow the external forecasts from MBA.

The impact of the COVID-era stimulus measures is projected to cease in the 2022-23 financial year, and higher interest rates are expected to negatively impact house prices. It is also considered that the *HomeBuilder* program has brought forward a significant amount of housing demand, and as a result, the number of new connections is projected to return to historical averages.

Figure 3 shows the actual numbers of residential connections and the outputs of the residential forecasting model to 2028-29. Historical customer connection numbers fluctuate, but the number of new residential connections in 2020-21 is comparable to the peaks of 2009-10 and 2010-11. The decrease in 2021-22 signals the ceasing impact of the COVID related stimulus measures, and the drop in new connections in 2011-12 and 2012-13 is likely to be a result of the wind-down of the global financial crisis (GFC) stimulus measures, and the economic conditions in Tasmania at the time.

Figure 3 – Residential customer connection forecasts

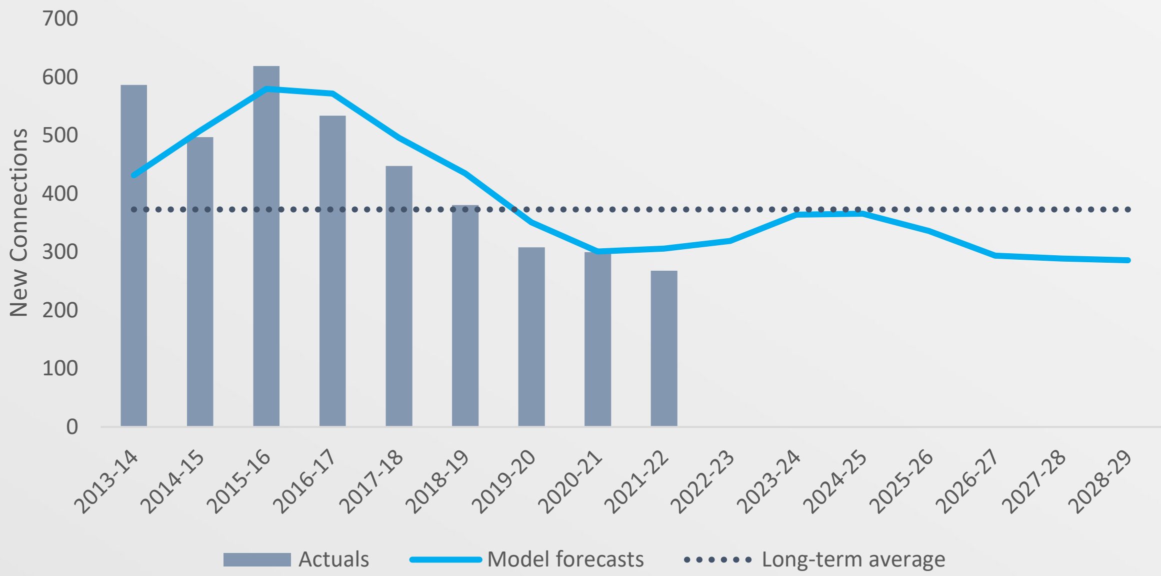


21.5. Commercial forecasts

TasNetworks' commercial connection forecasts are derived from MBA's projections of non-residential building activity. The number of new commercial connections has continuously declined during recent years, exacerbated by the impact of COVID-19 on various industries, particularly in the tourism and hospitality sectors. However, as the worst impact of the pandemic now seems to have passed and boarders have re-opened, a return to more "normal" business conditions with increased Commercial connections from 2022-23 onwards is projected.

Figure 4 shows the actual numbers of commercial connections and the outputs of the commercial forecasting model out to 2028-29.

Figure 4 – Commercial customer connection forecasts



TasNetworks’ LRMC model

Long run marginal cost

21.6. Introduction

It is a requirement under the National Electricity Rules that each network tariff must be based on the long run marginal costs (**LRMC**) of servicing customers who are assigned to that tariff[2].

Long run marginal costs are a forward-looking concept which measures expenditure changes in response to changes in demand. It considers both incurred expenditure in relation to growing demand (**augex**) and avoided expenditure in relation to declining demand (**repex**).

The purpose of LRMC is to provide efficient price signals to customers, which inform customers' decision-making around electricity usage by reflecting the long-term costs of changing network capacity in response to changes in demand. As such, LRMC inform our tariff setting process and form an important part of our forward-looking pricing strategy.

In response to previous feedback, TasNetworks has enhanced its methodology for the upcoming 2024-2029 regulatory control period and included repex in its LRMC calculations.

21.7. Background to revising our LRMC

21.7.1. Review of LRMC methodologies

TasNetworks continues to apply the AIC methodology for its LRMC calculations in the 2024-2029 regulatory control period. This approach is commonly used by other Distribution Network Service Providers (**DNSP**), and it derives LRMC as follows:

Formula 5 – LRMC Calculations (AIC)

$$\text{LRMC} = \frac{\text{Present Value (growth related expenditure + marginal operating costs)}}{\text{Present Value (additional demand served)}}$$

The AER approved this methodology for the 2019-2024 regulatory control period, however it required TasNetworks to improve its approach and include repex in its LRMC estimates for the 2024-2029 regulatory control period[3].

Based on research of other DNSPs' recent Regulatory Determinations, TasNetworks has identified the following potential calculation methodologies:

- The perturbation ("Turvey") approach, which estimates LRMC as the change in costs due to a shift in demand. This approach requires re-assessments of the program of works and has been used by some of the Victorian DNSP (Citipower, Powercor, United Energy)[4] and by Ausgrid (NSW)[5].

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[2] NER 6.18.5(f)

[3] TasNetworks - Determination 2019-2024 | Australian Energy Regulator

[4] CitiPower - Determination 2021-26 | Australian Energy Regulator

[5] Ausgrid – Determination 2019-2024 l | Australian Energy Regulator

- The Long Run Incremental Cost (**LRIC**) model, which is based on the creation of a hypothetical optimised network scaled to supply a certain coincident demand. This approach has been implemented by Ergon/Energex (QLD)[6], using the "500MW" model which is used in the UK.
- A modified version of the AIC approach, which considers avoidable repex in areas of falling demand. This approach has been used by Endeavour Energy (NSW)[7] and EvoEnergy (ACT)[8].

Considering the data and modelling requirements as well as the cost/benefit trade-offs of the three approaches, TasNetworks has decided to implement the modified AIC approach for its 2024-2029 regulatory control period.

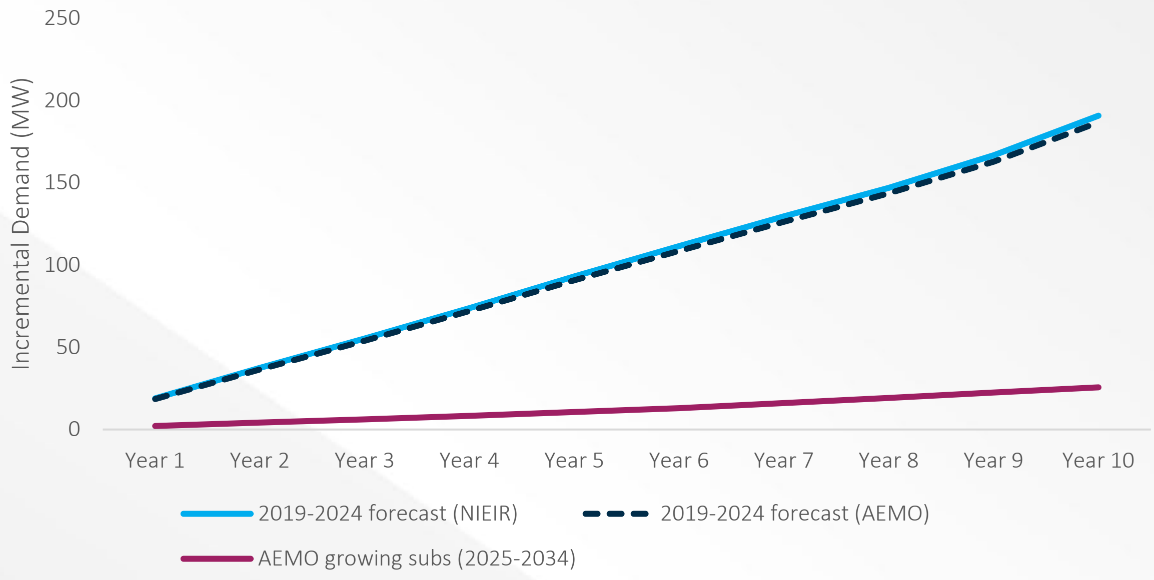
21.7.2. LRMC demand forecasts

An important part of enhancing the 2024-2029 LRMC methodology was to review the demand forecasts that underpin the calculations.

When preparing our LRMC for the current regulatory control period (2019-2024), the incremental demand forecasts from the National Institute of Economic and Industry Research (**NIEIR**) were used. These forecasts projected steady demand growth over time and were closely aligned to the forecasts that were issued by the Australian Energy Market Operator (**AEMO**) at the time.

The most recent Tasmanian distribution connection point forecasts from AEMO are largely flat, with an average growth rate of around 0.3% pa even when only substations with projected demand growth are considered (Figure 10). Further analysis revealed that the AEMO forecasts combine areas of growing and declining demand, however the LRMC-relevant expenditure within the proposed program of works is largely driven by smaller pockets of growing demand within the network.

Figure 6 – LRMC demand forecasts



[6] Energex - Determination 2020-25 | Australian Energy Regulator

[7] Endeavour Energy - Determination 2019-2024 | Australian Energy Regulator

[8] Evoenergy - Determination 2019-2024 | Australian Energy Regulator

21.8. LRMC methodology for 2024-2029

To enhance the accuracy of its LRMC calculations and to better reflect the pockets within its network that drive growth-related expenditure, TasNetworks proposes to use additional program capacities in its 2024-2029 LRMC calculations. These capacities were determined for the LRMC-relevant programs in our Program of Works and represent a stronger, more direct link between expenditure and demand than the AEMO substation level demand forecasts (as discussed in section 21.19.2).

To simplify the LRMC calculations and to enhance their transparency, voltage level estimates have been used for the 2024-2029 regulatory control period. Under the applied approach, separate LRMC are derived for the HV and LV network, and these estimates are used to calculate the LRMC price signals for TasNetworks' HV and LV network tariffs respectively.

21.8.1. TasNetworks' program of work

The expenditure underpinning the 2024-2029 LRMC calculations is sourced from TasNetworks' ten-year program of works. Costs that are driven by projected increases in demand have been included in the growth-related LRMC calculations – these predominantly relate to augmentation expenditure, but also include certain types of connections expenditure and expenditure that has been classified as repex for planning purposes.

When classifying expenditure, TasNetworks applies the AER's Expenditure Forecast Assessment Guideline, which defines repex as "*the non-demand driven capex to replace an asset with its modern equivalent where the asset has reached the end of its economic life*". According to this definition, expenditure that is classified as "repex" should not be included in the growth-related AIC calculations, as it does not meet the requirement of being driven by additional demand. In practice however, some programs that are classified as "repex" for planning purposes do include components that are related to demand growth. As part of the undertaken LRMC expenditure review, TasNetworks' have identified these components, and the associated costs have accordingly been included in the growth-related AIC calculations.

Growth related expenditure

Augmentation expenditure LRMC

Demand-driven projects and programs were identified within the augmentation expenditure of the program of works. This expenditure was assessed in more detail by TasNetworks' to determine the cost proportions that relate to increases in demand. For projects that relate to both the HV and LV networks, separate cost percentages were determined for the two network levels.

Connections augmentation expenditure LRMC

TasNetworks categorises customer connections into three categories:

- Residential;
- Commercial; and
- Subdivision.

Additional data underpinning the connections related information in the Regulatory Information Notices (RIN)[9] was used to estimate the LRMC-relevant connections expenditure:

[9] Distribution Category Analysis RIN, tables 2.5.1 & 2.5.2

- The percentages for residential and subdivision connections were determined based on work orders[10], considering the non-linear relationship between the number of work orders and the number of connections in subdivisions.
- Commercial connections were excluded from LRMC consideration as our distribution connection pricing policy defines these connections as complex[11]. As a result, connecting customers are required to pay augmentation costs based on their expected maximum demand as part of their connection costs (refer Table 10 for exclusions).

Table 2 – Program of work inclusions and exclusions for calculating the LRMC

Functional area	Initiative	RIN Category	LRMC justification
SOLCP	CNMAI Non-Major Works Residential Customer Connections	Residential	Included, % based on the Annual Regulatory Information Notice (**RIN**)[12] data
SOPOR	CNMAI Non-Major Works Residential Customer Connections	Residential	Included, % based on RIN data
SUPOR	CNMAI Non-Major Works Residential Customer Connections	Residential	Included, % based on RIN data
SOLCI	CNMAI Non-Major Works Residential Customer Connections	Residential	Small amount of funding, typically functional area no longer used
DESDB	*CNMAI Non-Major Works Residential Customer Connections*	*Residential*	*Not included, design drive-by only*
EASEC	*CNMAI Non-Major Works Residential Customer Connections*	*Residential*	*Not included, easement acquisition only*
SOSDI	CSUDN Customer Initiated Subdivisions	Subdivision	Included, % based on RIN data
SUSBD	CSUDN Customer Initiated Subdivisions	Subdivision	Included, % based on RIN data
EASEN	*CNMAC Non-Major Works Commercial Customer Connections*	*Commercial / Industrial*	*Not included, easement acquisition only*
EASES	*CSUDN Customer Initiated Subdivisions*	*Subdivision*	*Not included, easement acquisition only*
SOGSI	*CNMAC Non-Major Works Commercial Customer Connections*	*Commercial / Industrial*	*Not included, commercial connection is a step-change in load which triggers augmentation to which the customer pays an augmentation rate for - cost is not spread across customer base like included line items*

[10] Work orders were deemed appropriate as there is a one to one relationship between a work order and a connection.

[11] Our distribution pricing policy has different types of connections. Commercial connections are defined a complex and the customer is required to pay augmentation costs as part of their connecting costs.

[12] Distribution Category Analysis RIN, tables 2.5.1 & 2.5.2

Functional area	Initiative	RIN Category	LRMC justification
SOIRR	*CNMAI Non-Major Works Irrigation Customer Connections*	*Commercial / Industrial*	*Not included commercial connection is a step-change in load which triggers augmentation to which the customer pays an augmentation rate for - cost is not spread across customer base like included line items*
SUGSI	*CNMAC Non-Major Works Commercial Customer Connections*	*Commercial / Industrial*	*Not included, commercial connection is a step-change in load which triggers augmentation to which the customer pays an augmentation rate for - cost is not spread across customer base like included line items*
SUMPR	*CMAJC Major Works Commercial Customer Connections*	*Commercial / Industrial*	*Not included, commercial connection is a step-change in load which triggers augmentation to which the customer pays an augmentation rate for - cost is not spread across customer base like included line items*
SUSUB	*CSUBC Customer Initiated Subdivisions*	*Commercial / Industrial*	*Not included, commercial connection is a step-change in load which triggers augmentation to which the customer pays an augmentation rate for - cost is not spread across customer base like included line items*
CASYS	*CMAJC Major Works Commercial Customer Connections*	*Commercial / Industrial*	*Not included, desktop studies only*
EASEB	*CSUBC Customer Initiated Substations*	*Commercial / Industrial*	*Not included, easement acquisition only*
EASEM	*CMAJC Major Works Commercial Customer Connections*	*Commercial / Industrial*	*Not included, easement acquisition only*

Replacement expenditure

The AER provided TasNetworks with feedback through the 2019-2024 revenue reset process that our approach to estimating LRMC needed to be refined, particularly the inclusion of repex.

TasNetworks has undertaken extensive analysis to:

- determine whether our program of works contains expenditure that is classified as repex but aligns with the definition of marginal costs.
- assess our approach in relation to avoidable repex as a result of falling demand, and how this type of expenditure should be considered in the LRMC calculations.

TasNetworks replacement expenditure practices

TasNetworks' repex program covers replacements of high and low voltage assets in the distribution network. Most replacements are done on a like-for-like basis, driven by the need to maintain the functionality and reliability of the existing network, and to mitigate risks associated with asset failures. Asset inspections are usually conducted to inform the replacement decisions, and the depth of these assessments is determined by the criticality of the assets and the associated costs.

Replacements are guided by TasNetworks' planning, design and equipment standards, and by equipment contracts. TasNetworks aims for a standardisation of designs and equipment to achieve operational efficiencies with respect to works delivery, spares management and inventory holdings.

Transformer replacements have the potential to change network capacity. For larger or more complex asset replacements, TasNetworks considers previous and anticipated load growth in the serviced area to determine the size of the replacement units.

Asset replacements with lower rated equivalents are only done on very rare occasions, and are subject to careful considerations of numerous factors. These include the need to balance any cost savings of downsizing an asset against current and future load requirements, the risk of unanticipated demand growth, and an overall alignment with TasNetworks' network planning strategy. Large proportions of TasNetworks' replacement programs' expenditure tend to be fixed in nature, which means that the potential cost benefits from replacing assets with smaller equivalents tend to be low compared to the associated capacity reductions. These relatively small benefits are typically outweighed by the associated risks and the other influencing factors, leading to the predominantly like-for-like replacement practices described above.

Avoidable Repex in response to declining demand

Separate consideration has been given to replacement expenditure that can potentially be avoided as a result of declining demand. As outlined above, replacing assets with lower rated equivalents is not common practice under TasNetworks' asset management guidelines. We have assessed this expenditure type in the context of LRMC using a small number of relevant case studies (Appendix A – Appendix C). However, our overall conclusion is that a growth-related AIC methodology enables us to provide more accurate LRMC signals, which better reflect the relevant network cost drivers and our asset management practices, to our customers. We have therefore based our R24 LRMC estimates on growth-related expenditure only.

Repex for LRMC

Approximately $4.9m of repex programs in the program of work has been identified as augmenting the network to support projected demand growth. These programs have been included in the LRMC calculations.

21.8.2. Program capacities

As outlined above, TasNetworks proposes to use program-specific capacities in its LRMC calculations for the 2024-2029 regulatory control period to establish a more rigorous link between expenditure and underpinning demand. These capacities were calculated for all programs that were identified as being LRMC-relevant (i.e. growth related). This includes programs that have been classified as "repex" for Planning purposes but contain growth-related components which meet the definition of "marginal costs". In line with the overall approach of deriving separate LRMC estimates for the HV and LV networks, separate capacities were determined for these two network levels. The approach for each of the three expenditure categories that were included in the LRMC calculations is outlined below.

Augmentation capacities

Augmentation projects were individually assessed to determine the incremental capacity being added. Incremental capacity for augmentation programs was estimated using the following approaches:

- HV and LV network – an average kVA per kilometre was calculated which was applied to the forecast volumes to estimate the incremental capacity increase;
- Sub-transmission – the difference between the current capacity and the network planning target capacity was used to estimate the incremental capacity increase; and

- Transformer upgrades – TasNetworks has standard equipment sizes and the differential between the old and new unit sizes was applied to the forecast volumes to estimate the incremental capacity increase.

Sub-transmission expenditure flows into the HV estimates, whereas the transformer upgrades can flow into either the HV or LV network.

Connections augmentation capacities

Augmentation work orders that were used to complete the RIN were assessed to identify the installation of new transformers by connection type. An assumption was made that each installation replaced an existing unit and the replaced unit was the next standard size down from the installed transformer. This allowed for an estimate of the incremental installed capacity of each job by:

- Calculating the total incremental installed capacity for each financial year by summing up all the incremental installed capacities.
- Calculating an annual incremental installed capacity for each of the connection types by averaging the totals of each financial year.

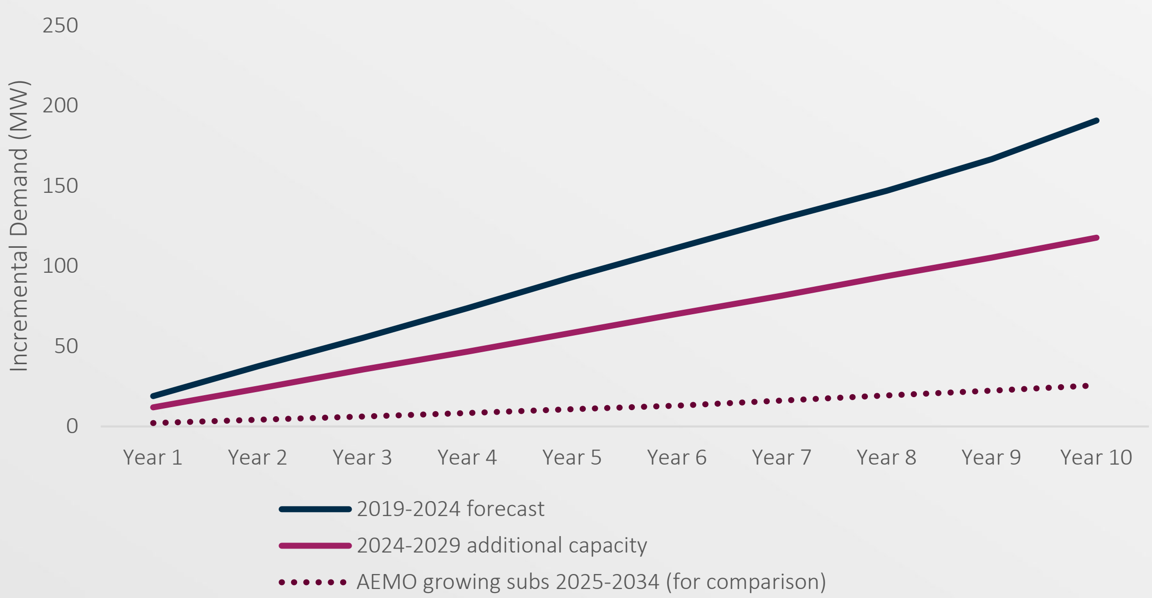
Replacement program capacities

To determine the incremental capacities for those replacement programs that have demand related drivers, analysis of historical work orders was conducted and the incremental installed capacity from each work order was captured. The incremental capacity for the relevant programs was then estimated by:

- Calculating the average incremental installed capacity by financial year.
- Calculating an annual incremental installed capacity by averaging the averages of each financial year.

Figure 11 compares the calculated project-specific capacity increases to the latest AEMO connection point forecast and to the demand projections that underpin the 2019-2024 LRMC calculations.

Figure 7 – LRMC demand forecasts



21.9. LRMC outcomes for 2024-2029

As mentioned above, TasNetworks proposes to use a modified AIC approach based on growth-related expenditure to calculate LRMC for the 2024-2029 regulatory control period. Under the revised approach, different estimates are derived for the HV and LV network levels, and both the relevant expenditure and the underpinning program capacities have been classified accordingly. Capitalised overheads have been added to the direct costs in the POW to derive the overall LRMC expenditure.

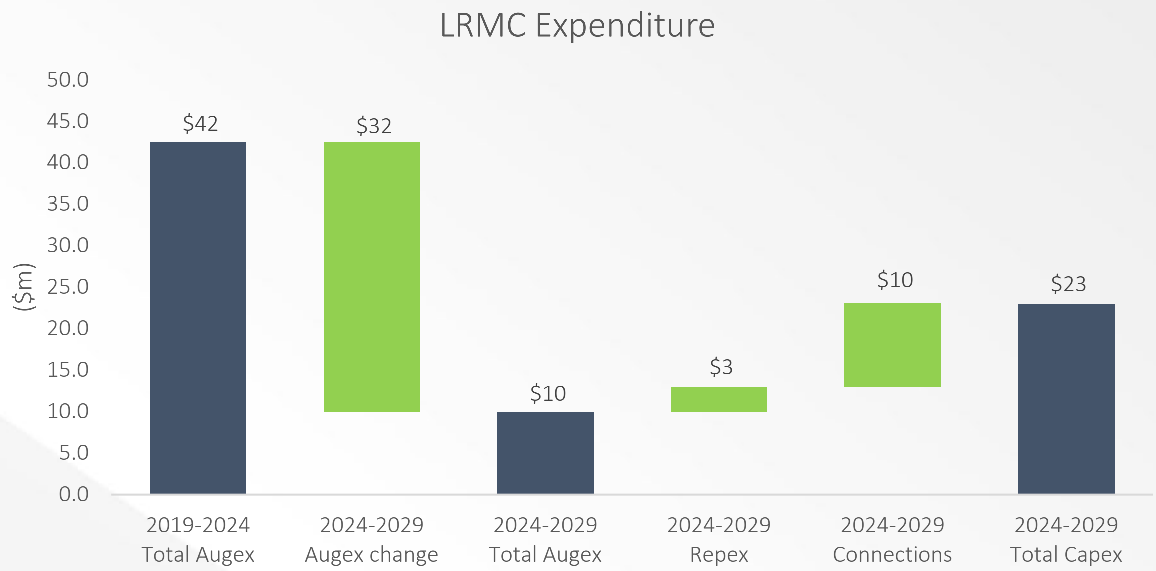
21.9.1. Proposed LRMC expenditure forecasts

The LRMC related expenditure has decreased for the 2024-2029 regulatory control period when compared to the expenditure included in the 2019-2024 regulatory control period.

The main changes to the LRMC related expenditure are related to:

- a reduction in augex by $32.5 million;
- inclusion of $3.0 million of repex;
- $10.0 million of connections related expenditure being included that had been excluded from the 2019-2024 LRMC.

Figure 8 – 2024-2029 regulatory control period LRMC expenditure compared to 2019-2024 regulatory control period



21.9.2. Proposed 2024-2029 LRMC

Figure 13 and Figure 14 show the change in TasNetworks' LRMC for HV and LV tariffs, using the program-specific capacities outlined in section 21.20.2 and incorporating the different expenditure categories that were considered in the LRMC calculations.

Figure 9 – LRMC for high voltage network

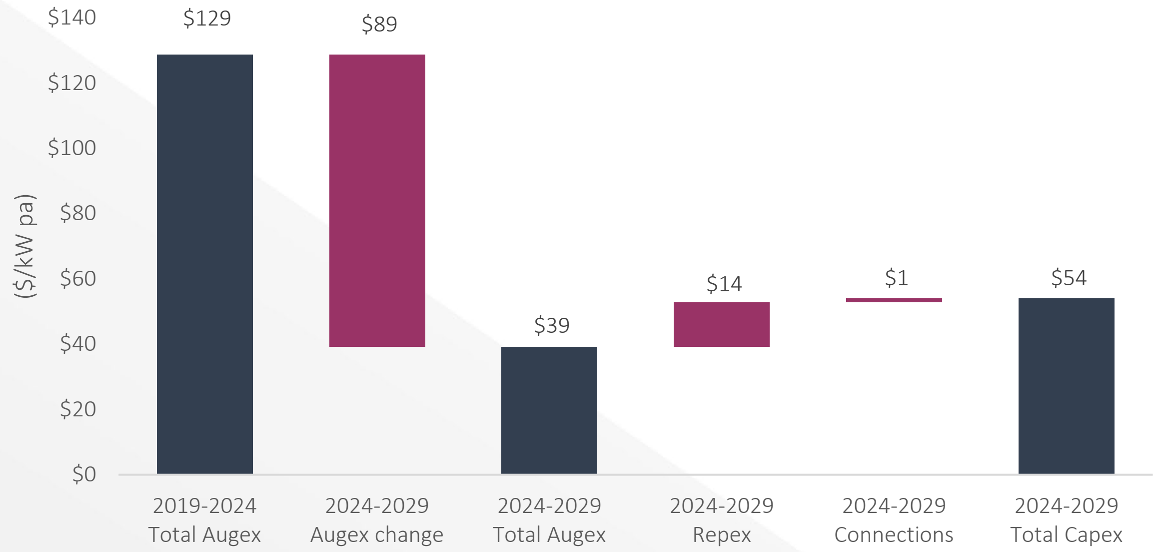
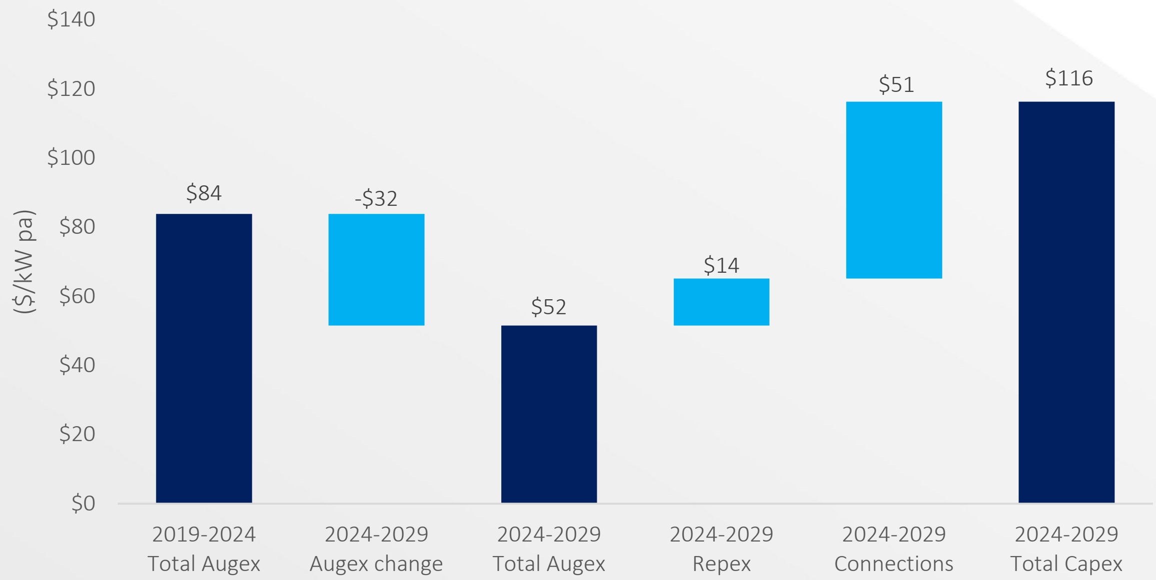


Figure 10 – LRMC for low voltage network[13]



21.10. Establishing LRMC tariffs charging components

The derived HV and LV LRMC estimates are used to calculate each network tariff's LRMC price signals. The approach for the individual tariffs somewhat differs depending on whether the tariff is a:

- Flat volumetric tariff
- Time of Use (ToU) volumetric tariff
- Demand tariff

[13] LRMC LV for R24 is largely driven by Connections expenditure

For volumetric tariffs, the LRMC estimates are converted from kVA to kW[14]. The number of peak hours per year are then considered to derive the kWh price signals for each tariff structure.

The LRMC price signals for demand tariffs are derived by dividing the LRMC estimates by the number of days in a year, which reflects the daily charging basis of these tariffs. Where applicable, power factors are used to convert the LRMC estimates from kVA to kW.

21.10.1. Flat volumetric tariff

For a simple tariff design incorporating daily and flat volumetric charges, the LRMC signal is incorporated in the volumetric charge component. This is because the LRMC is intended to inform our customers' decisions around electricity consumption by signalling the forward-looking costs of future network augmentation. However, as there is only a single volumetric charge which will also need to recover residual costs, the LRMC signal under a flat volumetric tariff structure will in practice become muted.

21.10.2. Time of use volumetric tariff

For a ToU consumption tariff incorporating a peak volumetric charge, the LRMC signal is reflected in the peak charge only. This is because LRMC provides a forward-looking signal about future network augmentation costs as a result of increases in demand. This signal is most effective if incorporated in the related peak volumetric charge. The other charging components are used to recover residual costs.

21.10.3. Demand tariffs

TasNetworks' tariff suite includes both time of use demand tariffs and tariffs that are charged based on anytime maximum demand (**ATMD**). In some of these tariffs, daily ATMDs are compared to customer-specific specified demands, and additional charges are applied if the ATMD exceed the specified demand level. To provide the most cost-reflective price signals to our customers, TasNetworks applies the LRMC signal for all demand-based tariffs to a demand charging parameter, irrespective of whether these tariffs include additional non-demand based charges[15]. This approach also reflects the revenue recovery of our demand-based tariffs, which are predominantly used by larger business customers and recover more revenue from demand charges than from consumption charges. For time of use demand tariffs, the LRMC signal is applied to the peak demand charging parameter and the remaining tariff parameters (incl. off-peak demand charges) are used to recover residual costs.

[14] Power factors of 0.98 and 0.95 for HV and LV respectively have been used to convert kVA to kW.

[15] The only exception is the Residential DER tariff TAS97. The LRMC signal for this tariff is applied to the peak consumption charge even though it includes a daily demand threshold.