



# Jemena Electricity Networks (Vic) Ltd

## Response to the Price Reset Regulatory Information Notice

Written Response

Information for the 2021-2026 Regulatory RIN



## 5. Replacement Capital Expenditure Modelling

5.1 In relation to information provided in *Workbook 1 – Regulatory determination, regulatory template 2.2* and with respect to the AER’s repex model, provide:

- (a) For individual asset categories in each asset group set out in the regulatory templates, provide in a separate document:
- (i) a description of the asset category, including:
    - (A) the assets included and any boundary issues (i.e. with other asset categories);
    - (B) an explanation of how these matters have been accounted for in determining quantities in the age profile;
    - (C) an explanation of the main drivers for replacement (e.g. condition); and
    - (D) an explanation of whether the replacement unit cost provides for a complete replacement of the asset, or some other activity, including an extension of the asset’s life (e.g. *pole* staking) and whether the costs of this extension or other activity are capitalised or not.
  - (ii) an estimate of the proportion of assets replaced for each year of the *current regulatory control period*, due to:
    - (A) aging of existing assets (e.g. condition, obsolesce, etc.) that should be largely captured by this form of replacement modelling;
    - (B) replacements due to other factors (and a description of those factors);
    - (C) additional assets due to the *augmentation*, extension, development of the network; and
    - (D) additional assets due to other factors (and a description of those factors).

### 5.1 (a)(i)(A)

JEN’s asset categories are aligned with asset categories defined in Appendix F of the reset RIN.

Asset categories are described in their respective Asset Class Strategies included as part of our Regulatory Proposal with the relevant sections identified below.

Asset Group	Asset Class Strategy
Poles	<i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i> <ul style="list-style-type: none"> <li>• Section 4.1 – Poles</li> </ul>
Pole Top Structures	<i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i> <ul style="list-style-type: none"> <li>• Section 4.2 – Pole Top Structures</li> </ul>
Overhead Conductors	<i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i> <ul style="list-style-type: none"> <li>• Section 4.3 – Conductors and Connectors</li> </ul>
Underground Cables	<i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i> <ul style="list-style-type: none"> <li>• Section 4.4 – Underground Distribution Systems</li> </ul>

Service Lines	<p><i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.8 – LV Overhead Services</li> </ul>
Transformers	<p><i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.5 – Pole Top Transformers</li> <li>Section 4.6 – Non-Pole Top Distribution Substations</li> </ul> <p><i>JEN - RIN - Support - Electricity Primary Plant Asset Class Strategy - 20200131 - Confidential</i></p> <ul style="list-style-type: none"> <li>Section 4.1 - Zone Substation Transformers and</li> <li>Section 4.4 - Zone Substation Instrument Transformers.</li> <li>Switchgear:</li> <li>Section 4.2 - Zone Substation Circuit Breakers</li> <li>Section - 4.3 Zone Substation Disconnectors and Buses</li> </ul>
Switchgear	<p><i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.7 – Overhead Line Switchgear</li> <li>Section 4.11 – HV Outdoor Overhead Fuses</li> <li>Section 4.13 – Automatic Circuit Reclosers</li> </ul> <p><i>EN - RIN - Support - Electricity Primary Plant Asset Class Strategy - 20200131 - Confidential</i></p> <ul style="list-style-type: none"> <li>Section 4.2 - Zone Substation Circuit Breakers</li> <li>Section - 4.3 Zone Substation Disconnectors and Buses</li> </ul>
Public Lighting	<p><i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.9 – Public Lighting</li> </ul>
SCADA, Network Control and Protection Systems	<p><i>JEN - RIN - Support - Secondary Plant Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.1 – GPS Clocks,</li> <li>Section 4.2 - Communications Network Devices,</li> <li>Section 4.3 - Zone Substation Remote Terminal Unit,</li> <li>Section 4.4 – Multiplexors,</li> <li>Section 4.5 – iNet Radio and 3G Service,</li> <li>Section 4.6 – Communications Cables,</li> <li>Section 4.7 – Protection and Control Equipment,</li> <li>Section 4.8 – DC Supply Systems</li> </ul> <p><i>JEN - RIN - Support - Electricity Measurement Asset Class Strategy - 20200131 - Confidential</i></p> <ul style="list-style-type: none"> <li>Section 4.2 – Power Quality Meters</li> </ul>
Other The asset group 'Other' includes the following asset categories: Zone Substation Property, Capacitor	<p><i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.10 – Earthing</li> </ul>

<p>Banks, Earthing Systems, Surge Arresters and Capital Recoverable Works.</p> <p>As required by the Schedule 2.16(b) Kiosk Transformer Refurbishment has been included under this category.</p>	<ul style="list-style-type: none"> <li>Section 4.12 - Distribution Surge Arresters</li> </ul> <p><i>JEN - RIN - Support - Electricity Primary Plant Asset Class Strategy - 20200131 - Confidential</i></p> <ul style="list-style-type: none"> <li>Section 4.7 - Zone Substation Earthing Systems</li> <li>Section 4.5 - Zone Substation Capacitor Banks</li> <li>Section 4.6 – Zone Substation Buildings and Grounds</li> </ul> <p><i>JEN - RIN - Support - Electricity Distribution Asset Class Strategy - 20200131 - Public</i></p> <ul style="list-style-type: none"> <li>Section 4.6 – Non-Pole Top Distribution Substations (REFURBISHED)</li> </ul>
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### 5.1 (a)(i)(B)

Individual asset age profiles have been provided for all of the Asset Categories with the exception of the additional categories displayed as ‘Other’ that were added by JEN as described in response to section 6.1(a)(i)(A).

Asset age profiles are derived as described in the Basis of Preparation for each of JEN’s annual Category Analysis RIN responses (template 5.2 – Age Profile).

### 5.1 (a)(i)(C)

Asset condition is the primary asset replacement driver. The following table provides a high level summary of the specific replacement programs by Asset Group. Further details about the replacement drivers can be found in the Asset Class Strategies (as identified in response to subsection (A) above) and the *JEN - RIN - Support - Network Performance Plan - 20200131 - Public*.

Asset Group	Condition-based replacement	Non-standard design replacement	Risk-based program
Poles	✓	✓ undersize pole replacement	
Pole Top Structures	✓ wooden crossarms		✓ HV and sub-transmission wooden crossarms in geographical areas that have been assessed as prone to pole top fires
Overhead Conductors	✓ conductors and connectors		<ul style="list-style-type: none"> <li>✓ steel conductor assessment in the HBRA</li> <li>✓ HV and LV line clash mitigation</li> <li>✓ LV mains removal in the HBRA</li> </ul>
Underground Cables	✓ underground cables and terminations		✓ trifurcating box replacement
Service Lines	✓ “non-preferred” service lines		

Transformers	✓ distribution and zone substation		
Switchgear	✓ distribution and zone substation		
Public Lighting	✓ public lighting poles and luminaires		
SCADA, Network Control and Protection Systems	✓		
Other The asset group 'Other' includes the following asset categories: Zone Substation Property, Capacitor Banks, Earthing Systems, Surge Arresters	✓ except where the project is part of capital recoverable works such as elective undergrounding and service relocations		

Notes:

- Condition based replacement refers to asset replacement where condition is the primary driver i.e. assets are in a poor condition with a high risk of failure, and are planned to be replaced prior to failure occurring.
- Non-standard design (condition driven) replacement refers to assets that have been superseded due to review of construction standards (e.g. undersized pole refers to an older vintage of pre 1970 poles that are no longer part of JEN construction standard and are progressively replaced with current standard poles)
- Risk based programs refer to condition driven replacement designed to mitigate safety hazards for example, fire hazards

### 5.1 (a)(i)(D)

Replacement unit costs for each asset group are described in the table below:

Asset Group	Explanation
Poles	Pole replacement unit cost includes replacement of the pole and an average number of crossarms on a pole. Pole staking refers to structural reinforcement of a limited life or an unserviceable pole. Expenditure and volumes are separately reported for these two activities.
Pole Top Structures	Replacement unit cost provides for a complete replacement of the crossarm and insulator set. Where insulators are replaced without replacing the crossarm then the insulators are reported separately and have a separate unit cost.
Overhead Conductors	Replacement unit cost provides for a complete replacement of the conductor and associated connectors. Where connectors or LV spreaders are replaced without replacing conductor then the connectors and LV spreaders are reported separately and have a separate unit cost.
Underground Cables	Replacement unit cost provides for a complete replacement of the asset. Surge Diverters are reported as separate asset categories and have a separate unit cost.

	HV and LV underground cable terminations are reported as separate asset categories and have a separate unit cost.
Service Lines	Replacement unit cost provides for a complete replacement of the asset.  The following assets are excluded as separate asset categories and have a separate unit cost: - Overhead to Underground Service replaced with Underground - Pillar to Pillar
Transformers	Replacement unit cost provides for a complete replacement of the asset. Kiosk transformer refurbishment is capitalised.
Switchgear	Replacement unit cost provides for a complete replacement of the asset.
Public Lighting	Replacement unit cost provides for a complete replacement of the asset.
SCADA, Network Control and Protection Systems	Replacement unit cost provides for a complete replacement of the asset.
Other The asset group 'Other' includes the following asset categories: Zone Substation Property, Capacitor Banks, Earthing Systems, Surge Arresters	Replacement unit cost provides for a complete replacement of the asset.

### 5.1 (a)(ii)

The proportion of assets replaced by the factors listed below have been provided in the following tables. Refer to JEN's Reset RIN Basis of Preparation which describes how the historical information has been prepared.

- (A) – replacement due to ageing of assets
- (B) – replacement due to other factors
- (C) – additional assets due to augmentation and customer initiated capex
- (D) – additional assets to other factors

Proportion replaced based on the total replacement volumes:

Asset Group	Replacement Factors	2016	2017	2018	2019	2020
<b>Poles</b>	Aging (condition)	61%	69%	86%	86%	78%
	Other Factors	23%	17%	8%	9%	13%
	Augex and network development	16%	13%	6%	6%	9%
	Other	0%	0%	0%	0%	0%
<b>Pole Tops</b>	Aging (condition)	64%	69%	77%	77%	76%
	Other Factors	4%	5%	3%	4%	3%
	Augex and network development	32%	26%	20%	19%	21%
	Other	0%	0%	0%	0%	0%
<b>Overhead Conductors</b>	Aging (condition)	100%	100%	100%	100%	100%
	Other Factors	0%	0%	0%	0%	0%
	Augex and network development	0%	0%	0%	0%	0%

	Other	0%	0%	0%	0%	0%
<b>Underground Cables</b>	Aging (condition)	100%	100%	100%	100%	100%
	Other Factors	0%	0%	0%	0%	0%
	Augex and network development	0%	0%	0%	0%	0%
	Other	0%	0%	0%	0%	0%
<b>Service Lines</b>	Aging (condition)	95%	97%	78%	97%	97%
	Other Factors	1%	0%	3%	2%	1%
	Augex and network development	4%	3%	19%	1%	3%
	Other	0%	0%	0%	0%	0%
<b>Switchgear</b>	Aging (condition)	59%	43%	65%	71%	62%
	Other Factors	12%	15%	12%	10%	12%
	Augex and network development	29%	42%	23%	19%	26%
	Other	0%	0%	0%	0%	0%
<b>Transformers</b>	Aging (condition)	60%	53%	55%	62%	64%
	Other Factors	9%	16%	16%	17%	12%
	Augex and network development	31%	31%	28%	20%	24%
	Other	0%	0%	0%	0%	0%
<b>Public Lighting</b>	Aging (condition)	86%	85%	85%	89%	86%
	Other Factors	14%	13%	13%	10%	13%
	Augex and network development	1%	2%	1%	1%	1%
	Other	0%	0%	0%	0%	0%
<b>SCADA</b>	Aging (condition)	72%	88%	1%	0%	38%
	Other Factors	0%	1%	0%	0%	0%
	Augex and network development	28%	12%	99%	0%	62%
	Other	0%	0%	0%	0%	0%

Proportion replaced based on the total population of assets in each asset group:

Asset Group	Replacement Factors	2016	2017	2018	2019	2020
<b>Poles</b>	Aging (condition)	0.52%	0.59%	1.32%	1.02%	0.87%
	Other Factors	0.20%	0.15%	0.12%	0.10%	0.14%
	Augex and network development	0.14%	0.12%	0.09%	0.07%	0.10%
	Other	0%	0%	0%	0%	0%
<b>Pole Tops</b>	Aging (condition)	1.10%	0.77%	0.94%	0.74%	1.17%
	Other Factors	0.08%	0.05%	0.04%	0.04%	0.05%

	Augex and network development	0.54%	0.29%	0.24%	0.18%	0.32%
	Other	0%	0%	0%	0%	0%
<b>Overhead Conductors</b>	Aging (condition)	0.23%	0.25%	0.03%	0.10%	0.14%
	Other Factors	0.00%	0.00%	0.00%	0.00%	0.00%
	Augex and network development	0.00%	0.00%	0.00%	0.00%	0.00%
	Other	0%	0%	0%	0%	0%
<b>Underground Cables</b>	Aging (condition)	0.02%	0.02%	0.02%	0.03%	0.06%
	Other Factors	0.00%	0.00%	0.00%	0.00%	0.00%
	Augex and network development	0.00%	0.00%	0.00%	0.00%	0.00%
	Other	0%	0%	0%	0%	0%
<b>Service Lines</b>	Aging (condition)	1.52%	1.55%	0.21%	1.69%	1.74%
	Other Factors	0.01%	0.01%	0.01%	0.03%	0.01%
	Augex and network development	0.07%	0.05%	0.05%	0.03%	0.05%
	Other	0%	0%	0%	0%	0%
<b>Switchgear</b>	Aging (condition)	0.93%	0.48%	1.00%	0.70%	0.85%
	Other Factors	0.19%	0.16%	0.18%	0.10%	0.16%
	Augex and network development	0.45%	0.47%	0.35%	0.19%	0.36%
	Other	0%	0%	0%	0%	0%
<b>Transformers</b>	Aging (condition)	0.75%	0.40%	0.56%	0.61%	0.73%
	Other Factors	0.11%	0.12%	0.17%	0.17%	0.14%
	Augex and network development	0.38%	0.23%	0.29%	0.20%	0.27%
	Other	0%	0%	0%	0%	0%
<b>Public Lighting</b>	Aging (condition)	1.72%	1.67%	1.38%	1.59%	1.59%
	Other Factors	0.28%	0.26%	0.22%	0.19%	0.24%
	Augex and network development	0.01%	0.03%	0.02%	0.02%	0.02%
	Other	0%	0%	0%	0%	0%
<b>SCADA</b>	Aging (condition)	0.65%	4.60%	0.07%	0.00%	1.17%
	Other Factors	0.00%	0.04%	0.00%	0.00%	0.00%
	Augex and network development	0.25%	0.62%	7.42%	0.00%	1.90%
	Other	0%	0%	0%	0%	0%

- (b) For the previous, current and *forthcoming regulatory control periods*, explain the drivers or factors that have changed *network* replacement expenditure requirements. Identify and quantify the relative effect of individual matters within the following categories:

- (i) rules, codes, licence conditions, statutory requirements;
- (ii) internal planning and *asset* management approaches;
- (iii) measurable *asset* factors that affect the need for expenditure in this category (e.g. age profiles, risk profiles, condition trend, etc.). Identify and quantify individual factors;
- (iv) the external factors that can be forecast and the outcome measured (e.g. demand growth, *customer numbers*) that affect the need for expenditure in this category. Identify and quantify individual factors, covering the forecasts and the outcome (external factors to be discussed here do not relate to changing obligations which are covered in paragraphs 10.3 and 10.8);
- (v) technology/solutions to address needs, covering:
  - (A) *network*;
  - (B) *non-network*; and
  - (C) any other significant matters.

#### 5.1(b)(i)

JEN is not aware of any specific rules, codes, licence conditions or statutory requirements that have changed network replacement expenditure requirements independently or materially.

JEN remains committed to delivering safety related programs as per our Electricity Safety Management System, including bushfire mitigation programs, line clearance solutions, pole top fire mitigation, non-preferred service replacement etc.

#### 5.1(b)(ii)

There are no changes to internal planning and asset management approaches that have materially changed network replacement expenditure requirements. However, it is worth noting that JEN is accredited to the international standard for Asset Management (ISO 55001) and Information Management (27001). Whilst this accreditation has not materially changed our expenditure requirements, it did improve our lifecycle management approach through providing:

- A standardised set of templates and tools to efficiently manage assets, allowing us to work in a more integrated way, and
- The framework and measures to enable us to track our progress against our objective of becoming a leading asset manager.

#### 5.1(b)(iii)

Measurable asset factors that affect the need for expenditure in this category (e.g. age profiles, risk profiles, condition trend, etc.) are discussed in Asset Class Strategies and the Network Performance Plan.

#### 5.1(b)(iv)

There are no specific external factors that we can point to as drivers of our replacement needs. As described in response to section 5.1(a)(i)(c) the primary driver of asset replacement is asset condition. In addition, there are several condition driven programs which are also aimed at reducing safety hazards on our network, which include:

Program	Description
<b>Pole Top Fire Mitigation Program</b>	Aimed at replacing our highest risk HV and sub-transmission crossarms that are still of a wooden construction. This replacement program, together with an enhanced inspection program, represents our pole top fire mitigation program.

	<p>This is an ongoing program, which commenced in 2000. We are proposing to continue pole top replacement under this program throughout the next regulatory period to further reduce the risk of pole top fires.</p>
<p><b>LV Mains Removal in Hazardous Bushfire Area</b></p>	<p>Program will progressively remove 40km of bare LV mains conductors and substitute with alternative LV distribution solutions such as aerial bundled conductor (<b>ABC</b>), underground cable and additional transformers; and be a cost effective way of reducing fire ignition risk.</p>
<p><b>Removal of Non-Preferred Service Lines</b></p>	<p>ABC is our standard construction type of overhead service lines since 1989. However, we still have approximately 50% of our overhead service lines that were constructed using what are now considered to be obsolete technologies (“non-preferred” service lines), mainly neutral screened conductors which were installed from the early-60s to mid-70s, and twisted wire (16%) which were installed from the mid-70s until the introduction of ABC.</p> <p>The main risks with these older types of service connection are public safety hazards:</p> <ul style="list-style-type: none"> <li>• customer safety incidents - the partial failure of a service could result in customers being involved in a safety incident</li> <li>• fires - the complete failure has resulted in ground fires in the past</li> <li>• lack of ground clearance - older overhead service lines are more likely to be below current ground clearance limits than recently installed service lines, and so, are more likely to be inadvertently interfered with by third parties.</li> </ul>
<p><b>Electric Line Clearance Solutions</b></p>	<p>Program is designed to meet the updated Electricity Safety (Electric Line Clearance) Regulations by applying engineering solutions in non-compliant locations where tree removal/trimming is not possible; and reduce exposure to risk of fire start, outage events, asset damage and safety incidents. Failure to implement this program is likely to result in an increasing trend of overhead service failures, deteriorating levels of safety and service reliability and non-compliance with electric line clearance regulations.</p>
<p><b>Underground Cable Trifurcating Boxes</b></p>	<p>Program will continue to address the population of underground cable metal trifurcating boxes that have a history of catastrophic failures resulting in damage to public property. Failure to implement this program will result in an increasing trend of trifurcating box failures, increased levels of public safety risk and property damage and deteriorating levels service reliability.</p>

**5.1(b)(v)(A)**

No specific impacts on replacement requirements.

**5.1(b)(v)(B)**

No specific impacts on replacement requirements.

**5.1(b)(v)(C)**

No specific impacts on replacement requirements.

Identify and provide information or documentation to justify and support any responses to paragraph 5.1(b) (i)-(v).

The information provided in response to paragraph 5.1(b) above should at least distinguish between the asset categories listed in *Workbook 1 – Regulatory determination, regulatory template 2.2*.

Relevant information and documentation has been provided in relation to the above responses. Refer specifically to our Asset Class Strategy documents (the table provided in response to paragraph 5.1(a)(i)(A) describes the relationships between our Asset Class Strategies and the asset categories listed in *Workbook 1 – Regulatory determination, regulatory template 2.2*) and our Network Performance Plan.