



Draft decision

Jemena Gas Networks (NSW) Ltd

Access arrangement 2015–20

Attachment 6: Capital expenditure

November 2014

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AER reference: 51741

Note

This attachment forms part of the AER's draft decision on Jemena Gas Networks' 2015–20 access arrangement. It should be read with other parts of the draft decision.

The draft decision includes the following documents:

Overview

Attachment 1 – services covered by the access arrangement

Attachment 2 – capital base

Attachment 3 – rate of return

Attachment 4 – value of imputation credits

Attachment 5 – regulatory depreciation

Attachment 6 – capital expenditure

Attachment 7 – operating expenditure

Attachment 8 – corporate income tax

Attachment 9 – efficiency carryover mechanism

Attachment 10 – reference tariff setting

Attachment 11 – reference tariff variation mechanism

Attachment 12 – non-tariff components

Attachment 13 – demand

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Shortened forms

Shortened form	Extended form
2010–15 access arrangement	Access arrangement for JGN effective from 1 July 2010 to 30 June 2015 inclusive
2010–15 access arrangement period	1 July 2010 to 30 June 2015 inclusive
2015–20 access arrangement	Access arrangement for JGN effective from 1 July 2015 to 30 June 2020 inclusive
2015–20 access arrangement period	1 July 2015 to 30 June 2020 inclusive
Access arrangement information	Jemena Gas Networks (NSW) Ltd, <i>Access Arrangement Information 2015–20</i> , 30 June 2014
Access arrangement proposal	Jemena Gas Networks (NSW) Ltd, <i>Access arrangement, JGN's NSW gas distribution networks, 1 July 2015 – 30 June 2020</i> , 30 June 2014
AER	Australian Energy Regulator
capex	capital expenditure
CAPM	capital asset pricing model
CCP	Consumer Challenge Panel
Code	National Third Party Access Code for Natural Gas Pipeline Systems
CPI	consumer price index
DRP	debt risk premium
ERP	equity risk premium
IPART	Independent Pricing and Regulatory Tribunal
I&C	industrial and commercial
IT	information technology
JGN	Jemena Gas Networks (NSW) Ltd (CAN 003 004 322)
MRP	market risk premium

Shortened form	Extended form
NECF	National Energy Consumer Framework
NGL	national gas law
NGO	national gas objective
NGR	national gas rules
opex	operating expenditure
PPI	partial performance indicators
PTRM	post-tax revenue model
RAB	regulatory asset base
RBA	Reserve Bank of Australia
Reference service agreement proposal	Jemena Gas Networks (NSW) Ltd, <i>Reference Service Agreement, JGN's NSW gas distribution networks</i> , 30 June 2014
RFM	roll forward model
RIN	regulatory information notice
RPP	revenue and pricing principles
SCADA	supervisory control and data acquisition
SLCAPM	Sharpe-Lintner capital asset pricing model
TJ	terrajoules
WACC	weighted average cost of capital

6 Capital expenditure

This attachment outlines our assessment of JGN's proposed conforming capex for 2009–14 and forecast capex for the 2015–20 access arrangement period.

6.1 Draft decision

Conforming capex for 2009–14

We approve \$775.8 million (\$2015) total net capex for 2009–14 as conforming capex under r. 79(1) of the NGR.

Table 6-1 AER approved capital expenditure by category over 2009–14 (\$million, 2015)

Category	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15 ^(a)
Connections/Market expansion	46.3	51.3	55.3	62.6	78.6	75.0
Augmentation/Growth capacity	11.6	31.6	28.9	6.0	7.0	6.8
Mains and service renewal	0.8	0.1	5.0	4.2	7.7	7.0
Facilities renewal and upgrade	9.0	7.9	17.9	10.5	10.7	21.2
SCADA	0.4	0.3	0.2	1.2	0.8	1.0
Meter renewal and upgrade	14.3	13.1	15.8	13.3	19.4	25.1
Government authority work	0.0	0.1	0.1	0.4	0.7	0.4
IT	0.0	41.3	28.0	12.7	11.6	38.6
Other - non-distribution	7.7	6.3	4.3	5.3	27.9	46.6
Overheads	15.6	17.6	23.3	24.2	25.7	26.2
GROSS TOTAL CAPITAL EXPENDITURE	107.9	185.5	189.1	143.3	191.0	249.0
Contributions	2.4	3.3	2.4	2.9	2.9	2.8
Asset disposals	0.2	7.2	3.2	1.8	0.2	0.1
NET TOTAL CAPITAL EXPENDITURE ^(b)	104.4	169.9	181.9	135.8	183.9	238.9

Source: AER analysis.

Note: (a) As set out in Attachment 2 the 2014-15 amounts have not been assessed by the AER as approved capex under this decision. This is because these values are estimates. The AER will undertake the assessment of whether the 2014-15 amounts are conforming capex as part of the next access arrangement determination.

(b) Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

Conforming capex for the 2015–20 access arrangement period

We approve \$918.6 million (\$2015) of JGN's proposed \$1,130.4 million (\$2015) total net capex for 2015–20 as conforming capex under r. 79(1) of the NGR.

Table 6-2 shows approved capex for the 2015–20 access arrangement period by category.

Table 6-2 AER approved capital expenditure^(a) by category over the 2015–20 access arrangement period (\$million, 2015)

Category	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Connections/Market expansion	58.9	61.4	60.4	59.3	59.5	299.6
Augmentation/Growth capacity	17.3	17.0	21.9	16.1	11.1	83.4
Mains and service renewal	12.5	16.1	12.4	8.5	9.7	59.1
Facilities renewal and upgrade	22.7	19.2	20.3	20.5	15.8	98.4
SCADA	0.6	0.5	0.7	0.7	0.7	3.2
Meter renewal and upgrade	24.3	26.7	27.3	25.8	22.9	126.9
Government authority work	0.4	0.4	0.4	0.4	0.4	1.9
IT	37.7	31.0	33.4	18.7	10.8	131.7
Other - non-distribution	7.4	3.3	4.0	7.4	4.7	26.8
Overheads	21.8	21.8	22.0	21.8	21.5	109.0
GROSS TOTAL CAPITAL EXPENDITURE	205.0	197.8	202.7	179.1	157.2	941.9
Contributions	5.6	4.5	4.1	4.1	4.1	22.4
Asset disposals	0.1	0.1	0.1	0.3	0.2	0.8
NET TOTAL CAPITAL EXPENDITURE ^(b)	199.3	193.2	198.4	174.7	152.9	918.6

Source: AER analysis.

Notes: (a) Including AER material and labour escalation adjustments.

(b) Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

Table 6-3 shows JGN's proposed capex compared with the AER's approved allowance for each category.

Table 6-3 Comparison of AER approved and JGN's proposed capital expenditure over the 2015–20 access arrangement period (\$million, 2015)

Category	Proposed	Approved ^(a)	Difference (\$millions)	Difference (%)
Connections/Market expansion	384.1	299.6	-84.6	-22.0%
Augmentation/Growth capacity	95.0	83.4	-11.6	-12.2%
Mains and service renewal	62.3	59.1	-3.2	-5.1%
Facilities renewal and upgrade	124.1	98.4	-25.7	-20.7%
SCADA	9.8	3.2	-6.5	-66.8%
Meter renewal and upgrade	163.9	126.9	-37.0	-22.6%
Government authority work	2.7	1.9	-0.8	-30.4%
IT	131.6	131.7	0.1	0.1%
Other - non-distribution	26.8	26.8	0.0	0.0%
Overheads	144.4	109.0	-35.4	-24.5%
GROSS TOTAL CAPITAL EXPENDITURE	1,148.5	941.9	-206.7	-18.0%
Contributions	17.3	22.4	5.1	29.6%
Asset disposals	0.8	0.8	0.0	0.0%
NET TOTAL CAPITAL EXPENDITURE ^(b)	1,130.4	918.6	-211.8	-18.7%

Source: AER analysis.

Notes: (a) Including AER material and labour escalation adjustments.

(b) Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

The reasons for our reductions are:

- JGN used an inconsistent basis for forecasting unit rates for connections, often only on the basis of one year of regional, material type and lay method composition. To have confidence that a forecast is based on efficient costs, we would expect to see a consistent treatment of historical averages that includes at least three years of data to adequately capture differences in composition. We substituted a five year historical average of unit rates. Our demand forecast of the total number of new connections is slightly lower than JGN's forecast. Together, our unit rate and volume changes explain a difference of \$84.6 million between JGN's proposed capex and our capex forecast.

- JGN applied its opex rate of change to network and corporate overheads. Consistent with our approach to escalating base opex, we have substituted our forecast of opex rate of change. Further, we do not consider that JGN has adequately justified the basis of its forecast for direct overheads. In anticipation of receiving more information from JGN to substantiate their magnitude we have estimated direct overheads on the basis of the two years of data that JGN has made available. We also adjusted down the amount of direct overheads included in our forecast to account for the direct overheads already captured in the historical unit rates we used to calculate our forecast capex for connections. This accounts for a \$35.4 million difference between JGN's proposed capex and our alternative estimate.
- For meter renewal and upgrade capex, we are not satisfied that JGN has justified particular replacement programs or there were unjustified step ups in the volume of replacements. This accounts for a \$37.0 million difference between JGN's proposed capex and our alternative estimate.
- For facilities renewal and upgrade capex, JGN did not justify the need for some replacements. In some instances its proposed costs which we were not satisfied are efficient. This accounts for a \$25.7 million difference between JGN's proposed capex and our alternative estimate.

6.2 JGN's proposal

2009–14 period

JGN proposed net total capex of \$775.8 million (\$2015) for 2009–14. This is 0.4 per cent above the amount approved by IPART for 2009-10 and 0.5 per cent below the amount approved by the AER for the 2010–14 access arrangement period.

Table 6-4 JGN's proposed capital expenditure over 2009-10 to 2013-14 (\$million, 2015)

Category	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Connections/Market expansion	46.3	51.3	55.3	62.6	78.6	75.0
Augmentation/Growth capacity	11.6	31.6	28.9	6.0	7.0	6.8
Mains and service renewal	0.8	0.1	5.0	4.2	7.7	7.0
Facilities renewal and upgrade	9.0	7.9	17.9	10.5	10.7	21.2
SCADA	0.4	0.3	0.2	1.2	0.8	1.0
Meter renewal and upgrade	14.3	13.1	15.8	13.3	19.4	25.1
Government authority work	0.0	0.1	0.1	0.4	0.7	0.4
IT	0.0	41.3	28.0	12.7	11.6	38.6
Other - non-distribution	7.7	6.3	4.3	5.3	27.9	46.6
Overheads	15.6	17.6	23.3	24.2	25.7	26.2

GROSS TOTAL CAPITAL EXPENDITURE	107.9	185.5	189.1	143.3	191.0	249.0
Contributions	2.4	3.3	2.4	2.9	2.9	2.8
Asset disposals	0.2	7.2	3.2	1.8	0.2	0.1
NET TOTAL CAPITAL EXPENDITURE	104.4	169.9	181.9	135.8	183.9	238.9

Source: JGN, 2015-20 Access Arrangement Information, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

Note: Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

2015–20 access arrangement period

JGN proposed net total capex of \$1,130.4 million (\$2015) for the 2015–20 access arrangement period. This represents a real increase of 29.6 per cent over the amount approved by the AER for the 2010–15 access arrangement period.

Table 6-5 JGN proposed capital expenditure by category over the 2015–20 access arrangement period (\$million, 2015)

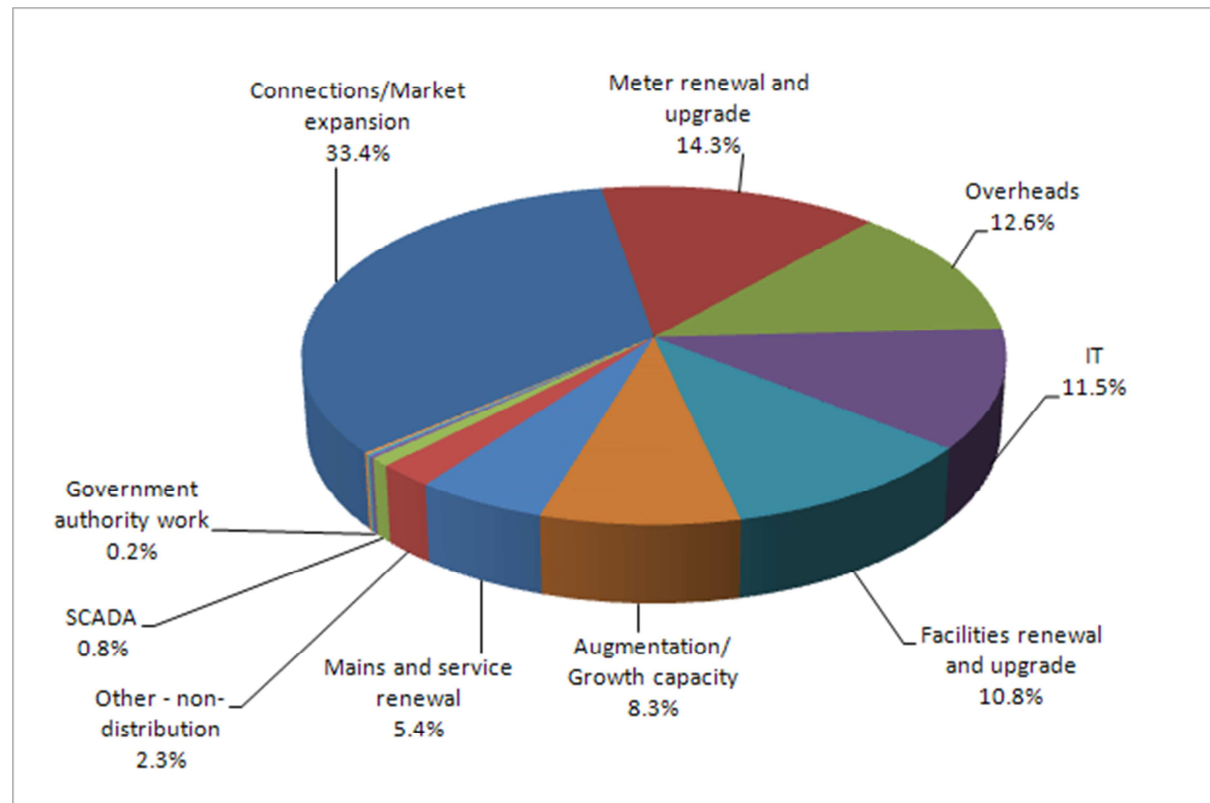
Category	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Connections/Market expansion	73.5	77.8	78.5	77.0	77.3	384.1
Augmentation/Growth capacity	18.0	18.5	23.3	19.3	15.9	95.0
Mains and service renewal	12.9	16.7	13.4	9.1	10.3	62.3
Facilities renewal and upgrade	24.5	21.9	27.4	29.1	21.1	124.1
SCADA	1.3	2.7	2.8	2.2	0.7	9.8
Meter renewal and upgrade	31.7	33.5	35.5	33.1	30.1	163.9
Government authority work	0.5	0.5	0.5	0.5	0.5	2.7
IT	37.6	31.0	33.5	18.7	10.8	131.6
Other - non-distribution	7.4	3.3	4.0	7.4	4.7	26.8
Overheads	28.5	29.0	29.5	29.0	28.3	144.4
GROSS TOTAL CAPITAL EXPENDITURE	237.9	235.7	248.7	225.9	200.3	1,148.5
Contributions	3.1	3.3	3.5	3.6	3.7	17.3
Asset disposals	0.1	0.1	0.1	0.3	0.2	0.8

NET TOTAL CAPITAL EXPENDITURE	234.7	232.2	245.0	222.0	196.4	1,130.4
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Source: JGN, 2015-20 Access Arrangement Information – Public, 30 June 2014, p.69; JGN, 2015-20 Access Arrangement Information, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.
Note: Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

The major components of the forecast gross total expenditure are connections/ market expansion (33 per cent), meter renewal and upgrade (14 per cent), overheads (13 per cent), facilities renewal and upgrade (11 per cent) and augmentation/ growth capacity (8 per cent) (see Figure 6-1).

Figure 6-2 Composition of JGN's total capex for 2015–20 (\$million, 2015)



Source: AER analysis.

6.3 Assessment approach

We must make two decisions regarding JGN's capex. First, we are required to assess past expenditure and determine whether it meets the criteria set out in the NGR to be added to the starting capital base.¹ Where capex meets these criteria, it is referred to as "conforming".² Secondly, we are required to assess JGN's proposed forecast of required capex for the 2015-2020 period to determine whether it is 'conforming.' The following sections set out our approach and the tools and techniques we employ in forming a view on these two issues. We also need to take into account timing issues associated with the lag between actual capex data being available and the need to forecast an opening capital base. This is explained in the next section.

6.3.1 NGR requirements for conforming capital expenditure

Capex will be conforming if it:

¹ NGR, r. 77(2)(b).
² NGR, r. 79.

- meets the definition of capex in r. 69 of the NGR. Capex is defined as costs and expenditure of a capital nature incurred to provide, or in providing, pipeline services
- is based on a forecast or estimate which is supported by a statement of the basis of the forecast or estimate required under r. 74(1) of the NGR. In accordance with r. 74(2) of the NGR, any forecast or estimate submitted must:
 - be arrived at on a reasonable basis; and
 - represent the best forecast or estimate possible in the circumstances.³
- conforms with the new capex criteria in r. 79 of the NGR. There are two essential criteria that must both be met under this rule:
 - The expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with good industry practice, to achieve the lowest sustainable cost of providing services; and
 - The expenditure must be justifiable on one of four grounds set out in r. 79(2) of the NGR.

The four grounds set out in r. 79(2) of the NGR can be summarised as follows. The capex must either:

- have an overall economic value that is positive
- demonstrate an expected present value of the incremental revenue that exceeds the expenditure
- be necessary to maintain and improve the safety of services, or maintain the integrity of services, or comply with a regulatory obligation or requirement, or maintain capacity to meet levels of demand existing at the time the capex is incurred, or
- be justifiable as a combination of the preceding two dot points.

Rule 79(3) of the NGR provides:

In deciding whether the overall economic value of capital expenditure is positive, consideration is to be given only to economic value directly accruing to the service provider, gas providers, users and end users.

We have limited discretion when making decisions under r. 79 of the NGR.⁴ This means that we must approve a particular element of the access arrangement proposal if we are satisfied that that element complies with the applicable requirements of the NGR and NGL and is consistent with any criteria set out in the NGR or NGL.⁵

6.3.2 Assessment of conforming capital expenditure in the previous period

In assessing JGN's proposed capex in the earlier access arrangement period, we reviewed JGN's supporting material. This included information on JGN's reasoning and, where relevant, business cases, audited regulatory accounts, and other relevant information. This information helped us identify whether capex over the earlier access arrangement period was conforming capex and, in turn,

³ NGR, r. 74(2).

⁴ NGR, r. 79(6).

⁵ NGR, r. 40(2).

whether that capex should be included in the opening capital base in accordance with r. 77(2)(b) of the NGR.

We do not approve certain information and forecasts provided by JGN if the information does not meet the requirements set out in the NGR.⁶ We must exercise our economic regulatory functions in a manner that will or is likely to contribute to the achievement of the NGO.⁷ For instance, having regard to the NGO, we take the view that a prudent service provider will seek cost efficiencies through continuous improvements, and that customers ultimately share in these benefits. This also provides the service provider with a reasonable opportunity to recover at least its efficient costs in accordance with the revenue and pricing principles.

Although the capital base roll forward relates to the 2010–15 access arrangement period, we are also required to adjust for the difference between actual and forecast capex in the capital base.⁸ Generally, the final year of the previous access arrangement period is based on forecast capex (in this case, 2009–10). Therefore, our assessment of conforming capex includes the regulatory years for 2009–14. This is because:

- 2009–10 capex—when conducting the previous access arrangement review, we did not yet have actual capex for 2009–10. We therefore included in the capital base benchmark JGN's estimate of capex for 2009–10. Since actual capex is now available for 2009–10, we have assessed whether JGN's actual capex for 2009–10 is conforming capex under the NGR.⁹ This conforming capex is now included in the capital base roll forward.¹⁰
- 2010–14 capex—for this access arrangement review, we have the actual capex for 2010–14. We have assessed whether JGN's actual capex for 2010–14 is conforming under the NGR for inclusion in the capital base roll forward.¹¹
- 2014–15 capex—for this access arrangement review, we do not yet have actual capex for 2014–15. We have therefore included in the capital base roll forward JGN's estimate of capex for 2014–15. At the next access arrangement review, we will assess whether JGN's actual capex for 2014–15 is conforming capex under the NGR.¹²

We assessed the key drivers for the capex to assess whether JGN's proposed capex in the projected capital base complies with the capex criteria in r. 79(1) of the NGR. In doing so, we relied on the following information:

- The access arrangement information (AAI) - this document outlines JGN's program of capital expenditure and describes the main drivers of increased capital expenditure¹³
- The Asset Management Plan, IT Strategy and Asset Management Plan, and appendices which provided specific expenditure detail¹⁴
- JGN RIN template and basis of preparation¹⁵

⁶ For instance, r. 74 of the NGR requires estimates and forecasts to be made on a reasonable basis, amongst other things.

⁷ NGL, s. 28(1).

⁸ NGR, r. 77(2)(a).

⁹ NGR, r. 79.

¹⁰ NGR, r. 77(2)(b).

¹¹ NGR, r. 79 and r. 77(2)(b).

¹² NGR, r. 79.

¹³ JGN, 2015-20 Access Arrangement Information, 30 June 2014.

¹⁴ JGN, 2015-20 Access Arrangement Information, 30 June 2014: Appendices 6.1, 6.2, 6.3, 6.5, 6.6, 6.7, 6.8, 6.9.

- Opportunity briefs which detail expenditure requirements of specific projects¹⁶
- JGN tender and contract documentation¹⁷
- Capex forecast model.¹⁸

Initially we assessed whether the proposed capex is justified on one of the four grounds under NGR r. 79(2). We then assessed the prudence and efficiency of the proposed capex. For analysis purposes the capex was broken into categories depending on whether the expenditure is driven by:

- Growth in demand - extensions, connections, augmentation
- Replacement on the basis of asset life, obsolescence, safety or regulatory obligations - mains, services, meters, regulators, city gates, IT, SCADA, or
- Other - new regulatory or safety obligations, opex or reliability improvements.

For each category of expenditure the scope, timing and cost of the proposed expenditure was considered in order to form a view on the prudence and efficiency of the expenditure. The assessment also considered whether cost forecasts have been arrived at on a reasonable basis and represent the best forecast possible in the circumstances.

6.3.3 Assessing forecast capex for the 2015-2020 access arrangement period

The following sections set out our approach to assessing JGN's forecast of required capex for the 2015-2020 access arrangement period. Our tools and techniques cover:

- assessing whether any outsourcing to third-parties reflect genuine arm's length arrangements
- assessing historical expenditure under the revealed cost approach
- how we compare costs against previous decisions we have made (benchmarking)
- consideration of technical engineering advice
- determining the appropriate allowance for equity raising costs.

Assessing competitive tender processes for outsourced activities

Outsourcing to specialist providers of a particular service is a common means by which businesses in the economy are able to gain access to economies of scale and scope and other efficiencies.

Where JGN has used tendered rates as the basis of proposed unit costs, we relied on our approach to assessing outsourcing arrangements.¹⁹ The first stage of the conceptual framework is a

¹⁵ JGN, 2015-20 Access Arrangement Information, 30 June 2014: Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM, Appendix B to the AA RIN response - Basis of preparation - CONFIDENTIAL.

¹⁶ JGN, 2015-20 Access Arrangement Information, 30 June 2014.

¹⁷ JGN, 2015-20 Access Arrangement Information, 30 June 2014: Appendix 9 Related party transactions, supporting documentation [CONFIDENTIAL].

¹⁸ JGN, 2015-20 Access Arrangement Information, 30 June 2014, Appendix 6.4.

¹⁹ AER, Better Regulation: Expenditure Forecast Assessment Guideline for Electricity Distribution, November 2013, pp. 9-10.

'presumption threshold' designed to be an initial filter to determine which contracts can be presumed to reflect efficient costs that would be incurred by a prudent operator.²⁰

In undertaking this 'presumption threshold' assessment, we consider:

- Did the service provider have an incentive to agree to non-arm's length terms at the time the contract was negotiated (or at its most recent re-negotiation)?
- If yes, was a competitive open tender process conducted in a competitive market?

In the absence of an incentive to agree to non-arm's length terms, we consider it reasonable to presume a contract price reflects efficient costs. We also consider this presumption to be reasonable where an incentive to agree to non-arm's length terms exists but the contract was the outcome of a competitive open tender process in a competitive market.²¹

Where an arrangement 'passes' the presumption threshold, we consider the starting point for setting future expenditure allowances should be the contract price itself, with limited further examination. This further examination involves checking whether the contract wholly relates to the relevant services and whether the contract price already compensates for risks or costs provided for elsewhere in the building blocks.

Revealed cost approach

The revealed cost approach considers information revealed by the past performance of a gas business. Under the ex ante regime, gas businesses are rewarded for spending less capex than allowed by the regulator. This incentive enables us to place some reliance on the historical costs of a gas business when reviewing its forecast capex. We used historical costs and volumes as an indicator of efficient costs and volumes for certain categories of capex. In particular, we used historical total costs, unit costs and volumes in assessing connections, mains and services replacements, meter replacements, SCADA and IT.

The revealed cost approach is an accepted industry practice. Many gas businesses, including JGN, have used this approach as a basis to forecast expenditure proposals. This approach has also been used previously by us in our assessment of access arrangement proposals for the Victorian gas businesses.

Benchmarking against the other businesses' proposed unit costs and volumes

We also conducted comparative analysis of unit costs JGN has used to develop its capex forecast. Comparing the costs incurred by one regulated entity against the costs incurred by other regulated entities in similar circumstances, and using the comparison to assess the efficiency and prudence of those costs, is known as 'benchmarking'. We consider that the use of benchmarking to assess whether capex is conforming is consistent with the requirements of the NGR.

We undertook a high level benchmarking of a selection of JGN's unit costs against similar unit costs of the Victorian gas businesses. Where required some adjustment for compositional difference was made. This comparison was used for assessing connections, mains and services replacements, meter renewals and upgrade and SCADA.

²⁰ NGR r. 71(1).

²¹ NGR r. 71(1).

Where this benchmarking indicated that JGN's capex may not be efficient, we undertook a detailed review of JGN's proposal. Our detailed review involved consideration of relevant documentation and the impact of factors expected to differ from the past and/or from the Victorian gas businesses.

We recognise that forecast efficient costs may legitimately depart from those revealed through past performance, and compared with other gas businesses. For example, gas businesses may discover more efficient processes over time. The gas businesses may propose that they can best achieve their safety, reliability or regulatory obligations by incurring expenditure to implement new, more efficient processes, and include such expenditure in their proposed forecast capex. We consider it likely that a prudent service provider, acting efficiently, would only change operating processes (from revealed, or otherwise efficient processes) if they are likely to result in efficiency gains (in the absence of any information to suggest other reasons for the change). Where we consider that future cost savings should result from capex investments, we have taken this into consideration in determining JGN's opex allowance.

Specialist technical advice

We engaged an engineering consultant, Sleeman Consulting, to provide specialist technical advice on the prudence and efficiency of JGN's proposed augmentation, facilities renewal and upgrade, metering renewal and upgrade, mains and services renewal and SCADA capex.²²

Cash flow analysis for equity raising costs

To determine the amount of equity raising costs, we have undertaken an assessment of benchmark cash flows calculated in the PTRM. Under this method, a prudent service provider, acting efficiently, would first exhaust the cheapest sources of funding, such as internal cash flows, before using more expensive external sources of funding, such as equity financing. The cash flow modelling approach used by the AER incorporates this assumption to determine if any external equity financing would be required based on the AER's capex forecast for JGN. For further discussion see attachment 3 of this draft decision (rate of return).

6.3.4 Interrelationships

In assessing JGN's total forecast opex we took into account other components of its regulatory proposal, including:

- the trade-off between potential capex and opex solutions in our assessment of JGN's proposed capex.
- Any change in the capitalisation policy applied between the current access arrangement and the 2015–20 access arrangement period. This relates to the change from the expensing of pigging in the current access arrangement period to capitalising in the next access arrangement and the change from the capitalising of access arrangement and consumer engagement costs in the current access arrangement period to expensing in the next access arrangement period.

²² Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014;

6.4 Reasons for draft decision

6.4.1 Conforming capex for 2009–14

We consider that the \$775.8 million (\$2015) net capex incurred by JGN for 2009–14 is conforming capex that complies with r. 79(1) of the NGR.

In reaching this view we have considered the following factors:

- JGN's network capex was 0.4 million (0.4 per cent) over the IPART approved amount of \$104.0 million for 2009–10.
- JGN's network capex was 3.4 million (0.5 per cent) under the AER approved amount of \$674.9 million for 2010–14.
- JGN spent less than our forecast on its network in seven out of 11 categories for 2010-14. In five categories, the under spend was greater than 20 per cent below forecast - see table 6-6.
- The largest underspends for 2010-14²³ occurred in the connections/market expansion, meter renewal and upgrade and facilities renewal and upgrade categories:
 - In the connections/market expansion category, JGN spent \$48.0 million less forecast due to a smaller volume of new connections occurring than was approved and lower industrial and commercial meter average costs²⁴
 - In the meter renewal and upgrade category, JGN spent \$36.2 million less than forecast due to lower project costs for the 'Replacement of 106 Meter Regulators' and deferral of and lower volumes of tariff meter replacement²⁵
 - In the facilities and renewal category, JGN spent \$14.0 million less forecast due to an APA project delay with consequential delay to a country packaged off-take station (POTS) project²⁶
- The largest overspends for 2010-14 occurred in overheads, other non-distribution, information technology (IT) and related party margin categories:
 - In the overheads category, JGN exceeded the forecast by \$64.0 million due to an IT roll-over that was directly allocated from Jemena Group corporate to JGN.²⁷
 - In the IT category, JGN spent \$23.2 million more than forecast due to changes in project scope and the implementation of transitional NECF, which was not included in the forecast.²⁸

In its submission, Origin Energy noted that JGN's capex on IT and other non-system assets had considerably increased in the early and later years of the period. It questioned what JGN had spent the allocation on given the upgrade to the proposed SAP operating system has yet to be completed.²⁹ JGN stated that the project commenced in the current access arrangement period with a two stage implementation from 2014-17.³⁰ Delta Electricity submitted that JGN had overspent its allowance by

²³ Only the 2010-14 period comparison by category has been presented as the IPART decision was not made on the same category basis and was not in the same level of detail as the AER 2010-15 Access Arrangement Decision.

²⁴ JGN, Revenue proposal, June 2014, p. 29.

²⁵ JGN, Revenue proposal, June 2014, p. 29.

²⁶ JGN, Revenue proposal, June 2014, p. 29.

²⁷ JGN, Revenue proposal, June 2014, p. 29.

²⁸ JGN, Revenue proposal, June 2014, p. 29.

²⁹ Origin Energy, Response to Jemena Gas Networks Access Arrangement - Initial Proposal 2015-20, August 2014, p. 9.

³⁰ JGN, Revenue proposal, June 2014, Att6.7 Forecast capital expenditure report, June 2014, p.38.

\$76 million and questioned why JGN's overspend should be included in the regulatory asset base.³¹ It didn't specify any particular areas of concern. The National Gas Rules require us to assess whether any overspend is prudent and efficient. Network service providers may incur unforeseen capex which is prudent and efficient and so is legitimately rolled into the asset base.

Table 6-6 Comparison of AER approved and JGN capital expenditure over 2010–14 (\$million, 2015)

Category	Proposed	Approved ^(a)	Difference (\$million)	Difference (%)
Connections/Market expansion	247.9	295.9	-48.0	-16.2%
Augmentation/Growth capacity	73.4	64.4	9.0	14.0%
Mains and service renewal	17.0	19.0	-2.0	-10.5%
Facilities renewal and upgrade	47.2	61.1	-14.0	-22.8%
SCADA	2.5	6.1	-3.6	-59.0%
Meter renewal and upgrade	61.7	97.9	-36.2	-37.0%
Government authority work	1.3	2.5	-1.2	-49.3%
IT	93.6	70.5	23.2	32.9%
Other - non-distribution	43.8	18.6	25.2	136.0%
Overheads	90.8	26.8	64.0	239.3%
GROSS TOTAL CAPITAL EXPENDITURE	708.9	680.5	28.4	4.2%
Contributions	24.9	5.6	19.3	342.6%
Asset disposals	12.5	0.0	12.5	
NET TOTAL CAPITAL EXPENDITURE ^(b)	671.4	674.9	-3.4	-0.5%

Source: JGN, *2015-20 Access Arrangement Information*, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM; AER analysis.

Notes: (a) Including AER material and labour escalation adjustments.

(b) Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

6.4.2 Conforming capex for the 2015–20 access arrangement period

Our forecasts discussed in this section do not include our adjustment to JGN's proposed labour and material cost escalation factors. For our forecasts which include these adjustments see table 6-7. Our

³¹ Delta Electricity, Jemena Gas Networks - Proposed 2015-2020 Access Arrangement, 22 August 2014, p. 2.

assessment of labour and material cost escalation is contained in section 7.5.3 of attachment 7 (opex) and appendix section A.6 of attachment 6 (capex) below.

We approve \$892.1 million (\$2015)³² of JGN's proposed \$1,083.9 million total net capex for the 2015–20 access arrangement period (see Table 6-7).

Table 6-7 AER approved capital expenditure over the 2015–20 access arrangement period (\$million, 2015)^(a)

Category	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Connections/Market expansion	58.2	60.4	58.9	57.4	57.2	292.1
Augmentation/Growth capacity	17.0	16.6	21.1	15.4	10.5	80.6
Mains and service renewal	12.3	15.7	12.0	8.2	9.2	57.4
Facilities renewal and upgrade	22.3	18.7	19.7	19.6	15.0	95.3
SCADA	0.6	0.5	0.7	0.7	0.7	3.2
Meter renewal and upgrade	24.1	26.3	26.8	25.2	22.2	124.5
Government authority work	0.4	0.4	0.4	0.4	0.4	1.8
IT	37.1	30.3	32.3	17.9	10.3	127.9
Other - non-distribution	7.3	3.3	4.0	7.4	4.7	26.7
Overheads	21.4	21.1	21.0	20.5	19.9	104.0
GROSS TOTAL CAPITAL EXPENDITURE	202.3	193.6	196.7	172.6	150.1	915.3
Contributions	5.6	4.5	4.1	4.1	4.1	22.4
Asset disposals	0.1	0.1	0.1	0.3	0.2	0.8
NET TOTAL CAPITAL EXPENDITURE ^(b)	196.6	189.0	192.4	168.2	145.9	892.1

Source: AER analysis, JGN.

Note: (a) Excluding AER adjustment for material and labour escalation.

(b) Totals do not add as JGN claimed confidentiality over mines subsidence and related party margin expenditure.

Our analysis of the capex driver categories is presented below.

Connections/Market expansion

Distribution businesses have a regulatory obligation to connect residential and commercial/industrial customers to the distribution network upon request. The capex associated with connecting customers

³² Excluding AER adjustment for material and labour escalation.

to the distribution network generally includes the cost of new mains, gas service pipe from the main to the meter, and the meter. As connecting customers is a regulatory obligation, we consider that connections expenditure is justified under r. 79(2)(c)(iii) of the NGR.

We have included \$292.1 million (\$2015, unescalated direct costs, excluding overheads) of connections capex in its alternative capex estimate (see table 6-11). This is lower than JGN's forecast expenditure of \$356.6 million (\$2015, unescalated direct costs, excluding overheads).³³ Our reduction of around 18 per cent is driven by a change in the number of new connections likely to be required and a change in the costs per connection. The number of new connections is discussed in the next section.

JGN attributes the increase in proposed expenditure to an increase in the number of new connections, particularly in new estates and medium/high density premises, and an increase in the unit rates. JGN submits that the increase in unit rates is due to the new contractual arrangements and real cost escalation.³⁴

JGN calculated the total capital expenditure for connections by determining the unit costs for mains, services, meters and associated equipment components and the forecast number of new connections for each segment of Tariff V class customers. The four Tariff V segments include electricity to gas conversions, new estates, medium density/high rise residential developments and industrial and commercial connections.

While we agree with this forecasting approach, we do not consider that JGN's unit rate composition used in determining the cost per connection is arrived at on a reasonable basis and is the best estimate in the circumstances.³⁵ This is because we assess that JGN's unit rates composition is based on one year of data instead of an average over a number of years. As there can be significant differences in regional composition, material types and lay methods between years, we consider that to have confidence that the costs underlying a forecast are efficient, at least three years of data is required.

In addition, we are not satisfied that JGN had adequately justified increases in the metres of mains/connection for medium density/high rise connections and I&C tariff connections. This is discussed in more detail below.

JGN proposed forecasting Tariff D connections expenditure at a total expenditure level rather than applying a unit rate and volume approach. For Tariff D customers expenditure tends to be lumpy in nature due to the heterogeneity in customer size and the volatility in the number of the connections. We consider an assessment of total expenditure rather than a unit rate and volume assessment is a reasonable forecasting approach to assessing proposed Tariff D connections capex.

Set out below are the elements of our assessment of the connections expenditure forecast.

Tariff V or volume connections expenditure

Tariff V class customer connections are residential and commercial/industrial customers who consume less than 10 TJ/year (see Table 6-8). Residential and commercial/industrial customers are

³³ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix A to the AA RIN response - Regulatory templates (PUBLIC) [UPDATE].XLSM.

³⁴ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, p. 44.

³⁵ NGL, r. 74(2)(b).

considered separately because there are different input requirements, especially in relation to services and meters.

Table 6-8 Tariff V connection types

Connection type		Description
Residential	Electricity-to-gas (E to G)	Customers currently not using gas, generally converting from electricity and/or LPG. May be on the line-of-main or may require a short main extension.
	New estates	Customers connected in new estate developments. Typically these are constructed in parallel with other services in the estate development with the benefits of greenfield construction and shared trenching.
	Medium/high density	Customers in medium/high density apartments. These usually involve gas for cooking and hot water using a centralised hot water system, and may include heating. This involves a service to the apartments and provision of a hot water meter and gas meter for each residence.
Industrial and commercial (I&C)	Volume market	This includes small business customers that use ~250 GJ p.a. and industrial and commercial (I&C) – volume market customers.

Source: JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 6.7, Table 4-2, pp.13–14.

Tariff V connections expenditure is calculated by deriving volume and unit rate forecasts.

Volumes

JGN's forecast volume of new connections is derived from:³⁶

- Core Energy's forecast of demand and connections, plus
- connections which JGN forecast to result from a step change in marketing expenditure (see attachment 7 of this draft decision (opex)).

Core Energy has forecast a 20 per cent increase in new estate and a 22 per cent increase in medium density connections. This is based on projected increases in the number of new dwellings forecast to be constructed in NSW. In turn, this is based on expected land releases and increases in house prices providing an economic environment that stimulates new estate development. Core Energy has also forecast increases in small industrial and commercial connections, based on historical annual growth of approximately five per cent.³⁷

Based on advice from Deloitte Access Economics we consider that the forecasts of Tariff V new connections are marginally overstated. This is because for small business connections we consider there is a structural break in the historical data series in 2008. Due to this we have used a shorter averaging period than Core Energy (2008-13 instead of 2003-13) to derive the trend, which is projected forward for forecasting new connections for small business.

³⁶ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix 05.2 Core Energy model - JGN demand and customer forecast - CONFIDENTIAL.xlsx; Appendix 07.3 Operating expenditure step change report - CONFIDENTIAL, pp. 11–18.

³⁷ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix 6.7 Forecast capital expenditure report, p. 17.

We also consider that JGN's allocation of new dwellings between new estate and medium/high density connections is not the best estimate possible in the circumstances. We have replaced JGN's assumption with the average calculated using historical Housing Industry Association (HIA) data.

The demand attachment discusses these issues in greater detail (see section 13.4 in attachment 13).

The table below (see Table 6-9) sets out JGN's actual new connections for 2010-14 and proposed new connections for 2015-20 and our estimated new connection volumes for 2015-20.

Table 6-9 JGN actual new connections (2010-14), proposed new connections (15-20) and AER estimated new connections (2015-20) (number)

Connection type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
JGN - E to G	7,848	8,475	9,030	8,649	8,217	7,395	7,025	6,885	6,747	6,612	6,480
AER - E to G							7,025	6,885	6,747	6,612	6,480
JGN - New estates	9,343	10,233	11,125	12,391	11,920	12,913	13,906	14,899	13,906	13,906	13,906
AER - New estates							12,674	13,549	13,111	12,674	12,674
JGN - Medium/ high density	9,387	11,994	9,119	12,110	12,913	13,906	14,899	15,893	15,893	14,899	14,899
AER - Medium/ high density							16,131	17,244	16,687	16,131	16,131
JGN - I&C volume	714	868	815	825	876	930	988	1,050	1,116	1,186	1,262
AER - I&C volume							854	864	877	893	907
JGN - total	27,292	31,570	30,089	33,975	33,925	35,144	37,219	39,127	38,062	37,005	36,948
AER - total							36,685	38,541	37,423	36,310	36,192

Source: JGN, 2015-20 Access Arrangement Information, June 2014, Appendix 6.7 Forecast capital expenditure report, Table 4-3, p. 15 [updated for Core Energy model changes]; Deloitte Access Economics, Australian Energy Regulator, Gas demand forecast for Jemena's NSW network, 30 October 2014.

Unit rates

JGN stated that its forecast unit rates were based on JGN's historical average for unit rates for each connection type and contract rates applicable from 1 July 2013.³⁸ We requested the build-up of the forecast unit rates.³⁹

We did not find that the forecast unit rates were supported by historical data and JGN's contract rates. We requested that JGN provide a derivation of the unit rates. JGN provided a derivation which indicated that JGN has relied upon only one year of data (year to March 2013) for forecasting regional composition, material types and lay methods.⁴⁰ As there can be significant differences in regional composition, material types and lay methods between years, we consider that more than one year of composition data should be used to forecast unit rates. We are satisfied that at least three years of data would adequately capture differences in composition differences across time.

Unit rates are built up from assumptions relating to metres of mains per connection, the number of services per connection and the number of meters per connection. JGN forecast an 81 per cent increase in the metres of mains per connection compared with the average over 2010-13 period for medium/high density connections. It also forecast a 72 per cent increase in the metres of mains per connection compared with the average over the 2010-13 period for tariff V I&C connections. We are not satisfied that JGN has adequately explained these increases. It did not explain the increase in medium/high density connections. It submitted that the tariff V I&C connections increase reflected the average taken between 2006 and 2014.⁴¹ Included in this average are some years which appear to be outliers. We also do not consider that 2014, as a forecast year, should be included in an historical average. There also appears to be an inconsistency in the number of years which JGN uses to forecast historical averages across categories. To have confidence that the unit rates that are calculated from historical averages are efficient, we consider that a consistent averaging process should be used. In the absence of further information supporting the use of different bases for averaging, we are not satisfied that JGN has justified the proposed unit rates.

On the evidence available to us, we considered that recent revealed unit rates provide the best estimate in the circumstances. We therefore calculated the unit rates using actual data between 2008 and 2013. For each Tariff V connection type we built up a total unit rate from the mains, services and meter unit rates and used these as our unit rate estimate for the 2015-20 access arrangement period. We understand that in using these historical rates we are including direct overheads and related party margins and the cost of metretek and data meter loggers.⁴²

Expenditure

In order to calculate the Tariff V connections expenditure to include our alternative capex estimate, we multiplied the volumes by the unit rates. This resulted in a total Tariff V connection expenditure of \$284.1 million ((\$2015, unescalated direct costs, excluding overheads) for the 2015-20 access arrangement period (see Table 6-10).

³⁸ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix 6.7 Forecast capital expenditure report, p. 16.

³⁹ AER, Information request 40 - connections, sent 12 October 2014.

⁴⁰ JGN, Response to information request 40, received 22 October 2014, p. 2.

⁴¹ JGN, Response to information request 40, received 22 October 2014, p. 8.

⁴² JGN, Response to information request 40, received 22 October 2014, Note, p. 3; JGN, Response to information request 42, received 24 October 2014, Appendix A, p. A-3 and Appendix B, p. 4.

Table 6-10 AER included Tariff V connections expenditure (\$million, real 2014-15, unescalated direct costs, excluding overheads)

Connection type	2016	2017	2018	2019	2020	Total
Residential	51.4	53.6	52.0	50.5	50.2	257.7
I&C volume	5.1	5.2	5.3	5.4	5.4	26.4

Source: AER analysis.

I&C contract connection expenditure (Tariff D or demand connections)

I&C contract connections are major industrial customer connections. These customers use more than 10 TJ per year.⁴³

JGN forecast I&C contract connections on a total expenditure basis. It proposed \$10.0 million (\$2015, unescalated direct costs, excluding overheads) over the 2015–20 access arrangement period.⁴⁴ JGN did not provide the basis for the estimate in its proposal. In response to our request for further information on the method used to forecast I&C contract connection expenditure, JGN stated that the basis was JGN's business forecast for the year to March 2014 excluding an unusual one-off connection.⁴⁵ It did not provide information on the method used to forecast the 2014 forecast. Also, the data in the RIN template indicates a 2013-14 estimate of \$0.5 million (\$2015, unescalated direct costs, excluding overheads) that is not reflected in the forecast years. There are escalating costs of \$0.8 million to \$1.1 million (\$2015, unescalated direct costs, excluding overheads) between 2016 and 2020. We therefore are not satisfied that JGN has justified its forecast of I&C contract connection expenditure.

We consider that an appropriate alternative forecast is to project forward an average of the 2009–13 actual expenditure. This is based on the most recent four years of actual data that JGN provided in the RIN template.⁴⁶ We excluded the 2008-09 data point as it appeared to be inconsistent with the trend over the last four years of actual data. Based on this average, we have included I&C contract expenditure of \$7.9 million (\$2015, unescalated direct costs, excluding overheads) over the 2015–20 access arrangement period in our alternative capex estimate.

Metreteks and meter data loggers expenditure

JGN did not provide the basis of its forecast of metretek and meter data loggers expenditure in its access arrangement information. It did not provide any actual historical expenditure information in the RIN template. We requested that JGN provide information on the forecasting method. It submitted that metreteks were forecast on the basis of JGN's business forecast for 2014.⁴⁷ It did not provide information on the method used to forecast the 2014 forecast. It did not provide information on how it forecast meter data loggers expenditure.⁴⁸ As indicated above, the historical unit rates capture the

⁴³ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix 6.7 Forecast capital expenditure report, p.14.

⁴⁴ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

⁴⁵ JGN, Response to information request 40, received 22 October 2014, p.9

⁴⁶ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

⁴⁷ JGN, Response to information request 42, received 24 October 2014, Appendix A, p. A-3.

⁴⁸ JGN, Response to information request 42, received 24 October 2014, Appendix B, p. 4.

metretek and meter data logger costs. In the absence of information to be able to better forecast this expenditure we have not adjusted the historical metretek and meter data logger costs included.

Menangle Park market expansion

JGN proposed \$0.1 million (\$2015, unescalated direct costs, excluding overheads) in 2016 for connections as part of its Menangle Park market expansion. This project commenced in 2013-14. We have included this amount in our alternative capex estimate.

Customer contributions for connections

Where a connection is not a standard connection, as specified in the NECF and/or JGN's access arrangement, JGN can seek a contribution from the customer.⁴⁹

JGN submits that it forecast its capital contributions by applying the 8-year average of the historically observed ratio of contributions to connections capex to forecast connections capex.⁵⁰

We agree with this approach to calculating customer contributions, as revealed past data is likely to be the best indicator of future contribution rates. However, JGN did not apply an 8-year average consistently across all connection types. On applying an 8-year average across all connection types we calculated customer contributions of \$18.4 million.

Related party margins

JGN forecast an amount for related party margin expenditure associated with connections. We do not consider that JGN justified this expenditure in its proposal. JGN did not set out why a Zinfra margin is incurred or how the margin is calculated. We therefore have not included it in our alternative estimate of capex. The amount forecast by JGN is contained in a confidential appendix to this draft decision.

Augmentation/Growth capacity

Network augmentation capex is directed at increasing the capacity of the existing network to meet the demand of existing and future customers. Augmentation capex is required to maintain gas pressure and minimise the risk of gas outages.

We have included \$80.6 million (\$2015, unescalated direct costs, excluding overheads) of augmentation capex in our capex forecast (see Table 6-11). On the basis of advice provided by our engineering consultant, Sleeman Consulting, we consider that this capex complies with r. 79(1) of the NGR for the following reasons:⁵¹

- JGN's proposed augmentation solutions are justified in light of forecast connections growth to address a decline in gas pressure along the constrained network areas.⁵² We consider that the included project expenditure is justifiable under r. 79(2)(c)(i)-(iii) of the NGR as it is necessary to maintain the safety of services, maintain the integrity of gas services and/or comply with a regulatory obligation or requirement.

⁴⁹ NGL, Part 12A, Part 21; JGN, *2015-20 Access Arrangement Information*, June 2014: 2015 Access Arrangement, Schedule 4 Reference Service Agreement; JGN, 2015 Reference Service Agreement, cl. 11.3(i) and (j).

⁵⁰ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix B to the AA RIN response - Basis of preparation - CONFIDENTIAL, p. 37.

⁵¹ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014.

⁵² The forecasts comply with NGR, r. 74 and the proposed capex is justifiable under NGR, r. 79(2)(c)(i)-(iii).

- the input costs of JGN's proposed augmentation projects are within a reasonable range and reflect that of a prudent and efficient service provider.⁵³

JGN forecast expenditure of \$88.7 million (\$2015, unescalated direct costs, excluding overheads) for gross customer connections capex over the 2015–20 access arrangement period.⁵⁴ This amounts to approximately 8 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents an 11 per cent increase in expenditure compared with the current access arrangement period.

JGN proposed augmentation capex to meet growth in peak hourly demand on the distribution network. This is to accommodate demand from new customers and to meet growth in peak demand from existing customers as they upgrade or add appliances.⁵⁵

We assessed JGN's augmentation projects by considering the timing of the proposed works, the capacity benefit which results from the augmentation solution and whether the input cost of each project represents the efficient, lowest sustainable cost, as the NGR requires.⁵⁶ In undertaking this assessment we sought input from our engineering consultant, examined the business cases and requested further information from JGN.

In assessing the prudence and efficiency of the proposed projects, Sleeman Consulting considered the:⁵⁷

- capacity shortfall and/or projected growth demonstrating the requirement for the augmentation
- alternative options available to address the issue
- prudence of the timing of the proposed augmentation
- prudence and efficiency of the scale of the proposed augmentation
- efficiency of the proposed project costs.

Based on the advice of Sleeman Consulting, we accept that 82 of the 93 augmentation projects, costing \$80.6 million (\$2015, unescalated direct costs, excluding overheads) are prudent and efficient and have included the expenditure in the capex estimate.⁵⁸ We consider that this capex complies with r. 79(1) of the NGR for the following reasons:

- JGN's proposed augmentation solutions are reasonable in light of forecast connections growth to address a decline in gas pressure along the constrained network areas.⁵⁹
- JGN's input costs of augmentation projects are within a reasonable range and reflect that of a prudent and efficient service provider.⁶⁰

⁵³ The capex complies with NGR, r. 79(1)(a).

⁵⁴ JGN, *2015-20 Access Arrangement Information*, June 2014, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

⁵⁵ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, p. 55.

⁵⁶ NGR, r. 79(1)(a).

⁵⁷ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 3–4.

⁵⁸ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 3–9.

⁵⁹ The forecasts comply with NGR, r. 74 and the proposed capex is justifiable under NGR, r. 79(2)(iii).

These projects are summarised in Table 6-11.

Table 6-11 Augmentation capital expenditure included in AER alternative capex estimate (\$million, 2015)^(a)

	Project name	Total
Top ten projects by value	Northern Primary Main Stages 1 to 2 and pig launcher land purchase	
	Rouse Hill Secondary Capacity Development (Riverstone) - Stage 3 and MAOP downgrade	
	Kotara CDP	
	Darlington to Alexandria secondary main	
	Pennant Hills Rd 350mm ST main Stages 1 to 3	
	Kembla Grange Secondary CDP	
	The Entrance Capacity Development Project Stage 3	
	Griffith (Yenda) CDP - Railway Crossing, secondary main and SRS	
	Belmont CDP (Redhead) (Secondary Extension) Stage 1	
	Calderwood Secondary CDP	
		49.6
Projects with a value between \$0.5 and \$1.6 million	21 projects	24.2
Projects with a value between \$0 and \$0.5 million	44 projects	6.7
	Total	80.6

Source: Sleeman Consulting, ;AER analysis.

Notes: (a) Direct costs excluding escalation and overheads.

Based on the advice of its consultant, Sleeman Consulting, we consider that 11 of the 93 augmentation projects, costing \$8.1 million (\$2015, unescalated direct costs, excluding overheads) are not prudent and efficient.⁶¹ These projects are summarised in table 6-12.

⁶⁰ The capex complies with NGR, r. 79(1)(a).

⁶¹ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 3–9.

We are not satisfied that the Surrey Hills upgrade, Woollooware Rd upgrade, Haymarket (Parker St) upgrade, Sydney (Kent - Druitt St), Sydney (Park St) and Rockdale reinforcement work are conforming as JGN's modelling does not show that pressure is expected to fall below the minimum required pressures. As there is not a capacity short fall we are not satisfied that the augmentation is justified.⁶²

We are not satisfied that the Hoxton Park (Yarrawa St) expansion is conforming as the augmentation is predicated on conditional demand growth, much of which is beyond 2020. Also, there is additional capacity available to meet demand growth via the Prestons/Edmondson Park expansion project. As the pressure is not expected to fall below the minimum required pressures we are not satisfied that the augmentation is conforming.⁶³

We are not satisfied that the Kincumber capacity expansion is conforming as the augmentation was based on 2013 gas demand forecasts. Given reduced demand expectations a capacity shortfall is not expected and we are not satisfied that the augmentation will be needed until after 2020.⁶⁴

The Unanderra - Farmborough Heights extension is highly dependent upon continued growth in the Farmborough Heights area. Due to the uncertainty around the growth, we are not satisfied that this augmentation will be required until after 2020.⁶⁵

We are not satisfied that the Alexandria Waterloo interconnection is justified as it is not scheduled for completion until 2021. Furthermore any capacity shortfall is likely to be met through the Darlington to Alexandria connection.⁶⁶

We are not satisfied that the Bradbury stage 2 extension not justified as it is not scheduled for completion till 2021. Furthermore Bradbury stage 2 requires Bradbury stage 1 to be completed. Bradbury stage 1 is not scheduled to be completed till 2021. Therefore the augmentation is not required in the 2015-20 access arrangement period.⁶⁷

⁶² Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 6-7.

⁶³ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 6.

⁶⁴ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 6.

⁶⁵ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 7.

⁶⁶ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 7.

⁶⁷ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 7.

Table 6-12 Augmentation capital expenditure not included in AER alternative capex estimate (\$million, 2015)^(a)

Project name	Total
Surry Hills upgrade	
Woollooware (Woollooware Rd North)	
Hoxton Park (Yarrawa St)	
Haymarket (Parker St)	
Kincumber 210 kPa	
Sydney 7kPa (Kent St/Druitt St)	
Sydney 7kPa (Park St)	
Unanderra - Farmborough Hts	
Alexandria Waterloo Intercon.	
Bradbuy - Stage 2	
Rockdale (security of supply)	
Total	8.1

Source: Sleeman Consulting, ;AER analysis.

Notes: (a) Direct costs excluding escalation and overheads.

Mains and service renewal

Mains and service renewal expenditure is for replacement of low and medium pressure gas mains as they are reaching the end of their economic life. Replacement may be required to maintain safety, levels of reliability and when the operating and maintenance costs required for the mains or services are greater than the cost of replacement. The majority of renewal activity is planned. However there is also a small amount of reactive or unplanned work that is required. This is typically for replacement of up to 250 metres of mains or individual services.⁶⁸ We consider that mains and services renewal expenditure is justified under rules 79(2)(c)(i)—(iv), on the basis that the capex is required to maintain safety, reliability, to meet minimum pressure obligations, and to be able to meet existing levels of demand.

We have included \$57.4 million (\$2015, unescalated direct costs, excluding overheads) of mains and service renewal expenditure in our capex forecast. On the basis of advice provided by Sleeman

⁶⁸ JGN, 2015-20 Access Arrangement Information – Public, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 20.

Consulting we consider that this capex complies with r. 79(2)(c)(i)–(iv) of the NGR for the following reasons:⁶⁹

- Ten of the fifteen projects proposed may potentially have public safety implications if not completed in a timely fashion.
- The residual five projects proposed are justified as mains condition indicators show the need for replacement. These projects are not as time critical as the ten mentioned above. However, we are not satisfied that the proposed costs for the Wollongong/Coniston projects are efficient, as they are considerably higher than comparable projects. We have reduced the amount included for these projects by fifteen per cent.

JGN proposed mains and services renewal capex of \$58.2 million (\$2015, unescalated direct costs, excluding overheads) for the 2015–20 access arrangement period. This amounts to approximately 5 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents a 147 per cent increase in expenditure compared with the current access arrangement period.

We are not satisfied that JGN has justified this forecast. The costs for the three Wollongong/Coniston rehabilitation project are higher than those we are satisfied a prudent service provider acting efficiently would incur.⁷⁰

JGN submits that the increase in expenditure is due to two projects:⁷¹

- Mt Druitt steel replacement program, where 10 km of steel main is proposed to be replaced
- Penrith primary mains thin wall replacement, where under the existing high pressure, the thin wall pipe does not meet current integrity standards and must be replaced.

JGN's proposed capex is forecast on the basis of historical proposals and average unit rates from comparable recent projects and current contractor panel unit rates.⁷² JGN also included an allocation for reactive mains and services replacement. This was forecast on the basis of historical expenditure.

We assessed JGN's mains and services renewal projects by considering the timing of the proposed works, the condition indicators set out in the opportunity briefs provided by JGN, the options available for replacement and whether the input cost of each project represents the efficient, lowest sustainable cost. In undertaking this assessment we sought input from our engineering consultant, examined the opportunity briefs and requested further information from JGN.

In assessing the prudence and efficiency of the proposed projects, Sleeman Consulting considered the:⁷³

- condition indicators demonstrating the requirement for the mains and services renewal

⁶⁹ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Meter Renewal and Upgrade, Mains and Services Renewal and SCADA, Report to Australian Energy Regulator*, October 2014, p. 7.

⁷⁰ NGL, r.79(1)(a).

⁷¹ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 23.

⁷² JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 22.

⁷³ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 3–4.

- alternative options available to address the issue
- prudence of the timing of the proposed replacement
- prudence and efficiency of the scale of the proposed replacement
- efficiency of the proposed project costs.

Based on the advice of Sleeman Consulting, we are satisfied that 14 of the 15 mains and services renewal projects, costing \$52.9 million (\$2015, unescalated direct costs, excluding overheads) are prudent and efficient and has included the expenditure in its alternative capex estimate.⁷⁴

While the Wollongong/Coniston projects are prudent, we are not satisfied that the project costs are efficient. This is because the costs are considerably higher than the costs of comparable projects being proposed. We have reduced the amount included for these projects by fifteen per cent, which brings the costs in line with that of other similar proposed works.

The total amount included in our alternative capex estimate is \$57.4 million (\$2015, unescalated direct costs, excluding overheads).

Mines subsidence

Expenditure in this category is required to manage and mitigate the effects on network assets of ground subsidence that can occur when mining takes place beneath or in the vicinity of those assets. It also includes the cost of monitoring the asset's condition where subsidence is anticipated and the monitoring leads to capital works.⁷⁵ We are satisfied that mines subsidence expenditure is justified under rules 79(2)(c)(i) and (ii) on the basis that it is necessary to maintain the safety and integrity of gas services.

We have included JGN's proposed amount of mines subsidence expenditure in our capex forecast. JGN's proposed mines subsidence capex is for monitoring and rehabilitation of gas pipelines in the vicinity of Mallaty Creek Mines at Mallaty Creek, Appin.

JGN forecast mine subsidence expenditure on the basis of historical mine subsidence projects. The amounts forecast are an estimate of JGN's share of the gross costs (the other shares being allocated to EGP and Gorodok) before recovery of any costs from BHP Billiton or the Mine Subsidence Board. Those recoveries, when received, are treated as capital contributions.⁷⁶

We consider that JGN's proposed gross amount of mines subsidence expenditure is prudent and efficient on the basis that mines subsidence expenditure is subject to third party scrutiny as it is substantially cost recovered. On the basis of these costs being subject to scrutiny, we consider that these costs are prudent and efficient.

As indicated, JGN recovers some of the mines expenditure it incurs from BHP Billiton or the Mine Subsidence Board. We included an amount for capital contributions in our capex forecast. JGN calculated the capital contributions on the basis of historical costs which were recovered from a third

⁷⁴ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 3-9.

⁷⁵ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 61.

party, that is, either BHP Billiton or the Mine Subsidence Board. JGN forecast a lower contribution rate than indicated by the 2005-15 contributions data. We have applied the 2005-15 contribution rate to the forecast mines subsidence expenditure.

Facilities renewal and upgrade

Facilities renewal and upgrade expenditure is required to renew or upgrade facilities that pose integrity, workplace health and safety, capacity, regulatory compliance or similar issues or have reached the end of their economic lives.⁷⁷ On the basis of advice provided by Sleeman Consulting⁷⁸, we are satisfied that renewal and upgrade projects are justified under rules 79(2)(c)(i)—(iv). This is on the basis that the capex is required to maintain safety, reliability, to meet minimum pressure obligations, and to be able to meet existing levels of demand.

We have included \$95.3 million (\$2015, unescalated direct costs, excluding overheads) of facilities renewal and upgrade expenditure in our alternative capex estimate. We are not satisfied that JGN's proposed amount of \$115.0 million (\$2015, unescalated direct costs, excluding overheads) is prudent and efficient as we were not satisfied that eight of the 90 projects were justified.

JGN proposed facilities renewal and upgrade capex of \$115.0 million (\$2015, unescalated direct costs, excluding overheads) for the 2015–20 access arrangement period. This amounts to approximately 11 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents a 71 per cent increase in expenditure compared with the current access arrangement period.

We assessed JGN's facilities and renewal upgrade projects by considering the requirement for the proposed works, the scope and timing of the proposed works, and whether the input cost of each project represents the efficient, lowest sustainable cost. Based on the advice of Sleeman Consulting, we accept that 82 of the 90 facilities renewal and upgrade projects, costing \$95.3 million (\$2015, unescalated direct costs, excluding overheads) are prudent and efficient.⁷⁹ These projects are summarised in Table 6-13.

⁷⁷ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, para 240, p. 57.

⁷⁸ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014.

⁷⁹ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 10–15.

Table 6-13 Facilities renewal and upgrade capital expenditure included in AER alternative capex estimate (\$million, 2015)^(a)

	2015-16	2016-17	2017-18	2018-19	2019-20	Total
Minor capital	2.5	2.0	2.4	2.3	1.6	10.7
Trunk mains	4.4	1.7	2.4	2.9	1.7	13.1
Trunk facilities	5.2	4.1	5.6	7.7	4.2	26.8
Primary mains	4.1	4.8	5.6	3.2	3.1	20.9
Primary facilities	3.4	3.2	1.0	0.9	2.1	10.5
Secondary Mains and Services	2.7	3.0	2.6	2.6	2.3	13.2
Total	22.3	18.7	19.7	19.6	15.0	95.3

Source: Sleeman Consulting, ;AER analysis.

Notes: (a) Direct costs excluding escalation and overheads.

Based on the advice Sleeman Consulting, we are not satisfied that 8 of the 90 augmentation projects, costing \$14.7 million, are prudent and efficient.⁸⁰ These projects are summarised in Table 6-14.

An increase in the operating pressure at the Newcastle end of JGN's Northern Trunk is the driver for six projects. However, we are not satisfied that the installation of heaters is justified as:⁸¹

- Injection of gas from the LNG storage facility will not necessitate the installation of heaters
- It is unlikely that CSG project development approval will be granted in time to allow commitment and development of a CSG project, and subsequent delivery of material quantities of gas to Newcastle within the period to 2020.

We are not satisfied that a project to address an inappropriate mix of Australian and American standard equipment is justified. This is because the stations of concern can operate to comply with the standard of the lowest-rated component.⁸²

We are not satisfied that a project to investigate possible stress corrosion cracking (SCC) of the Wilton to Horsley Park Trunkline is justified as:⁸³

⁸⁰ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 15-16.

⁸¹ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 15-16.

⁸² Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 16.

⁸³ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, p. 16.

- The conditions that converge to cause SCC are not prevalent on the Wilton to Horsley Park Trunkline
- The trunkline is scheduled to be inline inspected in 2014-15, which presents opportunity for SCC related investigations if required.

Table 6-14 Facilities renewal and upgrade capital expenditure not included in AER alternative capex estimate (\$million, 2015)^(a)

Facilities renewal and upgrade sub-category	Project name	Total
Minor capital	Zentec Designs	
Trunk mains	L1 Inline inspection and validation	
Trunk facilities	Hexham heater	
	Kooragang Island heater	
	Minmi heating (JGN ID 63)	
	Minmi heating (JGN ID 64)	
	Morriset heating	
	Wyee heating	
	Total	14.7

Source: Sleeman Consulting, ;AER analysis.

Notes: (a) Direct costs excluding escalation and overheads.

JGN allocated \$5.6 million (\$2015, unescalated direct costs, excluding overheads) of planning costs to the facilities renewal and upgrade category. We are not satisfied that this is a direct cost incurred in relation to facilities renewal and upgrade. We consider that planning costs are an overhead. We have therefore considered this cost in the section on overheads.

SCADA

This capex category includes SCADA and network control hardware and IT. SCADA systems are used to control and monitor station plant remotely via Remote Telemetry Units (RTUs). The monitoring includes instrumentation, pressure, temperature, flow, environmental monitoring and other event data. Facilities in this category monitor and control network assets, and contribute to the performance of core business functions including billing, gas despatch and distribution, and demand management.⁸⁴

⁸⁴ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 64.

We consider that SCADA expenditure is justified under rules 79(2)(c)(i)—(iv), on the basis that the capex is required to maintain safety, reliability, to meet minimum pressure obligations, and to be able to meet existing levels of demand.

We have included \$3.2 million (\$2015, unescalated direct costs, excluding overheads) of SCADA expenditure in our capex forecast. We are not satisfied that JGN's proposed amount of \$9.7 million (\$2015, unescalated direct costs, excluding overheads) is prudent and efficient because we are not satisfied that the GENE SCADA projects are justified.

JGN proposed SCADA capex of \$9.7 million (\$2015, unescalated direct costs, excluding overheads) for the 2015–20 access arrangement period. This amounts to approximately 1 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents a 180 per cent increase in expenditure compared with the current access arrangement period.

We assessed JGN's SCADA projects by considering the requirement for the proposed projects, the scope and timing of the proposed projects, and whether the input cost of each project represents the efficient, lowest sustainable cost. Based on the advice Sleeman Consulting we are satisfied that 17 of the 19 SCADA projects, costing \$3.2 million (\$2015, unescalated direct costs, excluding overheads) are prudent and efficient.⁸⁵

Further, based on the advice of Sleeman Consulting we are not satisfied that 2 of the 19 SCADA projects, costing \$6.5 million are prudent and efficient.⁸⁶ This is because JGN's justification for replacement of the GENE SCADA system is that the monitoring contract that it has with the supplier is due to expire in 2018. JGN submits that General Electric, which acquired GENE in 2010, may not offer ongoing support. Publicly available information does not support the view that General Electric will no longer support the GENE SCADA system. For this reason, we do not accept that the capex is justified.⁸⁷

We have therefore included \$3.2 million in our alternative capex estimate.

Meter renewal and upgrade

Meter renewal is an ongoing activity which is necessary to ensure that gas meters in the field are replaced when they fail to accurately read data. The NSW Gas Supply Act⁸⁸ requires that meters read customers' gas usage accurately within an acceptable error tolerance range. Gas meters are continually sampled and tested for accuracy. Based on sample test results, meter families⁸⁹ are allocated a life and a forecast replacement date. Sample testing is conducted in accordance with the in-service compliance standard.⁹⁰ We are satisfied that meter renewal and upgrade capex complies with r. 79(2)(c)(ii) and (iii) of the NGR as it is required to maintain the integrity of gas services and meet the AS4944 regulatory requirements.

⁸⁵ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 10–15.

⁸⁶ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 15–16.

⁸⁷ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 15–16.

⁸⁸ ESC, *Gas Distribution System Code (Version 9.0 effective from 1 January 2009)*, 12 December 2008.

⁸⁹ Groups of similar meters installed in the same year.

⁹⁰ Services Australia/Services New Zealand, *Gas meters—In service compliance testing AS/NZS 4944:2006*, May 2006.

We have included \$124.5 million (\$2015, unescalated direct costs, excluding overheads) of meter renewal and upgrade expenditure in our alternative capex forecast. We are not satisfied that JGN's proposed amount of \$150.2 million (\$2015, unescalated direct costs, excluding overheads) is prudent and efficient because JGN has proposed expenditure for meter replacements which we are not satisfied are justified.

JGN's forecast of \$150.2 million amounts to approximately 14 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents a 76 per cent increase in expenditure compared with the current access arrangement period. JGN's proposed meter renewal and upgrade capex components are listed in Table 6-15.

Table 6-15 Elements of JGN's proposed meter renewal and upgrade capex (\$m, 2015, unescalated, direct costs, excluding overheads)^(a)

	2015-16	2016-17	2017-18	2018-19	2019-20	Total
I&C gas meter upgrades	1.5	1.5	1.6	1.6	1.6	7.7
I&C gas meter replacement ^(b)	3.9	4.2	4.1	3.7	5.1	20.9
Residential gas meter and regulator replacement	6.1	8.2	8.5	8.5	8.4	39.7
Residential hot water meter replacement	10.3	10.3	10.3	8.8	4.5	44.2
Replacement of Meter Data Logging equipment ^(c)	5.5	4.7	4.7	4.6	4.6	24.2
Statistical sampling and testing of meters ^(d)	1.6	1.5	1.6	1.7	1.7	8.2
Other ^(e)	0.9	0.7	0.8	1.1	1.6	5.0
Total	29.8	31.1	31.5	30.0	27.5	149.9

Source: JGN, *2015-20 Access Arrangement Information – Confidential*, 30 June 2014, Appendix 06.04 - JGN capex forecast model - CONFIDENTIAL.xlsb

Note: (a) JGN's total meter renewal and upgrade capex reported in its Capex model does not equal the amount reported in the RIN.

(b) This includes replacement of aged I&C Diaphragm gas meters & <15 kPa meter sets/regulators, replacement & testing of aged I&C Rotary gas meters & <15 kPa meter sets/regulators, replacement of aged I&C Turbine gas meters (like for like and downsizing), new turbine meters to replace 35 year old meters.

(c) This includes upgrade of MDL modems due to NBN rollout.

(d) This includes statistical sampling of aged I&C Diaphragm and residential gas meters, inspection and review of I&C meters and regulators to determine the extent of required replacement (for planned programs) in the following year in order to facilitate efficient program delivery, quality assurance testing of new gas & water meters & regulators, post-failure analysis of products as part of management of lifecycle and to have early warning of any unexpected failure of families.

(e) This includes replacement of TRS gas meters, replacement of aged Metreteks, obsolete Flow Computers, aged Metretrek system, defective Mercury/Metretek equipment, replacement of Gas Chromatographs, replacement of Dew Point Analysers.

JGN attribute the increase in expenditure to:⁹¹

- a significant population of residential gas meters approaching the end of its economic life and must be replaced during the 2015-20 access arrangement period
- certain types of residential hot water meters have been found to be failing prematurely and are to be replaced during the 2015-20 access arrangement period
- increased unit rates reflecting new contractual arrangements and real cost escalation.

JGN submitted that it forecast the expenditure based on forecast volumes and unit rates. It stated that the forecast unit rates are based on current rates for purchase.⁹²

JGN's capex forecast model only provided four months of actual total capex. It provided actual total capex by project, which did not enable us to assess historical against forecast volumes and unit rates for the meter alone, installation costs and any other expenditure (for example, warehousing costs), as requested by the AER in the RIN templates.⁹³

JGN indicated that in compiling the RIN data it made assumptions based on the metering program as a whole. Data from the 2013 financial year was used to calculate the meter, internal labour, contractor cost shares of the total cost. These shares were applied to all classes of meter renewals. JGN reported that the application of these calculated shares results in overstatement of the component costs for some meter renewal classes and understatement for other classes.⁹⁴

This meant that there was insufficient information for us to be able to apply to compare revealed unit rates and volumes against the forecast volumes and unit rates. It also inhibited our ability to benchmark JGN's unit rates against those of the Victorian gas distribution businesses.

We therefore requested that JGN provide, for each of JGN's projects, the volume, meter and labour unit rates so that we could assess the proposed costs.⁹⁵

JGN's meter renewal and upgrade program relates to both residential and industrial and commercial gas meters and residential water meters. JGN's meter renewal and upgrade program comprises the following sub components:⁹⁶

- Aged meter replacement - Meters at the end of their in-service compliance periods (i.e. useful life) are removed from the field and replaced with new or refurbished assets of similar capacity
- Sampling of meters in the field - the test procedures allow for meter families to receive either a 1 year, 3 year or 5 year life extension depending upon test results
- Defective meter replacement - JGN reactively replace meters that fail in operation
- Upgrades/downgrades of sites - JGN upgrades or downgrades a number of meters each year.

⁹¹ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, p. 60; JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, pp. 28–30.

⁹² JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, p. 60.

⁹³ JGN, *2015-20 Access Arrangement Information – Confidential*, 30 June 2014, Appendix 06.04 - JGN capex forecast model - CONFIDENTIAL.xlsm

⁹⁴ JGN, Response to AER Information Request 21 - metering, 8 September 2014, pp. 4–5.

⁹⁵ AER, Information Request 38, sent 13 October 2014.

⁹⁶ JGN, *2015-20 Access Arrangement Information – Confidential*, 30 June 2014, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

We considered the basis on which JGN arrived at its forecasts of the replacement volumes and the cost (on a unit rate basis) of removing and replacing the meters. Specifically, we considered the:

- Efficiency and prudence of the proposed meter replacement volumes by examining the age of the meters JGN is proposing to remove and ensuring this is in a reasonable age range. We have determined this reasonable range having regard to the initial life expectancy of meters and the availability of sampling and maintenance techniques to extend meter life beyond that life expectancy.
- Efficient mix of using refurbished and new meters in meter replacement, and
- Efficiency of proposed unit rates of meters replaced as being reflective of the lowest sustainable input costs.

We understand that meter replacement capex may be uneven in nature and so examined JGN's proposed cost build-up as well as the historical level of capex. Based on the advice of Sleeman Consulting, we accept that \$124.5 million (\$2015, unescalated direct costs, excluding overheads) of metering renewal and upgrade capex is prudent and efficient.⁹⁷ This is because JGN tests its residential and I&C diaphragm meters to discover whether life extensions are possible. It considers the economic efficiency of extension versus replacement when considering the options for replacing aged meters. We assess that JGN's approach to replacement of residential and I&C diaphragm meters is prudent and efficient.

Based on the advice of Sleeman Consulting, we are not satisfied that 4 projects are justified and not satisfied that 2 projects are efficient.⁹⁸ These projects account for \$25.4 million (\$2015, unescalated direct costs, excluding overheads) of expenditure which we have not included in its alternative capex estimate. A further \$0.3 million (\$2015, unescalated direct costs, excluding overheads) is attributable to the difference between the sum of the components of the metering build-up and the amount hard coded in the total capex in the RIN templates. As we are not satisfied that JGN has justified this amount we have not included it in our capex forecast.

This is because:

- Replacement of defective I&C meters - JGN has proposed a step up in meter replacements from an historical average of 0.8 per cent of the population, that is between 200 and 300 meters per year, to 0.9 per cent of the population (300 meters per year) between 2015-16 to 2017-18, then 1.2 per cent of the population (400 meters per year). We are not satisfied that JGN has justified this step up in meter replacements. In the absence of evidence to justify a departure from historical trends in the future, we are satisfied that a better estimate is the revealed historical failure rate of 0.8 per cent of the meter population. On this basis we consider that capex be included for replacement of 305 meters in 2015-16, increasing by 10 meters per year to 345 meters in 2019-20.
- Replacement of Metretek devices and system - JGN provided information that there are between 500 and 1050 Metretek devices installed in the JGN network, 20 - 50 units fail each year and there are 650 call outs per year for minor failures. JGN has provided for outright replacement of

⁹⁷ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 10–15.

⁹⁸ Sleeman Consulting, *Jemena Gas Networks 2015 Access Arrangement Submission, Review of Capex Forecasts for Capacity Development and Facilities Renewal and Replacement, Report to Australian Energy Regulator*, September 2014, pp. 15–16.

all Metretek field devices and for ongoing call outs. JGN has also provided for replacement of the central Metretek data collection system in 2020. However, JGN has not yet identified a replacement or carried out economic analysis to justify the replacement. We assess that capex is only justified for the replacement of 60 modems per annum.

- Replacement of meter data loggers (MDLs) - JGN provided information that 100 MDLs fail per year. JGN has proposed to replace 150 defective MDLs per year. We assess that replacement of 150 defective MDLs per year is prudent. JGN also provided for further replacement of 200 faulty MDLs per year. We assess that this is doubling up on the defective replacement provision, described above, and have not included any capex for this in our forecast. JGN has also proposed outright replacement of 1,500 MDLs per year from 2015-16. We are not satisfied that JGN has justified the outright replacement of all MDLs. Given a failure rate of 1 per cent per year and current repair expenditure of \$300,000 per year, we are not satisfied that expenditure in excess of \$35 million for replacement of MDLs between 2015 and 2022 is economically efficient. We have therefore not included any capex for this in our forecast.

Government authority work

Government authority work (GAW) is expenditure for relocating gas mains or facilities on government or private property. We are satisfied that GAW is justified on the basis of rule 79(2)(c)(iv), that is, to maintain the service provider's capacity to meet levels of demand for services existing at the time the capex is incurred.

We have included \$1.8 million (\$2015, unescalated direct costs, excluding overheads) of GAW expenditure in our capex forecast. We are not satisfied that JGN's proposed amount of \$2.5 million (\$2015, unescalated direct costs, excluding overheads) is prudent and efficient because we are not satisfied that it is arrived at on a reasonable basis.⁹⁹ This is because JGN have applied an upward trend in GAW costs but has not provided reasons for assuming that GAW is increasing over the 2016-20 access arrangement period.

JGN proposed GAW capex of \$2.5 million (\$2015, unescalated direct costs, excluding overheads) for the 2015–20 access arrangement period. This amounts to approximately 0.2 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents a 56 per cent increase in expenditure compared with the current access arrangement period.

JGN submitted that where arrangements with the relevant authority or landowner do not provide JGN with a right guaranteeing the location of its assets, JGN is required to relocate them as required by the authority or landowner at JGN's expense. Where JGN does have rights it recovers the cost of relocation from the authority or landowner.¹⁰⁰

JGN states that the timing of relocations is dependent on the requirements of the relevant authority or landowner and is generally not predictable.¹⁰¹ For this reason, its forecast of government authority work is on the basis of historical expenditure.

We consider that this is a reasonable approach to forecasting this expenditure. However, given the unpredictability of the work, we consider that a longer time period, in particular a five year period, is a better basis over which to derive a forecast for GAW. This period of time is sufficiently long to allow for

⁹⁹ NGL, r.74(2)(a).

¹⁰⁰ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 30.

¹⁰¹ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 31.

the variation in expenditure to be captured in the estimate. We are satisfied that not estimating the costs over a longer period is appropriate, to enable the estimate to reflect reasonably current costs.

We used the most recent five years of actual GAW expenditure to calculate the annual average (see Table 6-16). We used this average as its estimate of annual expenditure for the 2015-20 access arrangement period. We have included GAW expenditure of \$1.8 million (\$2015, unescalated direct costs, excluding overheads) in its alternative capex estimate.

Table 6-16 AER estimate of GAW expenditure (\$'000s, 2015 unescalated direct costs, excluding overheads)

	2008-09	2009-10	2010-11	2011-12	2012-13	Annual average
Historical GAW expenditure	677	584	117	52	382	363

Source: JGN, *2015-20 Access Arrangement Information – Confidential*, 30 June 2014, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

We expect that the majority of relocation work is fully cost recovered. JGN has not provided reasons as to why no cost recovery of government authority work has been included. We note that the Victorian gas distribution businesses fully recovered this work.¹⁰² On this basis we have included customer contributions which totally offset the GAW expenditure.

IT

IT capex includes projects to maintain and develop IT capacity and deliver improved IT capabilities to support business operations, including to achieve compliance with regulatory obligations. IT capex is required to support the operation of the network and associated business activities, such as billing and accounting.¹⁰³ We are satisfied that IT capex is justified on the basis of one or more of the sub-rules in rule 79(2)(c) of the NGR. IT capex may be necessary to meet a regulatory obligation, or to maintain the safety or integrity of services.¹⁰⁴

We have included JGN's estimate of \$127.9 million (\$2015, unescalated direct costs, excluding overheads) for IT capex in our alternative capex forecast. We accept that JGN's forecast of this amount has been arrived at on a reasonable basis. For the reasons below, we are satisfied that the forecast capex is such as would be incurred by a prudent service provider acting efficiently.¹⁰⁵

JGN proposed IT capex of \$127.9 million (\$2015, unescalated direct costs, excluding overheads) for the 2015–2020 access arrangement period.¹⁰⁶ This is consistent with JGN's expenditure in this category in the 2010-2015 access arrangement period.¹⁰⁷ IT capex accounts for 12 per cent of JGN's proposed total capex forecast, in unescalated, direct terms.

JGN identified the key projects within the IT capex forecast as:¹⁰⁸

¹⁰² See AER, *Access Arrangement draft decision: Multinet Gas (DB No.1) Pty Ltd, Multinet Gas (DB No.2) Pty Ltd*, 2013–17 Part 2 Attachments, p.51 (recoverable works: Hightett); SP AusNet, *2013-2017 Gas Access Arrangement Review – Access Arrangement Information*, 30 March 2012, p.101 (major alterations).

¹⁰³ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, pp. 62-63.

¹⁰⁴ NGR, r. 79(2)(c).

¹⁰⁵ NGR, r. 74(2) and r. 79.

¹⁰⁶ JGN, *Appendix 6.3 - JGN IT Strategy and Asset Management Plan 2014/15 to 2019/20 - Public*, 30 June 2014, p. 11.

¹⁰⁷ JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 37.

¹⁰⁸ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, p. 47.

- completing the GASS+ replacement project which will replace JGN's legacy asset and works management system with a SAP-based system
- establishing new geographic information system (GIS) capabilities encompassing all land based asset information, mapping, geographic and topographic information
- introducing a field mobility solution which builds on the GIS and the works delivery capability provided by the SAP gas system.

JGN's IT capex forecast is driven by a number of business needs identified by JGN, including the need to:¹⁰⁹

- sustain the asset base through upgrades, optimise asset performance and provide for energy market growth
- implement projects which were deferred from the 2010-2015 access arrangement period as a result of work required to implement the National Energy Customer Framework in NSW
- replace systems that have come to the end of their useful life
- add new systems and technologies to enhance JGN's capability, particularly in the areas of geographic information systems, field mobility and business intelligence and analytics.

JGN's IT capex forecast is supported by its IT strategy and asset management plan. The IT strategy and asset management plan sets out JGN's IT strategy and governance arrangements, cost planning and forecasting methodology, and details of all projects included in the IT capital works program.¹¹⁰

JGN also submitted a series of project investment documents covering all proposed IT capex projects. The project investment documents set out the scope, business need and justification for the proposed IT capex projects, as well as other options and constraints considered and detailed project costs where available. On the basis of the information provided, we consider that JGN's IT capex forecast is consistent with its IT strategy and is appropriately justified with regard to JGN's business needs. We are therefore satisfied that the scope and nature of IT capex projects proposed is such as would be incurred by a prudent service provider.

JGN's cost estimates for IT capex projects are derived from a variety of sources, including competitive tender processes, estimates obtained from contractors or manufacturers, and actual historical costs for similar projects.¹¹¹ For example, the estimated costs for the major GASS+ replacement project have been derived directly from a competitive tender process. The cost estimates for the GIS project and IT infrastructure projects, which together account for approximately one third of JGN's proposed IT capex, are based on estimates obtained from contractors or manufacturers. On this basis, we are satisfied that JGN's estimate of IT capex costs has been arrived at on a reasonable basis and represents the best estimate possible in the circumstances.¹¹²

In summary, based on our review of the information submitted by JGN in support of its forecast IT capex, we are satisfied that the forecast capex is such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest

¹⁰⁹ JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 38.

¹¹⁰ JGN, *Appendix 6.3 - JGN IT Strategy and Asset Management Plan 2014/15 to 2019/20 - Public*, 30 June 2014.

¹¹¹ JGN, *RIN clauses 6.11, 6.13 and 6.14 - AA2015 - JGN Network Capex - PUBLIC*, 30 June 2014.

¹¹² NGR, r. 74(2).

sustainable cost of providing services.¹¹³ The various projects included in the forecast expenditure are variously necessary to meet regulatory obligations, or to maintain the safety or integrity of services.¹¹⁴

Other - non-distribution

This category includes expenditure for motor vehicles, property and other non-network capital items such as tools, furniture and office equipment. Non-network capex of this nature is required in order for JGN to efficiently manage and operate its network. We are satisfied that non-network capex is justified on the basis of rule 79(2)(c)(iv) of the NGR. It is necessary to maintain the service provider's capacity to meet levels of demand for services existing at the time the capex is incurred.

We have included JGN's estimate of \$26.7 million (\$2015, unescalated direct costs, excluding overheads) for other non-network capex in our capex forecast. For the reasons below, we are satisfied that JGN's forecast of this amount has been arrived at on a reasonable basis. The forecast capex is such as would be incurred by a prudent service provider acting efficiently.¹¹⁵

JGN proposed other non-network capex of \$26.7 million (\$2015, unescalated direct costs, excluding overheads) for the 2015–2020 access arrangement period. This accounts for 2.5 per cent of JGN's proposed total capex forecast, in unescalated, direct terms. It represents a 70 per cent decrease in expenditure compared with the current access arrangement period.

The main driver of JGN's forecast capex reduction in other non-network capex is a 90 per cent reduction in forecast property capex. This is due to JGN incurring significant one-off property costs for office and depot relocations in the 2010-2015 access arrangement period related to the expiry of existing lease arrangements.¹¹⁶ Cost estimates for property capex projects are typically derived from competitive tender processes or historical costs for similar projects.¹¹⁷ We are satisfied that this is a reasonable basis for estimating property related costs.

Motor vehicles capex of \$16.9 million (\$2015, unescalated direct costs, excluding overheads) represents the majority of JGN's forecast non-network capex. Capex for motor vehicles is forecast to reduce by 8 per cent in the 2015-2020 access arrangement period. This reflects the timing of vehicle replacements in accordance with the age profile of JGN's motor vehicle fleet.¹¹⁸ JGN submitted that vehicles are replaced in accordance with good industry practice to achieve the lowest sustainable cost of vehicles operations. JGN's fleet management strategy has regard to the principles of fit for purpose vehicle selection, safety, mitigation of age related failures, and reducing operating costs.¹¹⁹ Forecast costs are based on historical unit rates and estimates received from JGN's contracted fleet management provider.¹²⁰ Therefore, we are satisfied that JGN's estimate of motor vehicle costs has been arrived at on a reasonable basis and reflects capex which would be incurred by a prudent service provider acting efficiently.

JGN's forecast tools and equipment capex of \$4.1 million (\$2015, unescalated direct costs, excluding overheads) relates to the need to replace minor tools and pieces of equipment used by JGN's field personnel. JGN's cost estimate is based on historical expenditure profiles for these items.¹²¹ Regulatory costs related to JGN's access arrangement and regulatory reporting obligations were

¹¹³ NGR, r. 79(1)

¹¹⁴ NGR, r. 79(2).

¹¹⁵ NGR, r. 74(2) and r. 79.

¹¹⁶ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, p. 65.

¹¹⁷ JGN, *RIN clauses 6.11, 6.13 and 6.14 - AA2015 - JGN Network Capex - PUBLIC*, 30 June 2014.

¹¹⁸ JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 43.

¹¹⁹ JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 42.

¹²⁰ JGN, *RIN clauses 6.11, 6.13 and 6.14 - AA2015 - JGN Network Capex - PUBLIC*, 30 June 2014.

¹²¹ JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 47.

formerly capitalised in this category, but will be treated as opex for the 2015-2020 access arrangement period.¹²² As such, forecast tools and equipment capex has reduced by 80 per cent and represents a base level of expenditure on minor tools and equipment, reflective of historical expenditure in the last five years.¹²³ Therefore, we are satisfied that JGN's forecast capex for tools and equipment is such as would be incurred by a prudent service provider acting efficiently.

Overheads

Overheads are costs which are not directly attributable to the distribution businesses output but are necessary to support the businesses operations. Examples of overhead costs include network planning, procurement and human resources.

We have included \$109.0 million (\$2015, escalated costs) of total overheads expenditure in our alternative capex forecast. We are not satisfied that JGN's proposed amount of \$144.4 million (\$2015, escalated costs) is prudent and efficient. This is because we have applied our forecast opex rate of change in place of JGN's forecast opex rate of change. We also used the average of the 2012-13 and 2013-14 direct overheads in place of JGN's method of rolling forward the direct overhead share of total capex in 2012-13.

JGN's proposed amount of \$144.4 million (\$2015, escalated costs) represents 13 per cent of JGN's proposed total capex forecast. It represents a 23 per cent increase in expenditure compared with the current access arrangement period.

JGN did not set out the forecast method for its overhead expenditure in its proposal. JGN indicated that its treatment of overhead allocation and capitalisation is detailed in its Access Arrangement RIN response.¹²⁴ This consists of a category build-up of network and corporate overheads which totals \$93.1 million (\$2015, escalated costs). However, JGN did not allocate this amount across its capex driver categories. JGN included an additional \$51.3 million across its capex driver categories so that overheads totalled \$144.4 million (\$2015, escalated).

As we were concerned about the prospect of double counting, we requested that JGN explain the difference between the amounts in the overhead build up and the amount in the capex summary. JGN stated that this reflected direct overheads. JGN indicated that the direct overheads includes expenditure for:¹²⁵

Property—represents an allocation of JGN's property, rental and outgoing costs against capital and maintenance projects. Note that these property costs only relate to JGN's operation-based sites such as logistics facilities and control rooms—they do not include corporate offices. JGN interpreted that property costs fit within the AA RIN network overhead definition of “cost of providing network, control and management services that cannot be directly identified with specific operational activity”. Furthermore, ‘logistics’ is identified in the AA RIN network overhead definition as a project governance and related function.

Stores—represents JGN's labour, property and material costs in operating its warehouses. We note that ‘stores’ is identified in the AA RIN network overhead definition as a project governance and related function.

Non Labour—represents the residual costs (excluding labour, fleet, major equipment and property) within operation cost centres. Typical residual costs include (among others) office administration, telecommunications, travel and accommodation costs.

¹²² JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 47.

¹²³ JGN, *Appendix 6.7 - Forecast capital expenditure report - PUBLIC*, 30 June 2014, p. 48.

¹²⁴ JGN, *2015-20 Access Arrangement Information – Public*, 30 June 2014, Appendix 06.07 Forecast capital expenditure report - PUBLIC, p. 51.

¹²⁵ JGN, Response to Information request 39, received 20 October 2014, pp. 1–2.

The AER requested that JGN provide a five year period of actuals (2008-13) against which it could assess the trend in forecast direct overheads. JGN provided 2013 and 2014 data and stated that:¹²⁶

due to system limitations, JGN is only able to provide historical data for RY13 and RY14.

The direct overheads increased by 17.5 per cent between 2013 and 2014. As the expenditure is not stable, it indicates that there is likely to be some variability in direct overheads. We consider that two years of actual data is not sufficient to assess the trend over the current period. It is important to ensure that the amount we include in our alternative capex estimate is reflective of the average across the access arrangement period rather than a peak or trough in expenditure. A peak or trough may over- or under- compensate the service provider. In order to be able to assess this we need a reasonable time series. We consider that five years of data is required to assess the trend. We consider that the actual historical direct overhead amounts should be identifiable for the last five years of actual data.

We would expect that JGN would be able to either provide a longer time series or some other form of data to enable us to assess the proposed forecast direct overheads in its revised proposal. Preferably this would be on the same basis as in the RIN templates. In particular, we would prefer to be able to assess direct overheads, network and corporate overheads and related party margins consistently across the current and forecast period.

In recognition that JGN may have incurred direct overheads in addition to the network and corporate overheads identified, we have included a placeholder amount of expenditure based on the average of the 2012-13 and 2013-14 data provided. To this we have applied the opex rate of change, consistent with JGN's forecasting method of network and corporate overheads. As we have used historical unit rates for connections, which include direct overheads, we have deducted the connection share of the capex over which overheads is applied (that is, all capex categories excluding SCADA, IT and other non-distribution).¹²⁷ We have included \$18.7 million (\$2015, escalated) for direct overheads, as a placeholder, in our alternative capex estimate.

JGN indicated that it forecast direct overheads by calculating the direct overhead share of total capex in 2012-13 and applied that to the forecast period. We are not satisfied that this method produces the best estimate possible in the circumstances. We consider that these costs are largely fixed. We do not consider that these costs (such as depot costs, warehousing costs) scale in proportion with direct capex. For this reason we have applied our opex rate of change (see attachment 7 of this draft decision (opex)). This is consistent with the forecasting method applied for network and corporate overheads.

In relation to the \$93.1 million (\$2015, escalated) proposed for network and corporate overheads, we accept the capex allocation of the base year amount of total overheads. The 2013-14 base year amount of capex overheads is \$18.3 million (\$2015, escalated). However, we have applied our forecast opex rate of change in place of JGN's forecast opex rate of change. We have included an amount of \$90.3 million (\$2015, escalated) in our capex forecast for network and corporate overheads.

JGN allocated overheads by applying the same overheads rate to all capex categories (excluding SCADA, IT and other non-distribution where no overheads are applied). Consistent with this approach we have calculated the overheads rate for each year by dividing the overhead amount by the total of

¹²⁶ JGN, Response to information request 43a, received 4 November 2014.

¹²⁷ JGN, Response to information request 40, received 22 October 2014, p. 3, Note.

the escalated direct costs that we have included in our alternative capex estimate. These rates are set out in Table 6-17.

Table 6-17 AER calculated overheads rates (per cent)

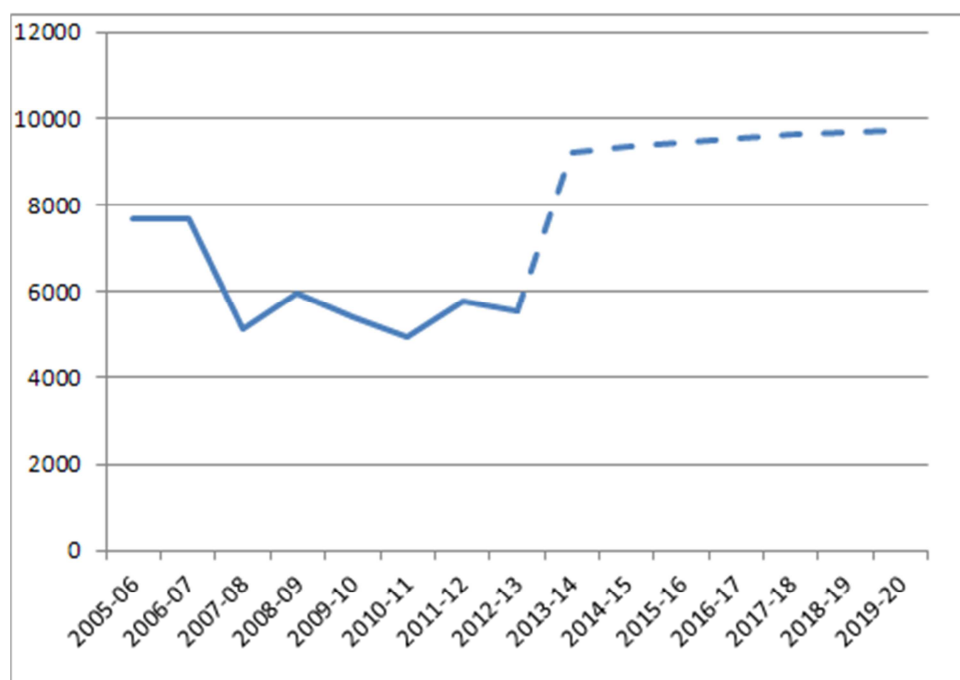
	2015-16	2016-17	2017-18	2018-19	2019-20
Overheads rate	16%	15%	15%	17%	18%

Source: AER analysis.

JGN allocated \$5.6 million (\$2015, unescalated direct costs, excluding overheads) of planning costs to the facilities renewal and upgrade category. We are not satisfied that this is a direct cost incurred in relation to facilities renewal and upgrade. We consider that planning costs are an overhead. We have therefore considered this cost in the section on overheads.

We are not satisfied that JGN has justified its proposal to increase planning costs. In assessing the total proposed planning costs, that is, the amounts included in overheads plus the amounts proposed to be included in the facilities renewal and upgrade category, we considered the forecast trend in expenditure against the historical trend (see Figure 6-3). Planning costs have been relatively stable over the 2007-13 period. JGN have forecast a 66 per cent step increase in planning costs. We consider that there are only incremental changes in the size and complexity of the JGN network. We have no evidence available to us that suggests that there are any changes in obligations which would impact planning requirements. For these reasons we have not included the step increase in forecast planning costs, which JGN proposed to include in the facilities renewal and upgrade category.

Figure 6-3 JGN's proposed total planning costs (\$million, real 2014-15)



Source: JGN, 2015-20 Access Arrangement Information – Confidential, 30 June 2014, Appendix A to the AA RIN response - Regulatory templates (CONFIDENTIAL) [UPDATE].XLSM.

Related party margin

As discussed in 'Connections/Market expansion' in section 6.4.2, we do not consider that JGN justified the inclusion of a related party margin for the 2015-2020 access arrangement period.

We had approved a margin for the 2010-15 access arrangement on all capex categories excluding Mines subsidence, SCADA & network control-IT and Other (non-distribution). During the previous period, Jemena Asset Management (JAM) managed JGN operations in return for a margin. For the coming 2015-2020 period, JGN has decided to restructure its arrangements, ceasing the JAM management agreement. JGN has split its network into a North and South region. It established new contracts for routine construction, repair and maintenance contracts for the Northern region after going out to open tender in October 2012.¹²⁸ Zinfra, a subsidiary of the Jemena Group, and so for this purpose a related party to JGN, has been awarded JGN's Southern region.¹²⁹

We reviewed the tender documents, the tender assessment and the decision to award the four contracts. We are satisfied that this was a competitive tender process. As it was a competitive tender price, we are satisfied that the unit rates established in the contracts reflect competitive unit rates prevailing in the market. On this basis we are satisfied that the unit rates drawn from these contracts which form the basis of estimates used in JGN's proposed capex are efficient.¹³⁰ JGN indicated that the awarded unit rates had increased compared with existing unit rates.¹³¹ JGN attributed the cost increase to increased contractor compliance costs in meeting JGN's quality system and health and safety requirements.¹³²

However, JGN has sought to apply a margin on market expansion/connections capex. JGN did not set out why a Zinfra margin is incurred or how the margin is calculated. So while we are satisfied the unit rates established in the contracts are efficient, we have not included the proposed margin on market expansion/connections capex. The amount forecast by JGN is contained in a confidential appendix to this draft decision.

6.4.3 Adjustments to labour and material escalation

We have revised down the labour and material escalation that was proposed by JGN. Internal and external labour escalation has been revised down. This is discussed in section 7.5.3 of attachment 7 (opex) of this draft decision. Materials escalation has been revised to nil real. This is discussed in appendix section A.66.5A.6 of the capex attachment below.

6.5 Revisions

Revision 6.1: Make all necessary amendments to reflect the AER's draft decision on opening capital base for the access arrangement period, as set out in table 6-1.

Revision 6.2: Make all necessary amendments to reflect the AER's draft decision on forecast capex by asset class over the access arrangement period, as set out in table 6-2.

¹²⁸ JGN, Access Arrangement Information, Attachment: awarding of northern region cont.pdf [CONFIDENTIAL], p. 4.

¹²⁹ JGN, Access Arrangement Information, Attachment: awarding of northern region cont.pdf [CONFIDENTIAL], p. 3.

¹³⁰ NGR, r. 71(1).

¹³¹ JGN, Access Arrangement Information, Attachment: awarding of northern region cont.pdf [CONFIDENTIAL], p. 7, para 5.3.

¹³² JGN, Access Arrangement Information, Attachment: awarding of northern region cont.pdf [CONFIDENTIAL], p. 7, para 5.4.

A Appendix: Real material cost escalation

Real material cost escalation is a method for accounting for expected changes in the costs of key material inputs to forecast capex. The materials input cost model submitted by JGN includes forecasts for changes in the prices of commodities such as aluminium, brass, concrete, plastic and steel, rather than the prices of physical inputs themselves (e.g., pipes and meters) which are the inputs directly sourced by JGN in the provision of its network services.

A.1 Position

We are not satisfied that JGN's proposed real material cost escalators (leading to cost increases above CPI) are arrived at on a reasonable basis, and are the best forecast possible in the circumstances.¹³³ We therefore do not consider that the forecast capex meets the capital expenditure criteria of clause 79(1) of the NGR. Instead we consider that zero per cent real cost escalation is likely to more reasonably reflect a realistic expectation of the cost inputs required to achieve the capex criteria.¹³⁴ We have arrived at this conclusion on the basis that:

- the degree of the potential inaccuracy of commodities forecasts is such that we consider that zero per cent real cost escalation is likely to provide a more reliable estimation for the price of input materials used by JGN to provide network services
- there is little evidence to support how accurately JGN's materials escalation forecasts reasonably reflect changes in prices paid by JGN for physical assets in the past and by which we can assess the reliability and accuracy of its capex forecast model. Without this supporting evidence, it is difficult to assess the accuracy and reliability of JGN's capex forecast model as a predictor of the prices of the assets used by JGN to provide network services, and
- JGN has not provided any supporting evidence to show that it has considered whether there may be some material exogenous factors that impact on the cost of physical inputs that are not captured by the capex forecast model used by JGN.

Our approach to real materials cost escalation discussed above does not affect the proposed application of labour escalators by JGN which apply to its capital expenditure. We consider that labour cost escalation as proposed by JGN is likely to more reasonably reflect a realistic expectation of the cost inputs required to achieve the capex criteria given these are direct inputs into the cost of providing network services.¹³⁵

A.2 JGN's proposal

JGN applied material and labour cost escalators to various asset classes in forecasting its capex for the 2015-20 period.¹³⁶ Real cost escalation indices for the following material cost drivers were calculated for JGN by BIS Shrapnel¹³⁷:

- aluminium
- brass

¹³³ NGR, clause 74(2).

¹³⁴ NGR, clause 79.

¹³⁵ NGR, clause 79.

¹³⁶ JGN, *2015-20 Access Arrangement Information (Public)*, 30 June 2014, p. 68.

¹³⁷ JGN, *Access Arrangement Proposal, Appendix 6.10 BIS Shrapnel - Input cost escalation report*, 4 June 2014.

- concrete
- plastic, and
- steel.

BIS Shrapnel commodity forecasts are converted into Australian dollars using its own in-house methodology based on three key drivers; commodity price forecasts, interest rate differentials between Australia and the United States and the VIX volatility index.¹³⁸

Table A.1 outlines JGN's real input materials escalation forecasts.

Table A.1 JGN's real materials cost escalation forecast—inputs (per cent)

	2015–16	2016–17	2017–18	2018–19	2019–20
Aluminium	5.56	3.86	11.00	-6.53	-2.44
Brass	1.94	2.13	9.53	-8.84	-5.31
Steel	0.98	-0.20	7.96	-8.87	-5.11
Plastic	-1.08	-0.22	6.49	-6.21	-3.56
Concrete	4.5	-0.5	-2.00	-1.10	0.50

Source: JGN, *2015-20 Access Arrangement Information (Public)*, 30 June 2014, p. 68.

JGN stated that the weight applied to each escalator in each distribution capex category was derived from an analysis of the actual split for JGN's financial year ending 31 March 2013 in consultation with project managers and key personnel.¹³⁹

A.3 Assessment approach

We assessed JGN's proposed real material cost escalators against the National Gas Rules (NGR) requirements. We must accept JGN's capex forecast if we are satisfied it reasonably reflects the capex criteria.¹⁴⁰ In particular, we must be satisfied that the forecast capital expenditure is such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services.¹⁴¹

We have also considered the views expressed in our Expenditure Forecast Assessment Guideline (Expenditure Guideline) in respect to assessing the input price modelling approach to forecast materials cost.¹⁴² Although the Expenditure Guideline is intended to enhance the transparency of our decisions and accountability under the NER and NEL, as well as refine and improve existing techniques to ensure the capex and opex allowances we approve are efficient, we consider that it is also relevant in our assessment of proposed expenditure by gas service providers.

¹³⁸ JGN, *Access Arrangement Proposal, Appendix 6.10 BIS Shrapnel - Input cost escalation report*, 4 June 2014, pp. A5-6.

¹³⁹ JGN, *2015-20 Access Arrangement Information (Public)*, 30 June 2014, p. 68.

¹⁴⁰ NGR, clause 79(1).

¹⁴¹ NGR, clause 79(1)(a).

¹⁴² AER, *Better Regulation - Explanatory Statement Expenditure Forecast Assessment Guideline*, November 2013, pp. 50-51.

In the Expenditure Guideline we stated that we had seen limited evidence to demonstrate that the commodity input weightings used by service providers to generate a forecast of the cost of material inputs have produced unbiased forecasts of the costs the service providers paid for manufactured materials.¹⁴³ We considered it important that such evidence be provided because the changes in the prices of manufactured materials are not solely influenced by the changes in the raw materials that are used.¹⁴⁴ Subsequently, the price of manufactured network materials may not be well correlated with raw material input costs. We expect service providers to demonstrate that their proposed approach to forecast manufactured material cost changes is likely to reasonably reflect changes in raw material input costs.

In our assessment of material cost escalation, we:

- reviewed the BIS Shrapnel report commissioned by JGN¹⁴⁵
- reviewed the cost escalation model used by JGN; and
- reviewed the approach to forecasting manufactured material costs in the context of gas service providers mitigating such costs and producing unbiased forecasts.

In forming our views, we also considered submissions by stakeholders. We received a submission from the Energy Markets Reform Forum (EMRF) which addressed materials escalation forecasts by JGN.¹⁴⁶ In its submission, the EMRF made the following statements in respect of materials escalation forecasts.¹⁴⁷

- the costs of key non-labour inputs such as steel, concrete, aluminium, copper and plastics are difficult to predict and can be quite volatile over a short period of time, and
- it would expect the gas networks to undertake prudent hedging arrangements for currency and commodity prices given the volatility of the various internationally linked prices and the relative certainty of the networks demand for each of the products.

A.4 Reasons

We must be satisfied that a forecast is based on a sound and robust methodology in order to accept that JGN's proposed total capex reasonably reflects the capex criteria¹⁴⁸ and are arrived at on a reasonable basis, and are the best forecast possible in the circumstances.¹⁴⁹ In making our assessment, we do recognise that predicting future materials costs for gas service providers involves a degree of uncertainty. However, for the reasons set out below, we are not satisfied that the materials forecasts provided by JGN satisfy the requirements of the NGR. Accordingly, we have not accepted it as part of our substitute estimate in our draft decision on total forecast capex. We are satisfied that zero per cent real cost escalation is reasonably likely to reflect the capex criteria and this has been taken into account into our substitute estimate.

Materials input cost model

¹⁴³ AER, *Better Regulation - Explanatory Statement Expenditure Forecast Assessment Guideline*, November 2013, p. 50.

¹⁴⁴ AER, *Better Regulation - Explanatory Statement Expenditure Forecast Assessment Guideline*, November 2013, p. 50.

¹⁴⁵ BIS Shrapnel, *Input cost escalation report*, 4 June 2014.

¹⁴⁶ The Energy Markets Reform Forum, *NSW Gas Distribution Revenue Reset Jemena Application - A response by The Energy Markets Reform Forum*, August 2014, pp. 41-42.

¹⁴⁷ The Energy Markets Reform Forum, *NSW Electricity Distribution Revenue Reset - Applications from JGN, Endeavour Energy and Essential Energy - A response*, July 2014, pp. 26-30 and Appendix 1 - Five-year drop for commodities' prices.

¹⁴⁸ NGR, clause 79(1).

¹⁴⁹ NGR, clause 74(2).

JGN's capex forecast model does not demonstrate how and to what extent material inputs have affected the cost of inputs such as gas mains and meters. In particular, there is no supporting evidence to substantiate how accurately JGN's materials escalation forecasts reasonably reflected changes in prices they paid for assets in the past to assess the reliability of forecast materials prices.

In our Expenditure Guideline, we requested service providers should demonstrate that their proposed approach to forecast materials cost changes reasonably reflected the change in prices they paid for physical inputs in the past. JGN's proposal does not include supporting data or information which demonstrates movements or interlink-ages between changes in the input prices of commodities and the prices JGN paid for physical inputs. JGN's capex forecast model assumes a weighting of commodity inputs for each asset class but does not provide information which explains the basis for the weightings or that the weightings applied have produced unbiased forecasts of the costs of JGN's assets. For these reasons, there is no basis on which we can conclude that the forecasts are reliable. In summary, JGN has not demonstrated that their proposed approach to forecast materials cost changes reasonably reflects the change in prices they paid for assets in the past.

Materials input cost model forecasting

JGN has used its consultant's report to estimate cost escalation factors in order to assist in forecasting future operating and capital expenditure. These cost escalation factors include commodity inputs in the case of capital expenditure. The consultant has adopted a high level approach hypothesising a relationship between these commodity inputs and the physical assets purchased by JGN. Neither the consultant's report nor JGN have successfully attempted to explain or quantify this relationship, particularly in respect to movements in the prices between the commodity inputs and the physical assets and the derivation of commodity input weightings for each asset class.

We recognise that active trading or futures markets to forecast prices of assets such as pipes and meters are not available and that in order to forecast the prices of these assets a proxy forecasting method needs to be adopted. Nonetheless, that forecasting method must be reasonably reliable to estimate the prices of inputs used by service providers to provide network services. JGN has not provided any supporting information that indicates whether the forecasts have taken into account any material exogenous factors which may impact on the reliability of material input costs. Such factors may include changes in technologies which affect the weighting of commodity inputs, suppliers of the physical assets changing their sourcing for the commodity inputs, and the general volatility of exchange rates.

Materials input cost mitigation

We consider that there is potential for JGN to mitigate the magnitude of any overall input cost increases. This could be achieved by:

- potential commodity input substitution by the gas service provider and the supplier of the inputs. An increase in the price of one commodity input may result in input substitution to an appropriate level providing there are no technically fixed proportions between the inputs. Although there will likely be an increase in the cost of production for a given output level, the overall cost increase will be less than the weighted sum of the input cost increase using the initial input share weights due to substitution of the now relatively cheaper input for this relatively expensive input.

We are aware of input substitution occurring in the electricity industry during the late 1960's when copper prices increased, potentially impacting significantly on the cost of copper cables. Electricity service provider's cable costs were mitigated as relatively cheaper aluminium cables could be substituted for copper cables. We do however recognise that the principle of input substitutability

cannot be applied to all inputs, at least in the short term, because there are technologies with which some inputs are not substitutable. However, even in the short term there may be substitution possibilities between operating and capital expenditure, thereby potentially reducing the total expenditure requirements of a gas service provider

- the substitution potential between opex and capex when the relative prices of operating and capital inputs change. For example, JGN has not demonstrated whether there are any opportunities to increase the level of opex (e.g. maintenance costs) for any of its asset classes in an environment of increasing material input costs
- the scale of any operation change to the gas service provider's business that may impact on its capex requirements, including an increase in capex efficiency, and
- increases in productivity that have not been taken into account by JGN in forecasting its capex requirements.

By discounting the possibility of commodity input substitution throughout the 2015-2020 period, we consider that there is potential for an upward bias in estimating material input cost escalation by maintaining the base year cost commodity share weights.

Forecasting uncertainty

The NGR requires that a gas service provider's forecast capital expenditure must be arrived at on a reasonable basis and must represent the best forecast or estimate possible in the circumstances.¹⁵⁰ We consider that there is likely to be significant uncertainty in forecasting commodity input price movements. The following factors have assisted us in forming this view:

- recent studies which show that forecasts of crude oil spot prices based on futures prices do not provide a significant improvement compared to a 'no-change' forecast for most forecast horizons, and sometimes perform worse¹⁵¹
- evidence in the economic literature on the usefulness of commodities futures prices in forecasting spot prices is somewhat mixed. Only for some commodities and for some forecast horizons do futures prices perform better than 'no change' forecasts;¹⁵² and
- the difficulty in forecasting nominal exchange rates (used to convert most materials which are priced in \$US to \$AUS). A review of the economic literature of exchange rate forecast models suggests a "no change" forecasting approach may be preferable to the forward exchange rate produced by these forecasting models.¹⁵³

¹⁵⁰ NGR, clause 74(2).

¹⁵¹ R. Alquist, L. Kilian, R. Vigfusson, *Forecasting the Price of Oil*, Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 1022, July 2011 (also published as Alquist, Ron, Lutz Kilian, and Robert J. Vigfusson, 2013, *Forecasting the Price of Oil*, in Handbook of Economic Forecasting, Vol. 2, ed. by Graham Elliott and Allan Timmermann (Amsterdam: North Holland), pp. 68-69 and pp. 427-508) and International Monetary Fund, *World Economic Outlook — Recovery Strengthens, Remains Uneven*, Washington, April 2014, pp. 25-31.

¹⁵² International Monetary Fund, *World Economic Outlook — Recovery Strengthens, Remains Uneven*, Washington, April 2014, p. 27, Chinn, Menzie D., and Olivier Coibion, *The Predictive Content of Commodity Futures*, Journal of Futures Markets, 2014, Volume 34, Issue 7, p. 19 and pp. 607-636 and T. Reeve, R. Vigfusson, *Evaluating the Forecasting Performance of Commodity Futures Prices*, Board of Governors of the Federal Reserve System, International Finance Discussion Papers, Number 1025, August 2011, pp. 1 and 10.

¹⁵³ R. Meese, K. Rogoff, (1983), *Empirical exchange rate models of the seventies: do they fit out of sample?*, Journal of International Economics, 14, B. Rossi, (2013), *Exchange rate predictability*, Journal of Economic Literature, 51(4), E. Fama, (1984), *Forward and spot exchange rates*, Journal of Monetary Economics, 14, K. Froot and R. Thaler, (1990), *Anomalies: Foreign exchange*, the Journal of Economic Perspectives, Vol. 4, No. 3, CEG, *Escalation factors affecting*

Strategic contracts with suppliers

We consider that gas service providers can mitigate the risks associated with changes in material input costs by including hedging strategies or price escalation provisions in their contracts with suppliers of inputs (e.g. by including fixed prices in long term contracts). We also consider there is the potential for double counting where contract prices reflect this allocation of risk from the gas service provider to the supplier, where a real escalation is then factored into forecast capex. In considering the substitution possibilities between operating and capital expenditure, we note that it is open to a gas service provider to mitigate the potential impact of escalating contract prices by transferring this risk, where possible, to its operating expenditure.

Cost based price increases

Allowing individual material input costs that constitute cost escalation reflects more cost based price increases. We consider this cost based approach reduces the incentives for gas service providers to manage their capex efficiently, and may instead incentivise gas service providers to over forecast their capex. This is not consistent with the revenue and pricing principles in the NGL in respect of promoting efficient investment.¹⁵⁴ It is also not consistent with the requirements of the NGL respect of incentives.¹⁵⁵

Selection of commodity inputs

The limited number of material inputs included in JGN's material input escalation model may not be representative of the full set of inputs or input choices impacting on changes in the prices of assets purchased by JGN. JGN's capex forecast model may also be biased to the extent that it may include a selective subset of commodities that are forecast to increase in price during the 2015-2020 period.

Commodities boom

The relevance of material input cost escalation post the 2009 commodities boom experienced in Australia when material input cost escalators were included in determining the approved capex allowance for energy service providers. We consider that the impact of the commodities boom has subsided and as a consequence the justification for incorporating material cost escalation in determining forecast capex has also diminished.

A.5 Review of independent expert's reports

We have reviewed the BIS Shrapnel report commissioned by JGN. We consider that this review, along with our review of two other reports detailed below, provides further support for our position to not accept JGN's proposed materials cost escalation.

BIS Shrapnel report

- BIS Shrapnel has forecast prices of gas service provider related materials to increase, in part due to movements in the exchange rate. BIS Shrapnel are forecasting the Australian dollar to fall to US\$0.77 from mid-2016 to mid-2018¹⁵⁶. This is significantly lower than the exchange rate forecasts by SKM of between US\$0.91 to US\$0.85 from 2014-15 to 2018-19.¹⁵⁷ CEG did not

expenditure forecasts, December 2013, and BIS Shrapnel, *Real labour and material cost escalation forecasts to 2019/20, Australia and New South Wales*, Final report, April 2014.

¹⁵⁴ NGL, Division 2, clause 24.

¹⁵⁵ NGL, Division 2, clause 24(3).

¹⁵⁶ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 6.

¹⁵⁷ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 10.

publish its exchange rate forecasts in its report but state that for the purposes of the report it sourced forward rates from Bloomberg until 2023.¹⁵⁸ BIS Shrapnel stated that exchange rate forecasts are not authoritative over the long term.¹⁵⁹

We consider the forecasting of foreign exchange movements during the next regulatory control period to be another example of the potential inaccuracy of modelling for material input cost escalation.

- In its forecast for general materials such as stationary, office furniture, electricity, water, fuel and rent, BIS Shrapnel assumed that across the range of these items, the average price increase would be similar to consumer price inflation and that the appropriate cost escalator for general materials is the CPI.¹⁶⁰ This treatment of general business inputs supports our view that where we cannot be satisfied that a forecast of real cost escalation for a specific material input is robust, and cannot determine a robust alternative forecast, CPI is a reasonable estimate of growth for a broad range of input prices.

In addition to our review of the BIS Shrapnel Report, we have also received submissions from energy service providers on other resets that are currently being undertaken. We have considered the relevance of those submissions to the issues raised by JGN in order to arrive at a position that takes into account all available information. Our views on these reports are set out below. Overall, both these reports lend further support to our position to not accept JGN's proposed materials cost escalation.

CEG report

- CEG acknowledge that forecasts of general cost movements (e.g. consumer price index or producer price index) can be used to derive changes in the cost of other inputs used by electricity service providers or their suppliers separate from material inputs (e.g. energy costs and equipment leases etc.).¹⁶¹ This is consistent with the Post-tax Revenue Model (PTRM) which reflects at least in part movements in an electricity service provider's intermediary input costs.
- CEG acknowledge that futures prices will be very unlikely to exactly predict future spot prices given that all manner of unexpected events can occur.¹⁶² This is consistent with our view that there are likely to be a significant number of material exogenous factors that impact on the price of assets that are not captured by the capex forecast model used by JGN.
- CEG provide the following quote from the International Monetary Fund (IMF) in respect of futures markets:¹⁶³

While futures prices are not accurate predictors of future spot prices, they nevertheless reflect current beliefs of market participants about forthcoming price developments.

This supports our view that there is a reasonable degree of uncertainty in the modelling of material input cost escalators to reliably and accurately estimate the prices of assets used by NSPs to provide network services. Whilst the IMF may conclude that commodity futures prices

¹⁵⁸ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 9.

¹⁵⁹ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. A-7.

¹⁶⁰ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 48.

¹⁶¹ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 3.

¹⁶² CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 4-5.

¹⁶³ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 5.

reflect market beliefs on future prices, there is no support from the IMF that futures prices provide an accurate predictor of future commodity prices.

- Figures 1 and 2 of CEG's report respectively show the variance between aluminium and copper prices predicted by the London Metals Exchange (LME) 3 month, 15 month and 27 month futures less actual prices between July 1993 and December 2013.¹⁶⁴ Analysis of this data shows that the longer the futures projection period, the less accurate are LME futures in predicting actual commodity prices. Given the next regulatory control period covers a time span of 60 months we consider it reasonable to question the degree of accuracy of forecast futures commodity prices towards the end of this period.

Figures 1 and 2 also show that futures forecasts have a greater tendency towards over-estimating of actual aluminium and copper prices over the 20 year period (particularly for aluminium). The greatest forecast over-estimate variance was about 100 per cent for aluminium and 130 per cent for copper. In contrast, the greatest forecast under-estimate variance was about 44 per cent for aluminium and 70 per cent for copper.

- In respect of forecasting electricity service providers future costs, CEG stated that:¹⁶⁵

There is always a high degree of uncertainty associated with predicting the future. Although we consider that we have obtained the best possible estimates of the NSPs' future costs at the present time, the actual magnitude of these costs at the time that they are incurred may well be considerably higher or lower than we have estimated in this report. This is a reflection of the fact that while futures prices and forecasts today may well be a very precise estimate of current expectations of the future, they are at best an imprecise estimate of future values.

This statement again is consistent with our view about the degree of the precision and accuracy of futures prices in respect of predicting electricity service providers future input costs. CEG also highlights the (poor) predictive value of LME futures for actual aluminium prices.¹⁶⁶

- CEG also acknowledge that its escalation of aluminium prices are not necessarily the prices paid for aluminium equipment by manufacturers. As an example, CEG referred to producers of electrical cable who purchase fabricated aluminium which has gone through further stages of production than the refined aluminium that is traded on the LME. CEG also stated that aluminium prices can be expected to be influenced by refined aluminium prices but these prices cannot be expected to move together in a 'one-for-one' relationship.¹⁶⁷

GEG provided similar views for copper and steel futures. For copper, CEG stated that the prices quoted for copper are prices traded on the LME that meet the specifications of the LME but that there is not necessarily a 'one-for-one' relationship between these prices and the price paid for copper equipment by manufacturers.¹⁶⁸ For steel futures, CEG stated that the steel used by electricity service providers has been fabricated, and as such, embodies labour, capital and other inputs (e.g. energy) and acknowledges that there is not necessarily a 'one-for one' relationship between the mill gate steel and the steel used by electricity service providers.¹⁶⁹

These statements by CEG support our view that the capex forecast model used by JGN has not demonstrated how and to what extent material inputs have affected the cost of intermediate

¹⁶⁴ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 5-6.

¹⁶⁵ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 13.

¹⁶⁶ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 5.

¹⁶⁷ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 19.

¹⁶⁸ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 19.

¹⁶⁹ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 23.

outputs. We note, as emphasised by CEG, there is likely to be significant value adding and processing of the raw material before the physical asset is purchased by JGN.

- CEG has provided data on historical indexed aluminium, copper, steel and crude oil actual (real) prices from July 2005 to December 2013 as well as forecast real prices from January 2014 to January 2021 which were used to determine its forecast escalation factors.¹⁷⁰ For all four commodities, the CEG forecast indexed real prices showed a trend of higher prices compared to the historical trend. Aluminium and crude oil exhibited the greatest trend variance. Copper and steel prices were forecast to remain relatively stable whilst aluminium and crude oil prices were forecast to rise significantly compared to the historical trend.

SKM report

- SKM caution that there are a variety of factors that could cause business conditions and results to differ materially from what is contained in its forward looking statements.¹⁷¹ This is consistent with our view that there are likely to be a significant number of material exogenous factors that impact on the cost of assets that are not captured by JGN's capex forecast model.
- SKM stated it used the Australian CPI to account for those materials or cost items for equipment whose price trend cannot be rationally or conclusively explained by the movement of commodities prices.¹⁷²
- In its modelling of the exchange rate, SKM has in part adopted the longer term historical average of \$0.80 USD/AUD as the long term forecast going forward.¹⁷³ This is consistent with our view that longer term historical commodity prices should be considered when reviewing and forecasting future prices. In general, we consider that long term historical data has a greater number of observations and as a consequence is a more reliable predictor of future prices than a data time series of fewer observations.
- SKM stated that the future price position from the LME futures contracts for copper and aluminium are only available for three years out to December 2016 and that in order to estimate prices beyond this data point, it is necessary to revert to economic forecasts as the most robust source of future price expectations.¹⁷⁴ SKM also stated that LME steel futures are still not yet sufficiently liquid to provide a robust price outlook.¹⁷⁵
- SKM stated that in respect to the reliability of oil future contracts as a predictor of actual oil prices, futures markets solely are not a reliable predictor or robust foundation for future price forecasts. SKM also stated that future oil contracts tend to follow the current spot price up and down, with a curve upwards or downwards reflecting current (short term) market sentiment.¹⁷⁶ SKM selected Consensus Economics forecasts as the best currently available outlook for oil prices throughout the duration of the next regulatory control period.¹⁷⁷ The decision by SKM to adopt an economic forecast for oil rather than using futures highlights the uncertainty surrounding the forecasting of commodity prices.

Comparison of independent expert's cost escalation factors

¹⁷⁰ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, Figures 3, 4 and 5, pp. 23, 25 and 28.

¹⁷¹ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 4.

¹⁷² SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 8.

¹⁷³ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 9.

¹⁷⁴ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 12.

¹⁷⁵ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p.16.

¹⁷⁶ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 18.

¹⁷⁷ SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 20.

To illustrate the potential uncertainty in forecasting real material input costs, we have compared the material cost escalation forecasts derived by the consultants as shown in Table A.2.

Table A.2 Real material input cost escalation forecasts (\$ real 2012-13)

	2014–15 (%)	2015–16 (%)	2016–17 (%)	2017–18 (%)	2018–19 (%)
Aluminium					
<i>CEG</i>	4.2	5.8	5.0	4.2	3.6
<i>SKM</i>	4.69	4.88	3.09	4.42	2.97
<i>BIS Shrapnel</i>	1.4	5.6	3.9	11.0	-6.5
<i>Range (low to high)</i>	1.4 to 4.69	4.88 to 5.8	3.09 to 5.0	4.2 to 11.0	-6.5 to 3.6
Copper					
<i>CEG</i>	-0.9	1.1	0.3	-0.3	-0.7
<i>SKM</i>	-0.17	0.17	-1.15	-0.16	-1.45
<i>BIS Shrapnel</i>	-0.9	-1.5	0.3	9.3	-8.7
<i>Range (low to high)</i>	-0.9 to 0.17	-1.5 to 1.1	-1.15 to 0.3	-0.3 to 9.3	-8.7 to -0.7
Steel					
<i>CEG</i>	0.6	3.2	0.6	0.3	-0.1
<i>SKM</i>	2.84	2.45	-0.35	0.38	-1.11
<i>BIS Shrapnel¹</i>	5.1	1.0	-0.2	8.0	-8.9
<i>Range (low to high)</i>	0.6 to 5.1	1.0 to 3.2	-0.35 to 0.6	0.3 to 8.0	-0.1 to -8.9
Oil					
<i>CEG</i>	-0.5	2.8	2.6	2.1	1.8
<i>SKM</i>	-5.11	-0.79	0.74	1.85	0.51
<i>BIS Shrapnel²</i>	1.4	-1.1	-0.2	6.5	-6.2
<i>Range (low to high)</i>	-5.11 to 1.4	-1.1 to 2.8	-0.2 to 2.6	1.85 to 6.5	-6.2 to 1.8

Source: CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 21, 24 and 27, SKM, *TransGrid Commodity Price Escalation Forecast 2013/14 - 2018/19*, 9 December 2013, p. 2 and BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. iii.

¹ Asian market price as BIS Shrapnel believes the Asia market is more appropriate.¹⁷⁸

² BIS Shrapnel have forecast plastics prices based on price changes in Nylon-11 and HDPE (Polyethylene). BIS Shrapnel state that Castor Oil is the key raw material of Nylon-11 and because it does not have any historical data on Castor Oil, it has approximated Nylon-11 by using HDPE growth rates. HDPE (Polyethylene) prices are proxied by BIS Shrapnel using Manufacturing Wages, General Materials, and Thermoplastic Resin prices. BIS Shrapnel state that Thermoplastic Resin is primarily driven by Crude Oil.¹⁷⁹

As Table A.2 shows, there is considerable variation between the consultant's commodities escalation forecasts. The greatest margin of variation is 10.1 per cent for aluminium in 2018-19, where CEG has forecast a real price increase of 3.6 per cent and BIS Shrapnel a real price decrease of 6.5 per cent. BIS Shrapnel's forecasts exhibit the greatest margin of variation but there also considerable variation between CEG and SKM's forecasts. These forecast divergences between consultants further demonstrate the uncertainty in the modelling of material input cost escalators to reliably and accurately estimate the prices of intermediate outputs used by service providers to provide network services. This supports our view that JGN's forecast real material cost escalators are not arrived at on a reasonable basis, and are not the best forecast possible in the circumstances¹⁸⁰ and do not meet the capital expenditure criteria.¹⁸¹

A.6 Conclusions on materials cost escalation

We are not satisfied that JGN has demonstrated that the weightings applied to the intermediate inputs have produced unbiased forecasts of the movement in the prices it expects to pay for its physical assets. In particular, JGN has not provided sufficient evidence to show that the changes in the prices of the assets they purchase are highly correlated to changes in raw material inputs.

The consultant's reports to the service providers identified a number of factors which are consistent with our view that JGN's capex forecast model has not demonstrated how and to what extent material inputs are likely to affect the cost of intermediate outputs. BIS Shrapnel assumed that for general materials such as stationary, office furniture, electricity, water, fuel and rent the average price increase would be similar to consumer price inflation and that the appropriate cost escalator for general materials is the CPI.¹⁸² CEG in its report stated that futures prices are unlikely to exactly predict future spot prices given that all manner of unexpected events can occur.¹⁸³ CEG also stated that while futures prices and forecasts today may well be a very precise estimate of current expectations of the future, they are at best an imprecise estimate of future values.¹⁸⁴ BIS Shrapnel also stated that exchange rate forecasts are not authoritative over the long term.¹⁸⁵

Recent reviews of commodity price movements show mixed results for commodity price forecasts based on futures prices. Further, nominal exchange rates are in general extremely difficult to forecast and based on the economic literature of a review of exchange rate forecast models, a "no change" forecasting approach may be preferable.

¹⁷⁸ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 40.

¹⁷⁹ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. iii.

¹⁸⁰ NGR, clause 74(2).

¹⁸¹ NGR, clause 79(1).

¹⁸² BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. 48.

¹⁸³ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, pp. 4-5.

¹⁸⁴ CEG, *Escalation factors affecting expenditure forecasts*, December 2013, p. 13.

¹⁸⁵ BIS Shrapnel, *Real Labour and Material Cost Escalation Forecasts to 2019/20 - Australia and New South Wales*, April 2014, p. A-7.

It is our view that where we are not satisfied that a forecast of real cost escalation for materials is robust, and we cannot determine a robust alternative forecast, then real cost escalation should not be applied in determining a service provider's required capital expenditure. We accept that there is uncertainty in estimating real cost changes but we consider the degree of the potential inaccuracy of commodities forecasts is such that there should be no escalation for the price of input materials used by JGN to provide network services.

In previous AER decisions, namely our Final Decisions for Envestra's Queensland and South Australian gas networks, we took a similar approach. This was on the basis that as all of Envestra's real costs are escalated annually by CPI under its tariff variation mechanism, CPI must inform the AER's underlying assumptions about Envestra's overall input costs. Consistent with this, we applied zero real cost escalation and by default Envestra's input costs were escalated by CPI in the absence of a viable and robust alternative. Likewise, for JGN, we consider that in the absence of a well-founded materials cost escalation forecast, escalating real costs annually by the CPI is the better alternative that will contribute to a total forecast capex that reasonably reflects the capex criteria.

The CPI can be used to account for the cost items for equipment whose price trend cannot be conclusively explained by the movement of commodities prices. This approach is consistent with the revenue and pricing principles of the NGL which provide that a regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs it incurs in providing direct control network services.¹⁸⁶

A.7 Labour and construction escalators

Our approach to real materials cost escalation does not affect the application of labour cost escalators, which will continue to apply to reference services capital and operating expenditure.

We consider that labour cost escalation more reasonably reflects a realistic expectation of the cost inputs required to achieve the capex objectives.¹⁸⁷ We consider that real labour cost escalators can be more reliably and robustly forecast than material input cost escalators, in part because these are not intermediate inputs and productivity improvements have been factored into the analysis (refer to the opex attachment).

Further details on our consideration of labour cost escalators are discussed in section 7.5.3 of this decision.

¹⁸⁶ NGL, Division 2, clause 24(2).

¹⁸⁷ NGR, clause 79(1).