Jemena Electricity Networks (Vic) Ltd

JEN - RIN - Support – Customer Connections – Forecast Summary Report – 20250131

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Table of contents

List of tables

List of figures

List of appendices

Glossary

Current regulatory period	A regulatory period covering financial year 2021/22 to 2025/26
Forthcoming regulatory period	A regulatory period covering financial year 2026/27 to 2030/31

Abbreviations

Abbreviation	Expanded Name
ACIF	Australian Industry Construction Forum
AER	Australian Energy Regulator
CB	Business Supply > 10kVA
CBE	Business Supply Project > 10kVA – LV Extension
CBG	Business Supply Project > 10kVA – Ground Substation
CBH	Business Supply Project > 10kVA – HV Customers
CBI	Business Supply Project > 10kVA – Indoor Substation
CBK	Business Supply Project > 10kVA – Kiosk Substation
CBL	Business Supply Project > 10kVA – Line of Mains
CBP	Business Supply Project > 10kVA – Pole Substation
CBS	Business Supply Project > 10kVA – Substation Modification
CBT	Business Supply Project >10KVA – Subtransmission Customer
CD or CDA	Dual & Multiple Occupancy
CFC	Construction forecasting council
CH	Medium Density Housing URD/ PURD
CHH	Medium Density Housing – HV Extension
CHL	Medium Density Housing – LV Extension only
CIC	Customer initiated capital
CL	Public Lighting
CLA	Public Lighting Project – Major Intersection
CLI	Public Lighting Project – Minor Intersection
CLJ	Public Lighting Project – Major Scheme
CLN	Public Lighting Project – Minor Scheme
CM	Service Wire Overhead and Underground
CMA	Basic Connection Upgrade – 1PH to 3PH <100A
CMB	Replace Overhead Service Line <100A
CMC	Replace Overhead Service Line >100A
CME	Elective Undergrounding Pole to Pit Installation
CMU	Underground Routine Connections < 100 Amps
CMV	Underground Routine Connections > 100 Amps
CMZ	Overhead Routine Connection < 100 Amps
COWP	Capital and operational work plan
CPI	Consumer price index
CR	Special Capital or Recoverable Works, Customer Contribution of a Non-Supply nature
CRB	Rectification of damaged assets – REC
CRE	Capital Recoverable Works – Subtransmission Asset

Abbreviation	Expanded Name
CRP	Capital Recoverable Works – In Line Poles / Stays
CRR	Capital Recoverable Works – Intersection Realignment
CRS	Capital Recoverable Works – Substation Modification
CRU	Capital Recoverable Works – Undergrounding of Assets
CRV	Capital Recoverable Works – Major Vic Roads
CS	Low Density & Small Business Supplies < 10kVA
CSO	Low Density & Small Business Development < 10kVA – Overhead Extension
CSU	Low Density & Small Business Development < 10kVA – Underground Extension
DC	Data Centre
EUSE	Expected unserved energy
HV	High Voltage, which can either be 22kV, 11kV or 6.6kV
JEN	Jemena Electricity Networks
LCTA	Least Cost Technically Acceptable
LV	Low Voltage, which is measured at 400V 3-phase or 230V single-phase
NER	National Electricity Rules
POE	Probability of Exceedance, where 50% POE is considered having a 1-in-2 years chance of occurring and 10% POE is considered having a 1-in-10 years of occurring
RIN	Regulatory information notice
RIT-D	Regulatory Investment Test for Distribution
SAP	Systems, Applications, and Products in Data Processing
SCS	Standard Control Service
The Rules	National Electricity Rules
TNSP	Transmission network service provider
URD	Underground Residential Distribution
VCR	Value of Customer Reliability
VEDCoP	Victorian Electricity Distribution Code of Practice

Executive Summary

Jemena Electricity Networks (JEN) is responsible for planning and developing its distribution network, as well as planning and directing the augmentation of its connection points with the shared transmission network, owned and maintained by the relevant transmission network service provider (TNSP).

JEN is responsible for providing connection services and supply to customers, embedded generators, asset relocation services including undergrounding, public lighting services and distribution services to other distributors. These distribution services are referred to as either direct control services or negotiated distribution services, and are classified by the Australian Energy Regulator (AER) in accordance with the National Electricity Rules (the Rules). Capital investments of these services are commonly referred to as customer connections capital or customer initiated capital (CIC). The terms are used interchangeably.

A number of regulatory instruments define JEN's obligations to provide direct control services and negotiated distribution services to customers. The regulatory instruments that set JEN's obligations to offer direct control services and negotiated distribution services to customers include JEN's Electricity Distribution Licence, Victorian Electricity Distribution Code of Practice (VEDCoP) and the National Electricity Rules (The Rules).

1.1 Forecast Approach

The Rules and National Electricity Objective require distributors to develop efficient and prudent capital expenditure forecasts. For this reason, JEN adopts a robust forecasting approach in relation to capital expenditure plans. In particular, JEN combines a 'top down' modelling to forecast expenditure required for the different market sectors using specific sector economic growth, with the 'bottom up' assessment to capture the volume and descriptor metric expenditure.

The 'top-down' CIC expenditure forecast is central to JEN's CIC gross expenditure plan. Key input to the 'top down' modelling comes from independent sources, in particular, the residential sector data comes from independent consultant [redacted], commercial and industrial sector data comes from the Australian Construction Market Report prepared by the Australian Construction Industry Forum (ACIF), and major customer developments come from JEN's direct engagement with its customers.

JEN's forecasting methodology and augmentation planning method deliver efficient outcomes for customers, and therefore complies with the Rules requirements.

1.2 Forecast Expenditure

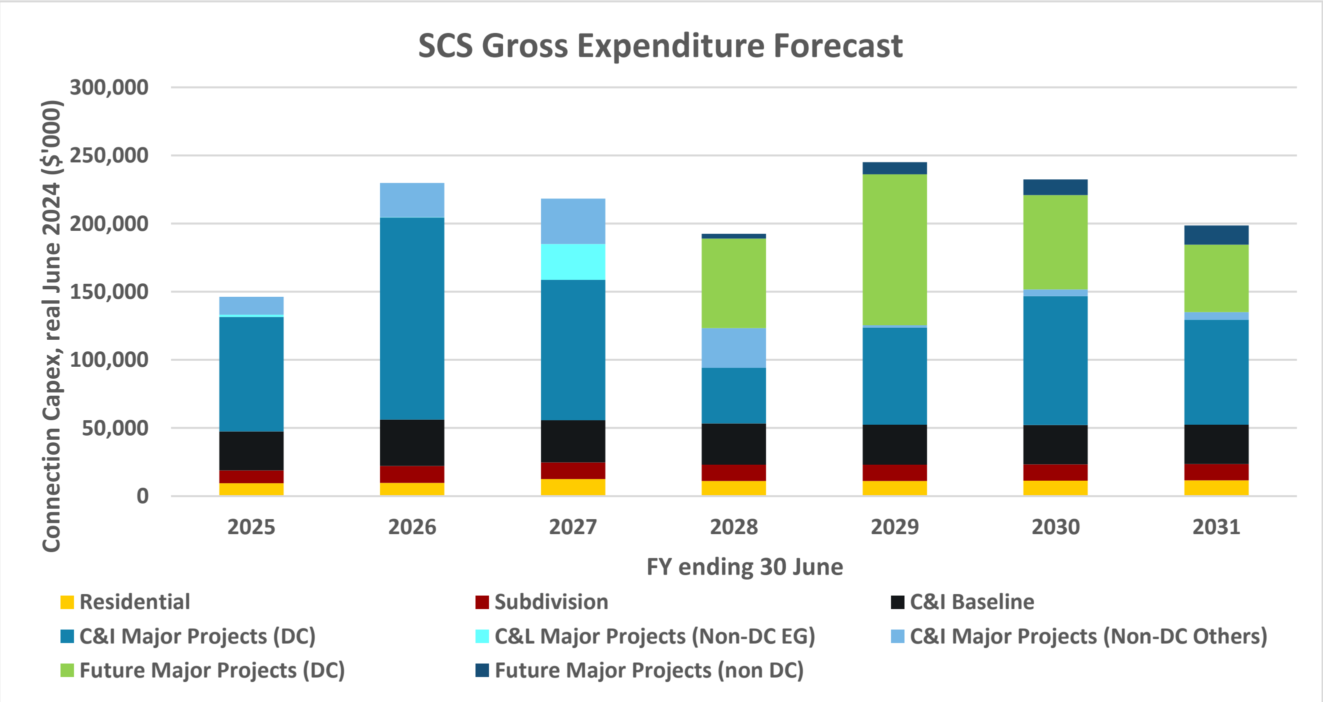
Table 2-1 and Figure 2-1 present a summary of the CIC gross expenditure forecasts that will be required over the forthcoming regulatory period in order to meet the expected demand for customer initiated works for each of the connection subcategory (residential, commercial & industrial, subdivision and embedded generation).

Table 2-1: CIC gross expenditure forecast over the forthcoming regulatory period

Connection Subcategory	Financial year ending 30 June (real June 2024 ($'000)							
	2025	2026	2027	2028	2029	2030	2031	Total (FY2027-31)
Residential	9,528	9,638	12,428	11,190	11,204	11,413	11,630	**57,866**
Commercial & Industrial								
Baseline	28,579	34,199	30,909	30,141	29,259	28,877	28,787	**147,973**
Major Projects Data Centre (DC)	84,054	148,234	102,962	40,810	71,381	94,474	76,907	**386,534**

Connection Subcategory	Financial year ending 30 June (real June 2024 ($'000)							
	2025	2026	2027	2028	2029	2030	2031	Total (FY2027-31)
Major Projects (non-DC Emb. Gen)	1,545	280	26,370	-	-	-	18	**26,387**
Major Projects (non-DC Others)	13,113	25,061	33,360	29,304	1,558	4,943	5,607	**74,771**
Subdivision	9,418	12,396	12,326	11,947	11,904	11,968	12,035	**60,180**
Total (excl Future Major Customers Projects)	**146,237**	**229,808**	**218,354**	**123,392**	**125,306**	**151,675**	**134,984**	**753,712**
Future Major Customers Projects Capex								
DC	-	-	-	65,523	110,820	69,195	49,552	**295,091**
Non-DC	-	-	-	3,699	9,043	11,622	14,160	**38,524**
Total Future Major Customers Projects Capex	**-**	**-**	**-**	**69,222**	**119,863**	**80,818**	**63,712**	**333,614**
Total SCS Connection Capex	**146,237**	**229,808**	**218,354**	**192,614**	**245,169**	**232,493**	**198,696**	**1,087,326**

Figure 2-1 CIC gross expenditure forecast over the forthcoming regulatory period



2. Introduction

2.1 Purpose

The purpose of this report is to explain JEN's CIC expenditure forecasts in the forthcoming regulatory period as one of the key drivers of its capital expenditure plans.

This report seeks to explain JEN's approach and methodology to customer connection planning and the capital expenditure forecast in the forthcoming regulatory period that is necessary to meet customer's needs. In particular, the report explains that:

- JEN adopts a robust forecasting approach in relation to capital expenditure plans. In particular, JEN combines a 'top down' modelling to forecast expenditure required for the different market sectors, with the 'bottom up' assessment to capture the volume and descriptor metric expenditure; and
- JEN's expenditure forecasting and connection planning approach delivers augmentation plans that are prudent and efficient.

2.2 Scope

This report provides a summary of the following matters:

- Network planning approach to customer connection;
- CIC gross expenditure forecasts for the forthcoming regulatory period;
- CIC gross expenditure forecasting methodology;
- An explanation of why JEN's approach complies with the Rules requirements and the National Electricity Objective; and
- Details of major customer network development plans.

This document is a summary report. Further detailed analysis and supporting information is provided in the following documents:

- JEN – RIN – Support – Customer Connections Forecast Methodology – 20250131 (ELE PR 0010);
- JEN – RIN – Support – Major Customers Forecast Methodology – 20250131 (ELE-999-PA-EL-007);
- JEN – RIN – Support – Major Customers Network Development Strategy – 20250131 (ELE-999-PA-EL-006);
- Australian Construction Market Report (May 2024);
- JEN Network Augmentation Planning Criteria (JEN PR 0007);
- JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131 ;
- Workbook 1 – forecast, regulatory template 2.5; and
- JEN – RIN – Support – Future Major Projects – Forecast Model – 20250131.

3. Network Planning Approach to Customer Connection

The purpose of this chapter is to explain the network planning approach to customer connection works which is consistent with JEN's network augmentation planning criteria[1]. This chapter therefore provides the following information:

- Section 3.1 provides an overview of the network planning methodology, which is principally probabilistic planning;
- Section 3.2 explains the approach to network limitation assessments;
- Section 3.3 explains the concept of energy at risk;
- Section 3.4 explains the concept of expected unserved energy; and
- Section 3.5 sets out concluding observations, which is relevant for customer connection works.

3.1 Overview of network planning methodology

JEN adopts two analytical planning methodologies:

- The probabilistic method, which is the standard planning approach in Victoria, and is regarded as good industry practice. It is consistent with the regulatory investment test for distribution (RIT-D), which is specified in the Rules. This method is applied to network assets with the most significant constraints and associated augmentation costs, including:
  - Transmission connection points;
  - Sub-transmission lines;
  - Zone substations;
  - High-voltage (HV) feeder lines when demand is forecast up to the maximum safe loading limit.
- The deterministic method, which is a simplified approach that is only applied to:
  - HV feeder lines when demand is forecast to exceed the maximum safe loading limit;
  - Distribution substations and associated low-voltage (LV) networks;
  - Connection assets works or network extensions based on Least Cost Technically Acceptable (LCTA) standard necessary for the load connection, unless the connection applicant requests a connection service, or part thereof, to be performed to a higher standard. In such case, the connection applicant will be required to pay the additional cost of providing the service to the higher standard in which a deterministic method is used for such works.

Probabilistic planning, which is JEN's principal planning method, is a cost-benefit approach to network augmentation, which compares:

- The expected amount (and value) of energy that will not be supplied for all feasible options including a 'do nothing' option; and
- The expected cost of all feasible network and non-network options that would reduce or eliminate the identified network capacity risk issues.

The option that maximises the net benefit, which includes the 'do nothing' option, is selected.

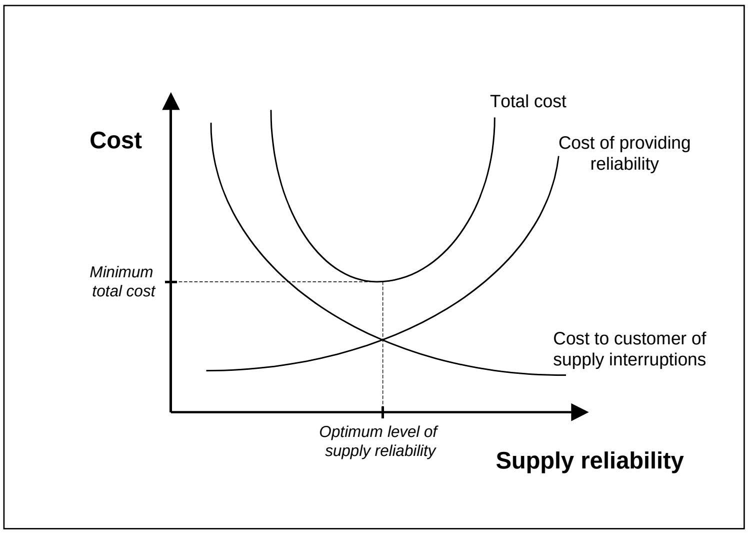
An important aspect of probabilistic planning is that it exposes customers to the risk that network capacity may not be sufficient to meet actual demand. Under this planning approach, action is only taken to address the risk of

[1] Refer to JEN Network Augmentation Planning Criteria (JEN PR 0007).

a capacity shortage if this outcome is less costly to customers than the expected cost of the outage. It should be noted that one source of risk is the demand forecast, especially as weather may have a significant impact on actual demand. For this reason, maximum demand forecasts are reported on a probability of exceedance (POE) basis, to denote the probability that the actual demand will exceed the forecast.

The planning approach requires us to estimate the expected costs of 'doing nothing', and to determine whether 'doing something' minimises total costs to customers. This approach is illustrated in the figure below.

Figure 3-1: Minimising the total costs to customers



Source: JEN, Network Augmentation Planning Criteria- Technical Methodology, Inputs and Assumptions, JEN PR 0007.

The practical application of probabilistic planning involves four key stages:

- Network limitation assessment, which involves determining the extent of network constraints for various network contingencies and demand forecast scenarios;
- Energy at risk analysis, where the annual energy at risk of not being supplied as a result of identified network constraints;
- Expected unserved energy (EUSE) calculation, which considers the probability of the forecast demand and contingency occurring, and weights the energy at risk by that probability to determine an expected amount of unserved energy;
- Calculating the cost of EUSE, where the EUSE is transformed into a dollar cost by multiplying the value of customer reliability (VCR) by the expected unserved energy.

Further details on the first three steps of the probabilistic planning approach are given in the remainder of this chapter.

3.2 Network limitation assessment

A network limitation is assessed by comparing the peak asset loading (under a range of different scenarios and network contingencies) with the asset's rating for each year in the forward planning period. The comparison identifies the extent to which asset overload will occur without corrective action.

The analysis of network limitations includes the following key inputs and assumptions:

- Season (winter and/or summer). Although the network is typically summer peaking, both periods are assessed because there may be some circumstances when a winter peak will exceed the relevant winter rating of assets;

- Calculation of EUSE takes into account probability of exceedance (POE). The likelihood of having a 1-in-2 years (50% POE) chance of occurring due to benign temperature conditions and having a 1-in-10 years (10% POE) chance of occurring due to more extreme temperature conditions are considered;
- The expected levels of embedded generation and demand-side support, which can affect the asset loading. However, it is assumed that embedded generation is not available at times of maximum demand unless network support contracts are in place;
- Contingencies, which can significantly affect asset loading. JEN considers loading for both system-normal conditions and following the most credible single contingency events;
- Pre and post-contingent operator actions, which can affect asset loading and the maximum load limit (and therefore the EUSE) are considered. Specifically, JEN considers likely operator actions given the relevant contingency conditions.

It is important to note that the network limitation assessment is asset-specific and location specific. JEN must have regard to the actual conditions 'on the ground'. Spatial demand forecasts, which recognise variations in the level of demand and the expected rate of growth in demand across the network, are essential inputs to the network limitation assessment.

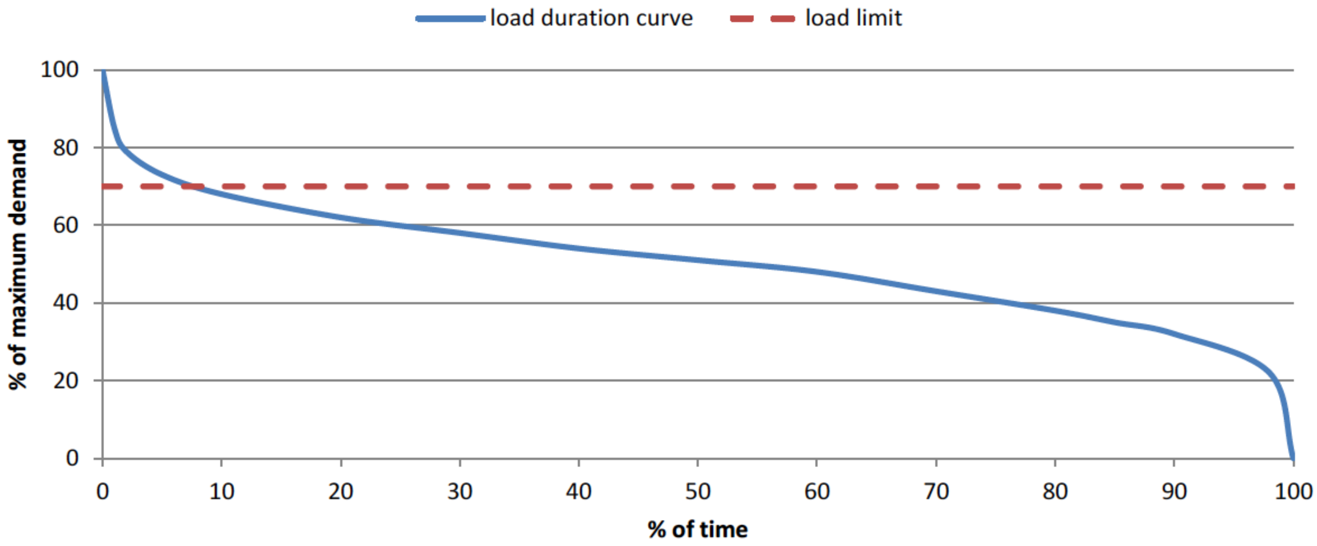
3.3 Energy at risk analysis

Energy at risk refers to the total energy that may not be supplied under contingency events, particularly around the maximum demand period. A contingency event refers to the loss or failure of part of the network, with N-1 referring to the loss of one critical element, such as a transformer.

Energy at risk can be approximated by using a load duration curve that reflects the maximum demand scenario for a given asset. It is calculated as the amount of energy under the load duration curve, but above the asset load limit (where the load limit is typically the asset's N-1 rating). The load duration curve is typically based on representative historical hourly load data scaled to the forecast maximum demand.

Figure 3-2 shows a load duration curve with a horizontal line representing the load limit following a specific contingency for a particular terminal station, zone substation or feeder.

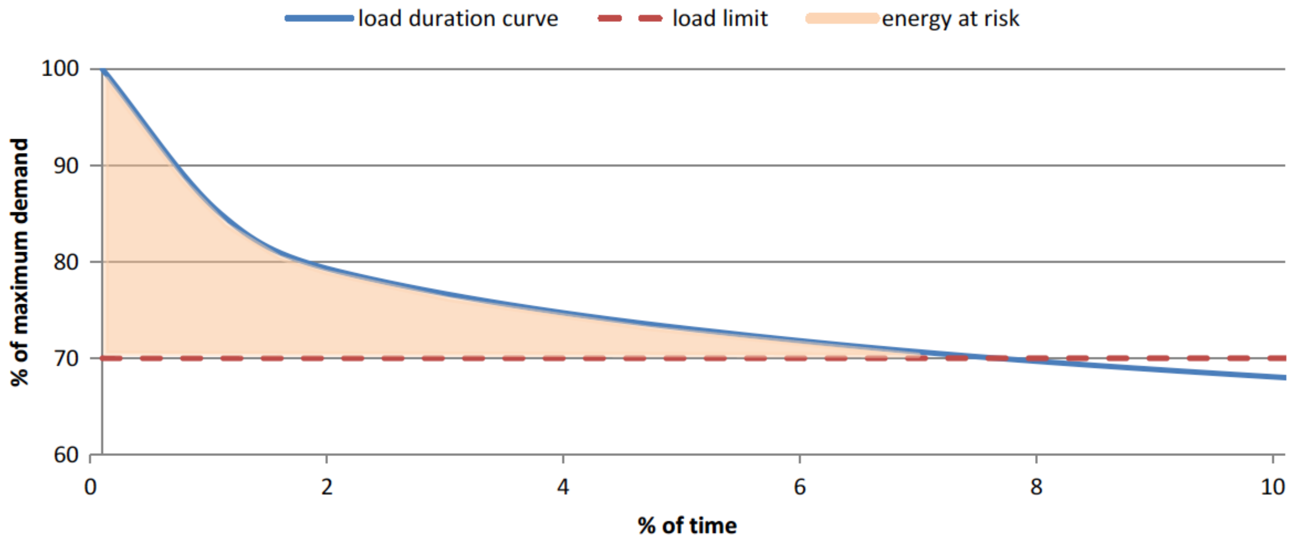
Figure 3-2: Load duration curve and load limit relationship



Source: JEN, Network Augmentation Planning Criteria- Technical Methodology, Inputs and Assumptions, JEN PR 0007.

Figure 3-3 below shows the same figure, magnified around that part of the load duration curve closest to maximum demand. This effectively illustrates the energy at risk calculation, which is represented by the area under the load duration curve and above the load limit.

Figure 3-3: Energy-at-risk calculation for the area of the load duration curve above the load limit



Source: JEN, Network Augmentation Planning Criteria- Technical Methodology, Inputs and Assumptions, JEN PR 0007.

3.4 Expected unserved energy

For a specific maximum demand scenario and contingency events, the EUSE measure in megawatt hours (MWh) is the product of:

- The energy at risk calculated for a given network state; and
- The probability of being in that network state.

Typically, the probability of being in an N-1 contingency is determined by the probability of a transformer outage or sub-transmission line outage.

3.5 Key observations

As explained in section 3.1, JEN adopts two analytical planning methodologies, being probabilistic method and deterministic method. Most (if not all) of the customer connection works are using deterministic method where it involves one of the following:

- HV feeder lines when demand is forecast to exceed the maximum safe loading limit;
- Augmentation of distribution substations and/ or associated low-voltage (LV) networks to meet customer's needs; or
- Connection assets works or network extensions based on Least Cost Technically Acceptable (LCTA) standard necessary for the load connection, unless the connection applicant requests a connection service, or part thereof, to be performed to a higher standard. In such case, the connection applicant will be required to pay the additional cost of providing the service to the higher standard in which a deterministic method is used for such works.

Over the forward planning period, a probabilistic method will be applied to determine whether any augmentation works to the shared network at these network levels are required:

- Transmission connection points;
- Sub-transmission lines;
- Zone substations;
- High-voltage (HV) feeder lines when demand is forecast up to the maximum safe loading limit.

JEN considers its planning approach to customer connection works is consistent with JEN’s network augmentation planning criteria.

4. CIC Gross Expenditure Forecasting Methodology

The purpose of this chapter is to explain the CIC gross expenditure forecasting methodology.

It explains the global level (i.e. top-down) capital expenditure forecasts, which are central to the gross connection plans, and the spatial level (i.e. bottom-up) forecasts for the descriptor metric volume and expenditure. The spatial level forecasts are then reconciled to the global level forecasts.

4.1 Overview

The methodology for preparing CIC expenditure calls for two sets of forecasts as follows:

- a global level (i.e. top-down) CIC expenditure forecast by SAP service codes; and
- a spatial level (i.e. bottom-up) forecast for the descriptor metric volume and expenditure using the global level forecast output as the growth index.

JEN reconciles its spatial forecasts to the global level forecasts to produce the final set of descriptor metric volume and expenditure forecasts as shown in Tables 2.5.1, 2.5.2 and 2.5.3 of workbook 1 – forecast, regulatory template 2.5. Both sets of forecasts are adopted for connection planning purposes.

The global and spatial level forecasting methodologies are discussed in turn below.

4.2 Global level gross connections capex forecast

The methodology for the global level CIC expenditure forecast by SAP service codes is documented in the methodology paper titled "Jemena Electricity Networks, Customer Connections Capital Forecast Methodology" and is summarised below.

The base data and model input data, which comes from independent sources, include:

- Actual CIC expenditure from prior years to determine the base year data (2-letter SAP service codes) and expenditure split (3-letter SAP service codes);
- Forecast of residential customer numbers produced by JEN's independent consultant [redacted];
- Australian Construction Market Report prepared by the Australian Construction Industry Forum (ACIF); and
- Major customer developments that are specific to JEN supply area come from JEN's direct engagement with its customers. These are above the baseline growth and driven from the macro-economic indices.

The growth rates calculated for the forecasts are:

- For activities CD, CH, CL and CM – the model assumes that the forecasts are driven by economic growth in the residential sector. Economic growth in residential sector is, in turn, driven by growth in customer numbers; hence [redacted] forecasts are used; and
- For activities CB, CR and CS - the model assumes that the forecasts are driven by economic growth in commercial and industrial sectors.
  - For activities CB and CS - economic forecasts by ACIF for "Melbourne non-residential sector (industrial, other commercial & miscellaneous)" is used; and
  - For activity CR - economic forecasts by ACIF for "Victoria engineering sector (roads & bridges railways harbours)" is used.

The output of the forecasting model is presented under the following activities. The annual forecasts under these activities are further split into 3-letter SAP service codes: From the 3-letter SAP service codes, the output can be grouped into the relevant service classification using the mapping table in Table 4-1.

- CH Medium density housing;
  - CHH and CHL
- CL Public lighting;
  - CLA, CLI, CLJ, CLN
- CD Dual and multiple occupancy;
  - CDA
- CB Business supply > 10kVA;
  - CBE, CBG, CBH, CBI, CBK, CBL, CBP, CBS and CBT
- CS Low density/ small business supplies < 10kVA;
  - CSO and CSU
- CM Service wire;
  - CMA, CMB, CMC, CME, CMU, CMV and CMZ
- CR Recoverable works.
  - CRB, CRE, CRP, CRR, CRS, CRU and CRV

Table 4-1: Customer connection activities and service classification

Service (Activity) Code	Description	Service classification
CB	Business Supply > 10kVA	Direct control service (standard control service)
CD	Dual & Multiple Occupancy	Direct control service (standard control service)
CH	Medium Density Housing URD/PURD	Direct control service (standard control service)
CL	Public Lighting	Direct control service (alternative control service)
CM	Service Wire Overhead and Underground	Direct control service (alternative control service), except CMV (Underground routine connections >100 amps) which is a standard control service.
CR	Capital Recoverable Works	Direct control service (standard control service)
CS	Low Density & Small Business Supplies < 10kVA	Direct control service (standard control service)

Refer to “JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131” for details of forecasting model.

4.3 Spatial level gross connections capex forecast

The spatial level forecast methodology for the descriptor metric volume and expenditure (refer Tables 2.5.1, 2.5.2 and 2.5.3 of Workbook 1 – forecast, regulatory template 2.5) is derived using the connection subcategory forecast expenditure and FY23/24 actual expenditure ratio, multiplied by the FY23/24 actual descriptor metric volume or expenditure as the 'base' year. The forecast volumes by connection classification in Table 2.5.3 are further split into new connections and upgrade to existing connections using a sample of projects for each connection subcategory.

The connection subcategory expenditure forecast is derived from the global level connections capex forecast output using SAP service code mapping method. Essentially, the descriptor metric volume and expenditure forecast in Tables 2.5.1, 2.5.2 and 2.5.3 of Workbook 1 – forecast, regulatory template 2.5 is either growing or declining at the same rate as the connection subcategory expenditure level.

Table 4-2 provides a more detailed calculation methodology for each variable in Tables 2.5.1, 2.5.2 and 2.5.3 of Workbook 1.

Table 4-2 Detailed Calculation Methodology

Base information		Data Type		Population approach		
Table number	**Table Name /Descriptor Metrics/ Connection Type**	**Actual Historical and/or Estimated Historical, Forecast**	**Reasons For estimation**	**Source**	**Methodology**	**Assumptions**
2.5.1	DESCRIPTOR METRICS (general)	Forecast	Not Applicable	Historical data used to derive 'Base Volume' and 'Base Expenditure' • Annual Category Analysis RIN – Template 2.5. Forecast volume and forecast expenditure • JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131 ; and • RIN E - Workbook 2.5 For connections capital expenditure forecast methodology and SAP service codes definitions: • "JEN - RIN - Support - Customer Connections - Forecast Methodology - 20250131". For Workbook 1 regulatory template 2.5 (connections) forecast model, see Excel spreadsheets named • "JEN – RIN – Support – Customer Initiated	In general, the forecast methodology for volume and expenditure is derived from the connection subcategory forecast expenditure and FY23/24 actual expenditure ratio, using the FY23/24 actual volume and expenditure as the 'base' year. The formulae for each descriptor metric is described below.	It is assumed that the forecast volume is growing at the same rate as the forecast expenditure. This assumption is considered reasonable as all the expenditure used in the forecast volume is based on direct unescalated cost, real$ (FY23-24, Dec), and any increase or decrease in the expenditure level is expected to result in similar output in the volume. Forecast descriptor metric

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
				Capital – Forecast Model – 20250131 "; and • "RIN E Workbook 2.5 .		expenditure within each connection subcategory is assumed to have the same ratio or split as the FY23/24 actual expenditure allocation. This assumption is considered reasonable as this is representative of the general expenditure allocation within each connection subcategory.
	Forecast Connection Numbers for the following subcategories: • Residential • Industrial & Commercial (C&I) • Subdivision	Forecast	Not Applicable	JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131 V1.0.xlsx	Derived from the following equation: $\mathbf{V_n} = \mathbf{V_b} * \frac{\mathbf{E_n}}{\mathbf{E_b}}$ Where: V_n is the forecast underground or overhead connections volume in year n; V_b is the 'base' underground or overhead connections volume, derived from the FY23/24 actual underground and overhead total connections volume multiplied by the FY21/22-FY23/24 average underground or overhead connections volume ratio; E_n is the forecast expenditure in year	

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
					n (direct unescalated cost, real$ (FY23-24, Dec) for the respective subcategories; E_b is the actual expenditure in FY23/24 for the respective subcategories.	
	Forecast Connection Embedded generation (EG)	Forecast	Not Applicable	As above.	Based on actual EG penetration rate derived in FY23/24. This penetration rate is then applied to Total Customer Number taken from [redacted] forecast.	It is assumed that this penetration rate remains constant over the forecasting period.
	Forecast volume (MVA & number), HV and LV circuit length (km) for the following subcategories: • Residential • C&I • Subdivision • EG	Forecast	Not Applicable	As above.	Derived from the following equation: $\mathbf{V_n = V_b * \frac{E_n}{E_b}}$ Where: V_n is the forecast volume for distribution substations (in MVA or number), HV or LV circuit length (in km) in year n; V_b is the 'base' distribution substations (in MVA or number), HV or LV circuit length (in km) derived from FY23/24 actual volume; E_n is the forecast expenditure in year n (direct unescalated cost, real$ (FY23-24, Dec) for the	

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
					respective subcategories; E_b is the actual expenditure in FY23/24 for the respective subcategories.	
	Forecast Expenditure (general)	Forecast	Not Applicable	RIN E – Workbook 2.5	Derived from the direct Maintenance Activity Type (MAT) code mapping for each descriptor metric. JEN started using MAT code to better capture expenditure since 2012/13.	
	Forecast Expenditure (Residential)			As above.	With the use of MAT code, forecast expenditure for SCS and ACS can be clearly distinguished. Therefore, Residential connection attributable to ACS (distinguished via the use of MAT code) are excluded from SCS expenditure.	
	Forecast Expenditure (C&I)	Forecast	Not Applicable	As above.	Derived from the forecast expenditure of relevant MAT codes attributable to Commercial & Industrial connections but excluding forecast expenditure for Data Centres (DC) connections. This is because DC connections take place mostly at the zone substation	

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
					level and upstream sub-transmission network. The C&I connection cost is then split into distribution subs, augmentation HV/LV based on FY23/24 actual expenditure ratio.	
	Forecast Expenditure (Subdivision)	Forecast	Not Applicable	As above.	Derived from the forecast of relevant MAT codes attributable to Subdivision connections. The forecast subdivision costs is then split into distribution subs, augmentation HV/LV based on FY23/24 actual expenditure ratio.	
	Forecast Expenditure (EG)	Forecast	Not Applicable	Not Applicable	Cost attributable to EG has not been separately reported historically. Hence, EG expenditure has not been separately forecast.	
	Customer service related metrics (Residential) • Mean days to connect residential customer with LV single phase connection • Volume of GSL breaches for residential customers	Forecast	Not Applicable	JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131	Prepared based on the average performance for FY20/21 to FY23/24 and remain constant throughout the forecasting period. Forecast for SCS was derived based on the expenditure ratio of SCS residential/Total residential Connection, except 'Mean days to	Assume forecast remains constant throughout the forecasting period.

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
	• Volume for customer complaints relating to connection services' • GSL payments				connect residential customer with LV single phase connection' (assume same mean days for both SCS and ACS connections).	
	Subdivision: 'Cost per lot'	Forecast	Not applicable	Not applicable as this is a calculated number based on forecast.	This forecast is determined by the 'sum of subdivision expenditure' divided by 'sum of underground & overhead connections'.	
2.5.2	COST METRICS BY CONNECTION CLASSIFICATION (general)	Forecast	Not Applicable	Historical data used to derive 'Base Expenditure': • Annual Category Analysis RIN – Template 2.5. Forecast expenditure and Workbook 1 regulatory template 2.5 (connections), see : • RIN E – Workbook 2.5. For connections capital expenditure forecast methodology and SAP service codes definitions: • "JEN - RIN - Support - Customer Connections - Forecast Methodology - 20250131	In general, the forecast methodology for expenditure is derived from the connection subcategory forecast expenditure and average proportion of historical expenditure (CY2019-FY23/24). The forecast expenditure for each connection classification is determined by mapping each connection classification to the SAP service codes and using the RIN E – Workbook 2.5 for the expenditure.	It is assumed that the expenditure ratio to connection type for each subcategory (residential, C&I and subdivision) remains constant throughout the forecasting period.
	Residential Connections	Forecast	Not Applicable	As above.	The applicable MAT codes are: • CD (Dual & Multiple Occupancy) • CM (Services)	

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
					Complex Connection LV and Complex Connection HV are generally not applicable for Residential connections.	
	C&I Connections	Forecast	Not Applicable	As above.	C&I connections carry the MAT code of CB*. There are two categories of C&I forecast expenditure: • baseline C&I expenditure is allocated to the relevant connection types based on historical proportion (average of CY2019 – FY23/24); and • major C&I project are either Complex connection HV (customer connected at HV) or Complex connection sub-transmission. Major Project forecast expenditure is individually assigned to either of the connection types based on the project characteristic.	

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
	Subdivision Connections	Forecast	Not Applicable	As above.	Subdivision connections carry the MAT codes of CH*. Forecast Subdivision expenditure is allocated to the relevant connection types based on historical proportion (average of CY2019 – FY23/24).	
	EG Connections	Forecast	Not Applicable	Not Applicable	Cost attributable to EG has not been separately reported historically. Hence, EG expenditure has not been separately forecast.	
2.5.3	VOLUMES BY CONNECTION CLASSIFICATION (general)	Forecast	Not Applicable	Historical data used to derive 'Base Volume' and 'Base Expenditure' • Annual Category Analysis RIN – Template 2.5. Forecast volume and forecast expenditure • JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131 ;	In general, the forecast methodology for volume and expenditure is derived from the connection subcategory forecast expenditure and FY23/24 actual expenditure ratio, using the FY23/24 actual volume and expenditure as the 'base' year.	It is assumed that the forecast volume is growing at the same rate as the forecast expenditure. This assumption is considered reasonable as all the expenditure used in the forecast volume is based on direct unescalated cost (real$, FY23-24, Dec) and any increase or decrease in the expenditure level is expected to result in similar

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
						output in the volume.
	Residential and Subdivision Conenctions	Forecast	Not Applicable	Historical data used to derive 'Base Volume' and 'Base Expenditure' • Annual Category Analysis RIN – Template 2.5. Forecast volume and forecast expenditure • JEN – RIN – Support – Customer Initiated Capital – Forecast Model – 20250131 .	Forecast volume for each connection classification is derived from the following equation: $V_n = V_b * \frac{E_n}{E_b}$ Where: Vn is the forecast volume for a connection classification in year n; Vb is the 'base' volume for a connection classification, derived from FY23/24 actual volume; En is a connection classification forecast expenditure in year n ((direct unescalated cost, real$ (FY23-24, Dec); Eb is a connection classification actual expenditure in FY23/24.	
	C&I Connections	Forecast	Not Applicable	As above	This follows the structure of C&I forecast expenditure: • Baseline C&I: Derived from the following equation: $V_n = V_b * \frac{E_n}{E_b}$ Where: Vn is the forecast volume for a connection classification in year n; Vb is the 'base' volume for a connection classification,	

Base information		Data Type		Population approach		
Table number	Table Name /Descriptor Metrics/ Connection Type	Actual Historical and/or Estimated Historical, Forecast	Reasons For estimation	Source	Methodology	Assumptions
					derived from FY23/24 actual volume; En is a connection classification forecast expenditure in year n (direct unescalated cost, real$ (FY23-24, Dec); Eb is a connection classification actual expenditure in FY23/24. • Major projects (volume attributable to a particular connection type is manually counted based on project characteristic).	
	EG Connection	**Forecast**	**Not Applicable**	As above.	**Same methodology** as EG connection volume forecast for Table 2.5.1 (as previously described).	

5. CIC Expenditure Forecasts for 2025-2031

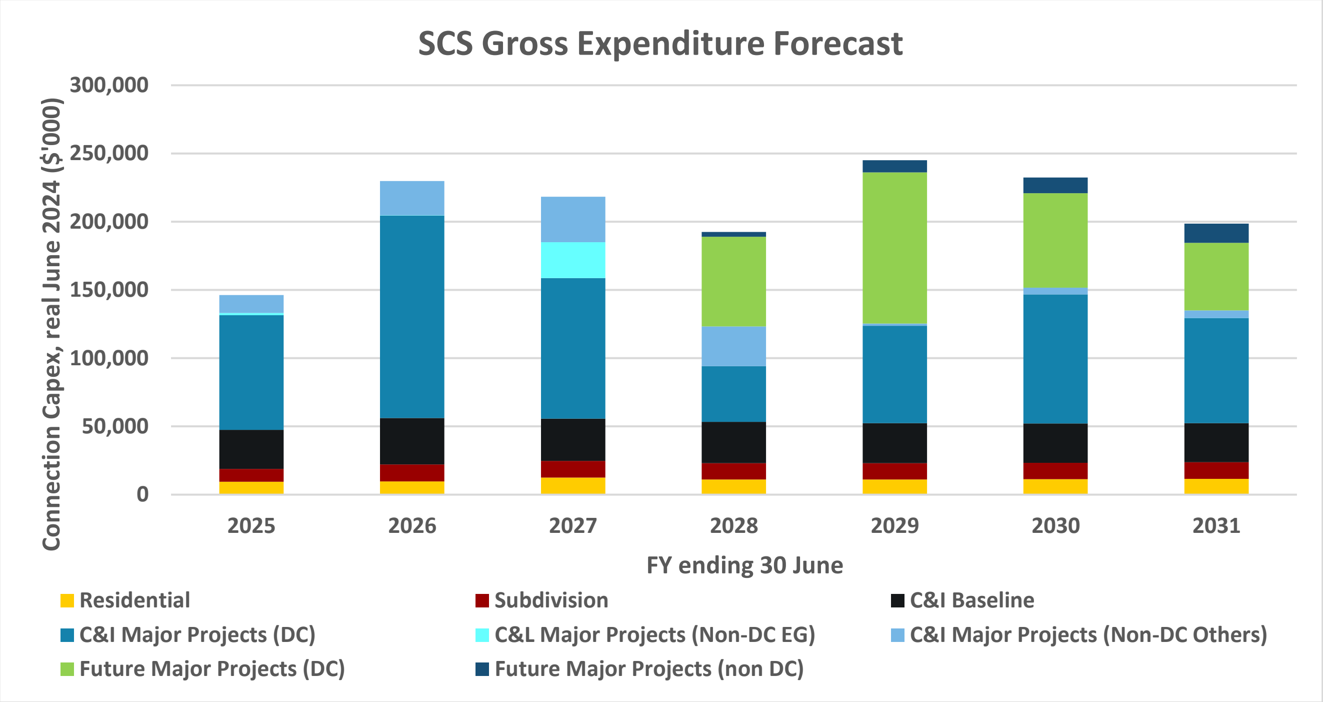
The purpose of this chapter is to summarise the CIC gross expenditure forecasts for the forthcoming regulatory period. As explained in Section 4, the global level forecasts are central to JEN's efficient connection planning.

Table 5-1 and Figure 5-1 below presents a summary of the CIC gross expenditure forecasts that will be required over the forthcoming regulatory period in order to meet the expected demand for customer initiated works for each of the connection subcategory (residential, commercial & industrial, subdivision and embedded generation).

Table 5-1: CIC gross expenditure forecast over the forthcoming regulatory period

Connection Subcategory	Financial year ending 30 June (direct cost, real June 2024 ($'000)							
	2025	2026	2027	2028	2029	2030	2031	Total (FY2027-31)
Residential	9,528	9,638	12,428	11,190	11,204	11,413	11,630	**57,866**
Commercial & Industrial								
• Baseline	28,579	34,199	30,909	30,141	29,259	28,877	28,787	**147,973**
• Major Projects Data Centre (DC)	84,054	148,234	102,962	40,810	71,381	94,474	76,907	**386,534**
• Major Projects (non-DC Emb. Gen)	1,545	280	26,370	-	-	-	18	**26,387**
• Major Projects (non-DC Others)	13,113	25,061	33,360	29,304	1,558	4,943	5,607	**74,771**
Subdivision	9,418	12,396	12,326	11,947	11,904	11,968	12,035	**60,180**
Total (excl Future Major Customers Projects)	**146,237**	**229,808**	**218,354**	**123,392**	**125,306**	**151,675**	**134,984**	**753,712**
Future Major Customers Projects Capex								
DC	-	-	-	65,523	110,820	69,195	49,552	**295,091**
Non-DC	-	-	-	3,699	9,043	11,622	14,160	**38,524**
Total Future Major Customers Projects Capex	**-**	**-**	**-**	**69,222**	**119,863**	**80,818**	**63,712**	**333,614**
Total SCS Connection Capex	**146,237**	**229,808**	**218,354**	**192,614**	**245,169**	**232,493**	**198,696**	**1,087,326**

Figure 5-1: CIC gross expenditure forecast over the forthcoming regulatory period



6. Demonstrating Rules Compliance

The purpose of this chapter is to set out the principal regulatory obligations that are relevant to the tasks of preparing customer connections forecasts and capital expenditure plans. The chapter concludes by explaining why JEN's approach to these tasks complies with these Rules requirements.

6.1 Relevant regulatory obligations

Clause 6.5.7(a) of the National Electricity Rules (the Rules) requires a building block proposal to include the total forecast capital expenditure for the relevant regulatory control period which the Distribution Network Service Provider considers is required in order to achieve each of the following (the capital expenditure objectives):

1. meet or manage the expected demand for standard control services over that period;
2. comply with all applicable regulatory obligations or requirements associated with the provision of standard control services;
3. maintain the quality, reliability and security of supply of standard control services;
4. maintain the safety of the distribution system through the supply of standard control services.

In addition, Clause 6.5.7(c) of the Rules also requires the forecast expenditure to reasonably reflect each of the following capital expenditure criteria:

1. the efficient costs of achieving the capital expenditure objectives;
2. the costs that a prudent operator would require to achieve the capital expenditure objectives; and
3. a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.

Clause 16(1) of the National Electricity Law requires the AER to exercise its economic regulatory function or power in a manner that will or is likely to contribute to the achievement of the National Electricity Objective. Section 7 of the NEL states that:

> "The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to -
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system."

A number of other regulatory instruments define JEN's obligations to provide direct control services and negotiated distribution services to customers. Important points relevant to these services include the following:

- JEN's Electricity Distribution Licence (Chapters 6 to 12) sets the obligations for JEN to offer connection services and supply to customers, embedded generators, asset relocation services including undergrounding, public lighting services, distribution services to other distributors and other excluded services;
- The AER determines the classification of services for JEN for each regulatory control period, in accordance with clause 6.2.1(a) and 6.12.1 (1) of the Rules;
- Chapter 5 – Part A – Network Connection of the Rules sets the framework for connection to the JEN network; and
- The VEDCoP (Chapter 3 – Connection of Supply) requires JEN to use best endeavours to connect the customer and sets out various obligations in relation to connection of supply.

6.2 Observations for connection planning and capital expenditure forecasting

In relation to connection planning and connection capital expenditure, the following observations can be drawn in relation to the regulatory provisions noted in section 6.1:

- JEN's capital expenditure forecasts must meet or manage the expected demand for standard control services (Clause 6.5.7(a)(1) of the Rules). Due to the nature of the customer connection demand, JEN considers the global level total forecast capital expenditure a realistic demand forecast, referred to in Clause 6.5.7(c)(3) of the Rules. A global level or network-wide capital forecast would be reasonable given the input cost into the forecasting model is also at the network level which enable JEN to "meet or manage the expected demand for standard control services."
- The capital expenditure criteria require JEN to take an efficient and prudent approach in determining the costs of achieving the capital expenditure objectives (clauses 6.5.7(c)(1) and (2) of the Rules). JEN's approach to connection planning and capital forecast are based on economic growth in residential, commercial and industrial sectors, delivers efficient outcomes that is consistent with the broader macro-economics in the JEN supply area. In terms of prudency, JEN considers the forecasting inputs (based on actual costs, independent forecasting economic indices and direct customer engagement) achieve a realistic expected expenditure and capital expenditure objectives.
- The National Electricity Objective is concerned with promoting efficient investment for the long term interests of consumers with respect to price, quality, safety, reliability and security of supply of electricity. JEN's methodology is aimed at providing a consistent, transparent and auditable approach underpinning the forecast capital expenditure required to meet the expected demand for customer connections and is focused on investing to meet customers' needs. JEN considers its planning approach to customer connection works is consistent with JEN's network augmentation planning criteria, and is regarded as good practice.

Appendix A
Major Customer Network Development Plans

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A1. Future Major Customers Projects

Refer to 'JEN – RIN – Support – Major Customers – Network Development Strategy – 20250131 (ELE-999-PA-EL-006) document which explains the development plans required to meet the needs of customers. Appendix C of ELE-999-PA-EL-006 contains references to either feasibility studies or scope of works prepared for known major customer connection projects.

A1.1 Future Major Projects

Known major customer connection projects (e.g. Data Centres) are included in CIC expenditure forecasts.

We also forecast 'future' (currently unknown) customer connections which will occur beyond the horizon of our known connections.

This forecast is based on the average incremental load of known customer load over a 10-year period. We apply this forecast from 2028. We forecast that future load will increase as known connections fall away (given the forecasting horizon of known connections).

We also adjust this forecast based on our general expectation around how these connections will change. For major customers we expect connections to be similar to what has been observed in the past. For data centres, we expect those connections will reduce over the period as the boom in data centre investment moderates.