Jemena Gas Networks (NSW) Ltd

2015-20 Access Arrangement Information

Appendix 6.7

Forecast capital expenditure report

Public

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GLOSSARY

AA	Access Arrangement
ALBV	Automatic Line Break Valve
AMP	Asset Management Plan
AS	Australian Standard
CDP	Capacity Development Project
CPI	Consumer Price Index
E&P	Evans and Peck
EBA	Enterprise Bargaining Agreement
EBS	Enterprise Business Services
FA	Feasibility Assessment
GAW	Government Authority Work
GL	General Ledger
I&C	Industrial and Commercial
IT	Information Technology
JGN	Jemena Gas Networks
JSAP	Jemena SAP
MAOP	Maximum Allowable Operating Pressure
MDL	Meter Data Loggers
ME	Market Expansion
MSB	Mine Subsidence Board
NECF	National Energy Customer Framework
NGR	National Gas Rules
NPV	Net Present Value
OB	Opportunity Brief
OB+	Enhanced Opportunity Brief
PEM	Project Estimation Model
POTS	Packaged Off-take Station
PRS	Primary Receiving Stations
RIN	Regulatory Information Notice
RTU	Remote Telemetry Unit
SCADA	Supervisory Control and Data Acquisition
SDRS	Secondary District Regulator Sets
SKM	Jacobs SKM
SOP	Sydney Olympic Park

TRS	Trunk Receiving Station
UAG	Unaccounted for Gas
WBS	Work Breakdown Structure
WHS	Work Health and Safety

1. PURPOSE

1. The purpose of this document is to demonstrate that Jemena Gas Network's (**JGN**) capital expenditure (**capex**) forecast for the 2015-20 Access Arrangement (**AA**) period meets the requirements of rules 74, 75 and 79 of the National Gas Rules (**NGR**) to be conforming capital expenditure that may be added to the capital base. In summary the NGR require that:

   - forecasts be the best estimates possible in the circumstances arrived at on a reasonable basis (rule 74)
   - extrapolations or inferences in deriving the capex forecast must be supported by primary information (rule 75)
   - capex forecasts:
     - reflect expenditure that 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 (rule 79(1))
     - meet one or more of the following criteria (rule 79(2)):
       - the overall economic value of the expenditure is positive
       - the present value of the expected incremental revenue to be generated as a result of the expenditure exceeds the present value of the capital expenditure
       - the capital expenditure is necessary:
         - to maintain and improve the safety of services
         - to maintain the integrity of services
         - to comply with a regulatory obligation or requirement
         - to maintain the service provider's capacity to meet levels of demand for services existing at the time the capital expenditure is incurred (as distinct from projected demand that is dependent on an expansion of pipeline capacity).

2. JGN describes how its capex forecast meets requirements of the NGR by:

   - explaining JGN's methodologies for cost estimation and forecasting and how they reflect good industry practice and produce the best estimates possible in the circumstances
   - explaining the nature of each category of capex
   - clearly identifying which of the criteria under rule 79(2) apply to each category of expenditure
   - clearly setting out the drivers for new capex, in particular their relationship to JGN's Asset Management Plan (**AMP**), which sets out the good industry practice applied by JGN and the volume and growth forecasts that have been expertly derived
   - comparing the capex forecast against the current AA period capex (actual and approved) and explaining material differences
   - explaining the benefits of proposed capex by category as regards supporting our customers' long-term interests, and the associated consequences of not making the proposed investment.

3. JGN's capex planning and forecasting is undertaken within the context of the policies, plans, practices and procedures adopted for the broader Jemena business and the policies, plans, procedures and practices that are specific to JGN. Major elements particular to JGN's processes are its AMP and its specific capex governance processes.

4. JGN's AMP and IT AMP are provided as appendices 6.2 and 6.3 to the AAI respectively.

5. Jacobs SKM (**SKM**) has reviewed JGN's governance structures and processes for capex as a means of ensuring and demonstrating the prudency and efficiency of capex that will be subject to assessment by the AER in accordance with rules 74 and 79. SKM's report is provided as appendix 6.5 to the AAI. SKM concluded that JGN has in place a capital investment governance framework that is robust in its support of prudency and efficiency in the identification, planning and delivery of its capital program.

6. Evans and Peck (**E&P**) has reviewed JGN's capital cost estimation methodology as a means of producing a forecast of capex for the 2015-20 AA period that meets the requirements of NGR rules 79(1)(a) and 74. In particular, E&P validated the allowances that JGN includes in its estimates to provide for the scope-related cost increases that occur on average for all projects between initial scoping at gate 0/gate 1 and project completion. E&P's report is provided as appendix 6.9 to the AAI. In E&P's opinion, JGN's capital cost estimating methodology satisfies the requirements of rules 74 and 79(1)(a).

2. BACKGROUND

7. This section of the report outlines:

- how capital projects are identified
- how capital projects are reviewed and scoped
- how these processes contribute to ensuring that JGN's capex meets the requirements of rule 79(1)(a).

8. That is, the capex is "such as would be incurred by a prudent service provider … in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing the services."

2.1 IDENTIFICATION OF CAPITAL PROJECTS

9. The identification and planning of capital projects is based upon a four phase process:

Phase 1

10. The need for capex is most often identified in the course of considering and reviewing:

- technical and regulatory requirements
- Australian standards and codes
- JGN's technical policies
- growth and capacity analysis
- assessment of asset condition
- lifecycle cost review
- assessment of asset performance, quality and costs
- service standards
- analysis of incidents
- organisational risk assessments
- technical risk assessments
- customer enquiries.

Phase 2

11. Asset class strategies are developed to provide a structured method for identifying, analysing and evaluating risk and opportunities for the particular asset class. The asset class strategies:

- classify and define the scope of the asset class. This includes documentation of asset systems and their constituent assets, including the function and relative importance of the asset class

- gather information about the asset class. This includes, but is not limited to, management and control activities which affect the assets' performance, technical and regulatory requirements, levels of service required, operating and maintenance activity and trends (including reliability, opex, condition monitoring, predictive and corrective maintenance) future demand, technological changes and criticality
- identify threats, opportunities, strengths and weakness to ensure all issues, risks and opportunities are documented. Risks and opportunities are then compared against the asset objectives to confirm ranking/prioritisation, through the Jemena Risk Management Policy
- undertake a scenario analysis varying such parameters as time, capital and maintenance costs to confirm the commercial resilience in respect of the risks and opportunities that may arise as the commercial environment changes
- review the effectiveness of the controls and the processes in mitigating or managing key identified risks, including the effect of a low probability/high consequence events
- document the life-cycle plan.

Phase 3

12. Activities in the asset class strategies are scoped into opportunity briefs (**OB**s) to define the scope, scheduling and potential options to be considered to respond to the issues identified.

13. Additional issues may also be identified at this phase, generally of a shorter-term nature or due to environmental or external drivers within the review cycle of the asset class or regional capacity strategies (generally five years).

Phase 4

14. The outputs from Phase 3 are then used to define the activities that will be implemented and the resources that will be applied to meet the asset management objectives and consequently the organisational objectives. This is documented in the AMP. The AMP contains a rationale for asset management activities, operational and maintenance plans, capital investment (refurbishment, renewal, replacement and enhancement) plans, and financial and resource plans, often based on a review of earlier achievements. The AMP makes allowance for any additional issues identified during the two year firm program. These issues and the subsequent projects are generally due to environmental or external drivers within this two-year period, for example market expansion, government authority works (**GAW**), or remediation works.

2.2 CLASSIFICATION OF PROJECTS

15. Once identified, capital activities are classified into the following groupings:

- *low complexity individual projects*—these are projects with a generic scope which can be built up through standard constituent elements. Generally these projects are valued at less than $0.2M and do not require any direct project management. These projects are initially managed through an issues or project register; no OB is created.

- *moderate complexity projects*—these are projects that have a moderate level of technical or delivery complexity, and are built up from a mixture of standard and unique constituent elements. These projects are generally valued above $0.2M, and the majority are less than $2M. These projects require a level of direct project management, but generally minimal engineering support. When issues that may lead to this classification are identified, an OB is developed to scope the issue. If during the evaluation of the OB it is identified that there is a unique constituent element that may require additional engineering, an enhanced opportunity brief (**OB+**) is developed. In some circumstances, where the scope or cost is of a larger scale, a feasibility assessment (**FA**) may be undertaken.
- *high complexity projects*—these projects have a significant level of technical and/or delivery complexity and are characterised by a substantial number of unique constituent elements These projects are generally valued above $0.2M, and the majority are less than $2M. These projects require a level of direct project management and engineering support. When issues that may lead to this classification are identified, an OB is developed to scope the issue. The next phase in the evaluation of the issues leading to these projects is the preparation of a FA.[1]
- *sub-programs*—where a large number of analogous capital activities (projects) occur on a repeatable (recurring nature) basis, the projects are linked into a sub-program of work that is delivered as if an individual project. As with other 'projects', an OB is developed to provide a basis of scope for the sub-program.
- *minor capital projects*—are projects, which are minor in size and significant in volume. They therefore do not warrant detailed processes for forecasting. Instead an allowance based on historical trends is used. There are eight categories of minor capital projects:
  - small main extensions for capacity development and market expansion
  - valve installations—high risk valve installation, bushfire isolation valves installation, secondary valve installation, generally to ensure the continued or improved safety of service due to either changes in urban areas (new or enlarged shopping centres) or areas identified with bushfire or other environmental risks
  - minor cathodic protection capital works, such as the installation of new circuits to meet integrity and regulatory requirements, and remote monitoring/data loggers
  - minor mains and services renewal, including works such as insertion of a street or series of streets to meet safety or integrity of service or protective works such as concrete encasement where there has been a change in the risk level to the asset from third party interference. It also includes washaway remediation/rehabilitation minor capital works, generally being the replacement of section of infrastructure that has been identified as being, or has been affected by water flows, often due to changes in surrounding land usage or layout
  - trunk receiving station minor capital works, including installation of plant for gas quality changes, replacement of end-of-life elements of plant, or minor works associated with regulatory changes, enhanced work health and safety (**WHS**) requirements (e.g. earthing of stations), bushfire mitigation works due to changes in surrounding land use or vegetation density
  - primary regulator station minor capital works including installation of plant for gas quality changes, replacement of end-of-life elements of plant, or minor works associated with regulatory changes, enhanced WHS requirements (e.g. earthing of stations)
  - secondary district regulator set minor capital works—separate from the meter set works, generally related to changes in road conditions or other WHS requirements or replacement of end-of-life elements of plant, or minor works associated with regulatory changes

[1] Moderate and high complexity projects make up less than half of the capex forecast. The remainder can be classified as "routine".

- secondary meter set minor capital works, generally related to relocation or replacement of end-of-life elements of plant, or minor works associated with regulatory changes.

3. ESTIMATION METHODOLOGIES

16. JGN has adopted a structured approach to project cost estimation by applying fit-for-purpose and best practice estimation methodologies.

17. Forecast capex estimates based on the methods described will deliver cost estimates meeting the requirements of rule 74; that is they are arrived at on a reasonable basis and represent the best possible estimate in the circumstances. They also reflect the estimates of a prudent service provider acting efficiently as required by rule 79(1).

18. The estimation methodologies in this section only apply to the distribution capital program. The non-distribution capital program activities are estimated using methodologies appropriate to each category of non-distribution capital program.

3.1 COST ESTIMATION PRINCIPLES

19. Cost estimation for the 2015-20 AA capital program follows the JGN cost estimation methodology as described in the cost estimation manual. This methodology is based upon the following principles:

- *fit-for-purpose*—estimates are developed to a level of accuracy that ensures they are appropriate for the purpose for which they are to be used;
- *credible*—assumptions used in developing the estimate have a reasonable basis and are commensurate with the level of confidence required for the estimate
- *transparent*—supporting documentation explains the process, sources, and methods used to create the estimate and identifies the underlying data and assumptions used to develop the estimate
- *approved*—estimates are reviewed and approved to ensure appropriate accountability and responsibility, and confirm costing methodologies and controls are properly applied prior to the asset investment decision.

20. As outlined in the Cost Estimation Manual, there are a number of estimates undertaken in a project lifecycle as the project progresses through the stages of the gating process and to satisfy governance process requirements. Distribution capital projects included the 2015-20 capital program apply Gate 0 or Gate 1 cost estimates.

3.2 PROGRAM ESTIMATES

21. Programs are characterised by large volumes of repetitive or similar works and account for approximately 56 per cent of JGN's 2015-20 capex forecast. Program cost estimates are derived by forecasting the quantity of work and unit rates (based on an appropriate materials and labour mix).

22. Unit rates are developed using the following information:

- long-term market tendered rates
- extrapolated current unit rates
- long-term material and equipment supply agreements.

3.3 INDIVIDUAL PROJECT ESTIMATES

23. JGN also delivers projects that are of sufficient size and complexity to require an individual project assessment and cost estimate. These estimates cover a range of project sizes and complexity, for which assessments and estimates are prepared with a commensurate degree of rigour. The following criteria are applied to determine the level of assessment and cost estimation:

- *projects less than $0.2M*—a desktop summary is produced based upon a review of the scope of the project which indicates the approximate volume of work to be undertaken, for example, lay 100 m of 50 mm nylon pipe in Smith Street. Cost estimates apply unit rates to the scope of work overlaid with appropriate adjustments to reflect environmental or other construction factors.
- *projects of more than $0.2M, low complexity*—these projects have standard constituent elements and so unit rates can be used. For these projects, cost estimates are compiled using the JGN project estimation model (**PEM**) and supported by a gate certificate (either gate 0 or gate 1, depending on the level of scope definition and the progress through the project lifecycle). The scope is defined in the OB which covers:
  - the extent or volume of work to be undertaken
  - environmental/construction considerations, such as restoration required, road crossings, traffic management requirements

  The assessment in the OB is based upon desktop measurements supported by either a field confirmation visit or evaluation by an estimator with local knowledge.
- *projects of greater than $0.2M, moderate complexity*—these projects predominantly consist of standard constituent elements with some additional non-standard constituent elements and therefore are mainly a mix of unit rates with some non-standard cost elements. The costs of the non-standard elements may be estimated either from knowledge of similar projects, quotations, or first principles. For these projects, cost estimates are compiled using the PEM and documented with a gate certificate (either gate 0 or gate 1, depending on the level of scope definition and the progress through the project lifecycle). The scope for this type of project is defined in an OB+ which covers:
  - the extent or volume of work to be undertaken, based upon desktop measurements confirmed by a field visit
  - environmental/construction considerations, such as restoration required, road crossings, traffic management requirements based upon desktop measurements confirmed by a field visit
  - extent and nature of the unique requirements.
- *projects of greater than $0.2M with a high level of complexity*—predominantly consist of some standard elements and non-standard constituent elements and therefore are built from individually costed elements and unit rates for the standard elements. The costs of the non-standard elements may be estimated either from knowledge of similar projects, quotations, or first principles. For these projects, cost estimates are compiled using the PEM supported by a gate certificate (either gate 0, or gate 1 if a FA has been completed). A FA includes engineering concept documentation for the recommended option in addition to the information contained in an OB+.

3.4 MINOR CAPITAL PROJECTS

24. Minor capital projects are projects that are small in size and significant in volume for which no process of individual identification or assessment is made in advance for reasons of efficiency and practicality. There is a sound expenditure history for these projects and amounts included for these projects are based upon historical patterns of expenditure.

3.5 REFERENCE DOCUMENTS

25. The following documents underpin this section:

- JGN capital cost estimation manual
- Asset management system quality manual.

26. Reviews relevant to this section:

- SKM review of JGN's capex governance, AAI appendix 6.5
- E&P review of capital cost estimation methodology, AAI appendix 6.9.

4. FORECAST CAPEX BY CATEGORY

27. This section provides:

- an overview of the 2015-20 AA period forecast capital program
- a comparison of period-on-period expenditure (actual/estimated for current AA period and forecast for next AA period)
- an analysis of the capital program by expenditure category.

4.1 OVERVIEW OF FORECAST CAPEX

4.1.1 THE PROGRAM

28. JGN has developed a capex program that it considers is necessary to deliver the service levels that its customers expect now, and into the future.

29. JGN's proposed capex for the 2015-20 AA period is $1,148.8M. This is an increase of $189.9M, or 20 per cent, over actual/estimated expenditure for the 2010-15 AA period and an increase of $268.4M relative to the amount that the AER approved for that period.

30. As described in the AAI and summarised in section 6.1 of this report, JGN has analysed a number of alternative scenarios relative to the one that forms the basis for its proposal and concludes that the proposed program delivers the most preferable long-term outcome for customers. Those customers and customer representatives that JGN has consulted support this view.

31. In general, if the AER was to approve an amount of capex for the 2015-20 AA period that is less than the amount proposed, and JGN was to spend that lesser amount, the result is likely to be a reduction in the safety, reliability and quality of services; a lower rate of growth in new customer connections; increased attrition of the existing customer base; and increased operating costs leading to a higher cost of services in the long term.

4.1.2 CAPEX CATEGORIES

32. The JGN 2015-20 capital program is broken down into two groupings and a series of expenditure categories as follows:

- distribution capital program which accounts for 85 per cent of total forecast capex:
  - market expansion (**ME**)—new assets required for the connection of new customers, including new mains, services and meters
  - capacity development
  - mains and services renewal
  - facilities renewal and upgrade
  - meter renewal
  - mines subsidence
  - government authority work (**GAW**)

- non-distribution capital program representing 15 per cent of proposed capex:
  - information technology (**IT**)
  - supervisory control and data acquisition (**SCADA**)
  - motor vehicles
  - property
  - other.

33. Figure 4–1 and Figure 4–2 show the value proportions of each of these categories.

Figure 4–1: Breakdown of forecast capex 2015-20

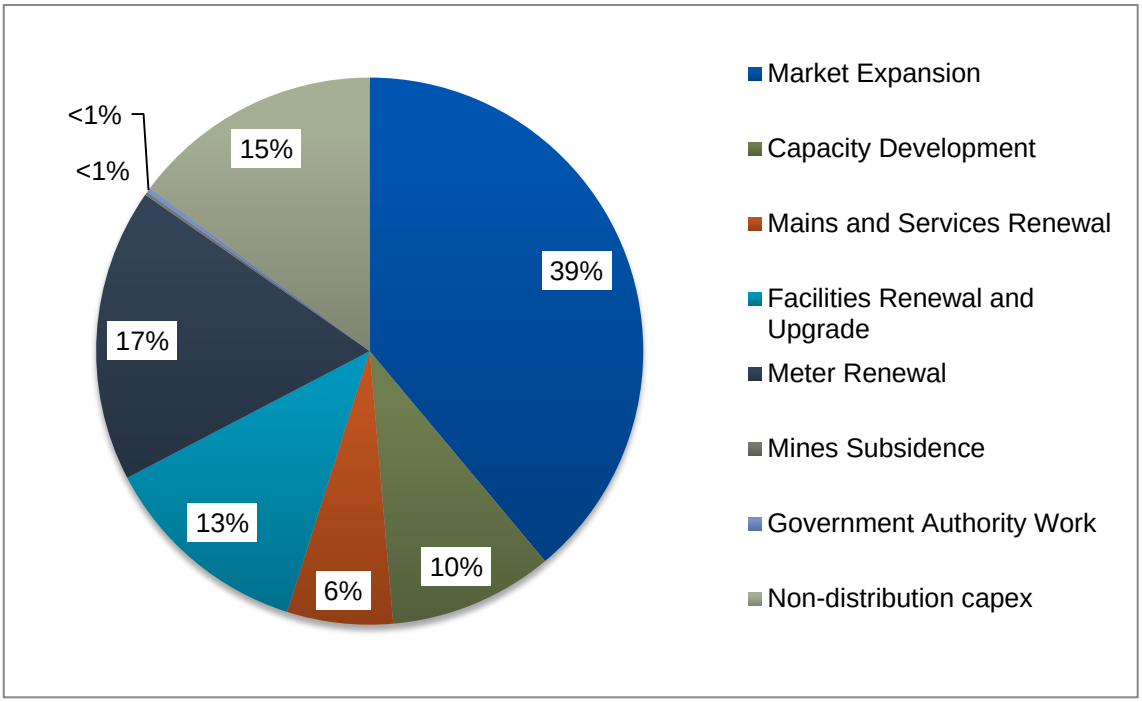
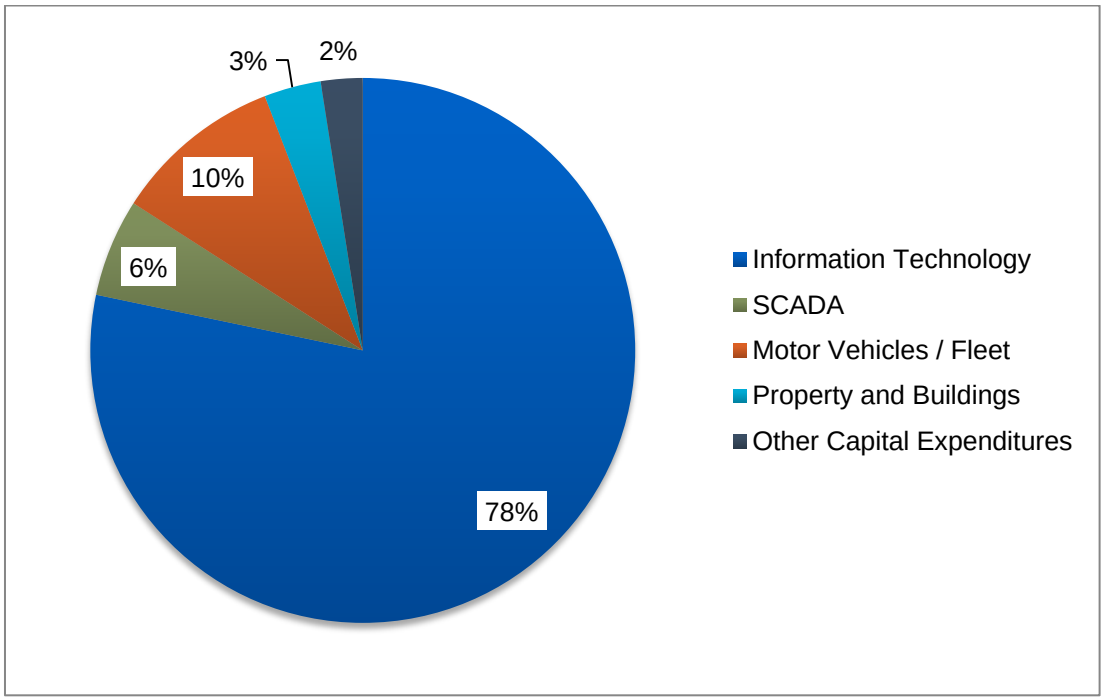


Figure 4–2: Breakdown of non-distribution capex



4.2 PERIOD-ON-PERIOD COMPARISON

34. JGN's forecast capex is broken down by detailed category comparing actual/estimates, the AER's allowances for current AA period, and the proposed forecast for 2015-20. The comparison is set out in Table 4–1 and Figure 4–3.

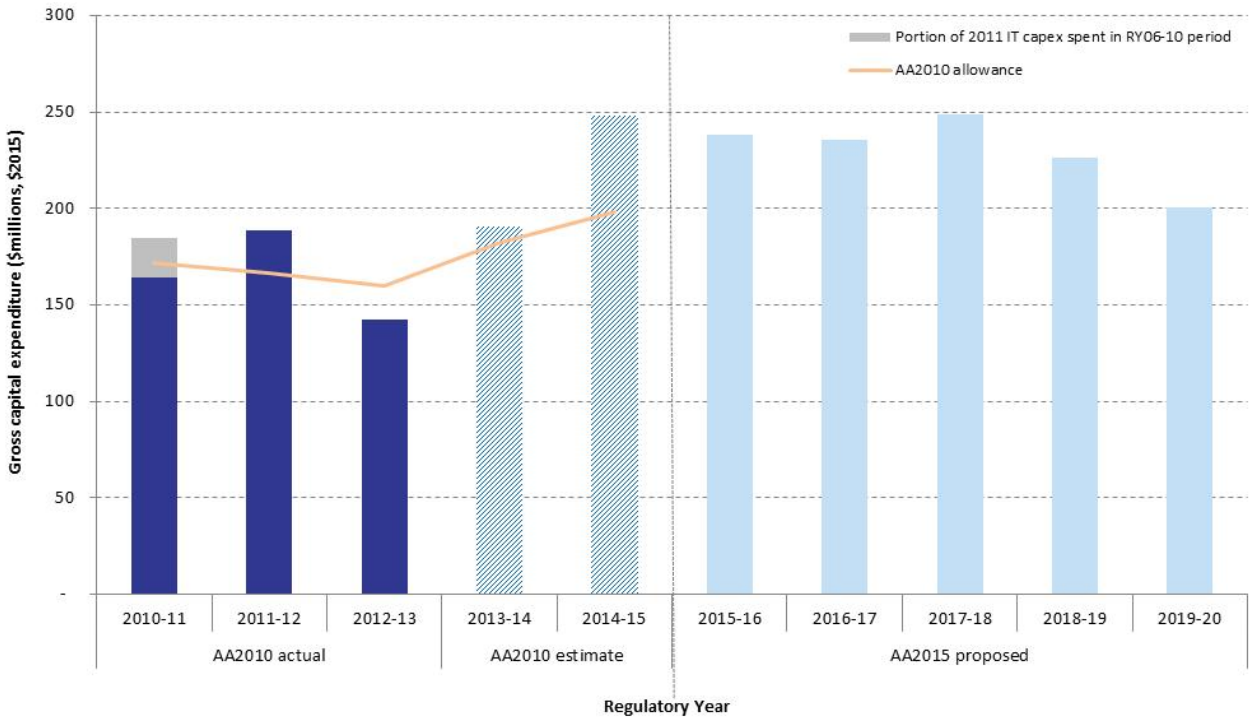
Table 4–1: 2010-15 actual/estimate, approved and 2015-20 forecast capex – $2015, $millions

	Current AA period		Next AA period	Variance: proposed vs actual/estimate		Variance: Proposed vs allowance	
	Allowed	Actual/ Estimate	Proposed	$M	per cent	$M	per cent
Market expansion	412.29	400.11	450.91	50.80	13	38.62	9
Capacity development	78.22	101.02	111.99	10.98	11	33.78	43
Mains and services renewal	21.74	29.52	72.13	42.61	144	50.39	232
Facilities renewal and upgrade	86.93	82.54	144.70	62.15	75	57.77	66
Meter renewal	134.56	107.79	195.35	87.56	81	60.79	45
IT	104.79	131.69	131.61	-0.08	0	26.83	26
Property	0.44	57.90	5.68	-52.22	-90	5.24	1195

	Current AA period		Next AA period	Variance: proposed vs actual/estimate		Variance: Proposed vs allowance	
Other (1)	40.02	47.30	36.16	-11.14	39	-3.86	1.33
Total	**878.99**	**957.87**	**1,148.54**	**190.67**	**20**	**269.55**	**31**

(1) Includes mine subsidence, SCADA, GAW, motor vehicles/fleet and other non-distribution.
(2) Appendix A provides a more detailed breakdown of the amounts in Table 4–1.

Figure 4–3: 2010-15 actual/estimate, approved and 2015-20 forecast capex



4.3 MARKET EXPANSION

35. ME capex is required to directly connect new customers and includes mains extensions (where needed), installation of services, meters and associated equipment required to make those connections. Growing the network economically is in the interests of customers because it lowers average network charges and increases gas availability. JGN actively promotes new connections through its marketing activities.

36. Forecast ME capex represents 39 per cent of forecast capex requirements for the next AA period.

37. Table 4–2 summarises the nature of each connection type.

Table 4–2: Subcategories of ME capex

Connection type	Description
Volume Market	
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.

Connection type	Description
Residential – 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.
Residential – 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.
Small business	Small business customers that use ~250 GJ p.a.
Industrial and commercial (**I&C**) – volume market	Small scale industrial users and commercial buildings.
Demand Market	
I&C – contract market	Major industrial customers using more than 10 TJ p.a.

4.3.1 JUSTIFICATION

38. ME programs and projects result from identification of new customer connections to the JGN network where the net present value **(NPV)** of the projects are expected to be positive based on JGN's incremental project hurdle rate of 10 per cent (post-tax nominal) applied to routine ME projects. A hurdle rate of 10 per cent is chosen to allow for variations in estimated loads and costs and to allow for deep capacity development that will result from ME. If gross capex for the project exceeds the amount that can be justified by this analysis, the customer will be asked to contribute the difference. If the customer declines to contribute, the project will not proceed. As a result net ME capex is justified under rule 79(2)(b) of the NGR as conforming capex.

39. The forecast of numbers of connections has been developed on a network-wide basis. JGN has forecast gross capex for ME as described in section 4.3.3 and has forecast an amount of capital contributions to be deducted from the gross amount. The forecast of capital contributions is based on the historically observed ratio of contributions to ME capex. As a result JGN is confident that the forecast net amount of ME capex is conforming capital expenditure and is the best estimate possible in these circumstances (rule 74).

4.3.2 DRIVERS

40. ME capex is driven by the forecast volume of new customer connections and unit costs of connection for each connection type and real cost escalation of unit rates. New connections are forecast to increase from around 164,700 in the current AA period to around 186,400 over the next AA period. Figure 4–4 and Table 4–3 provide the volumes of each connection type.

Figure 4–4: New connections volumes and capex 2010-20

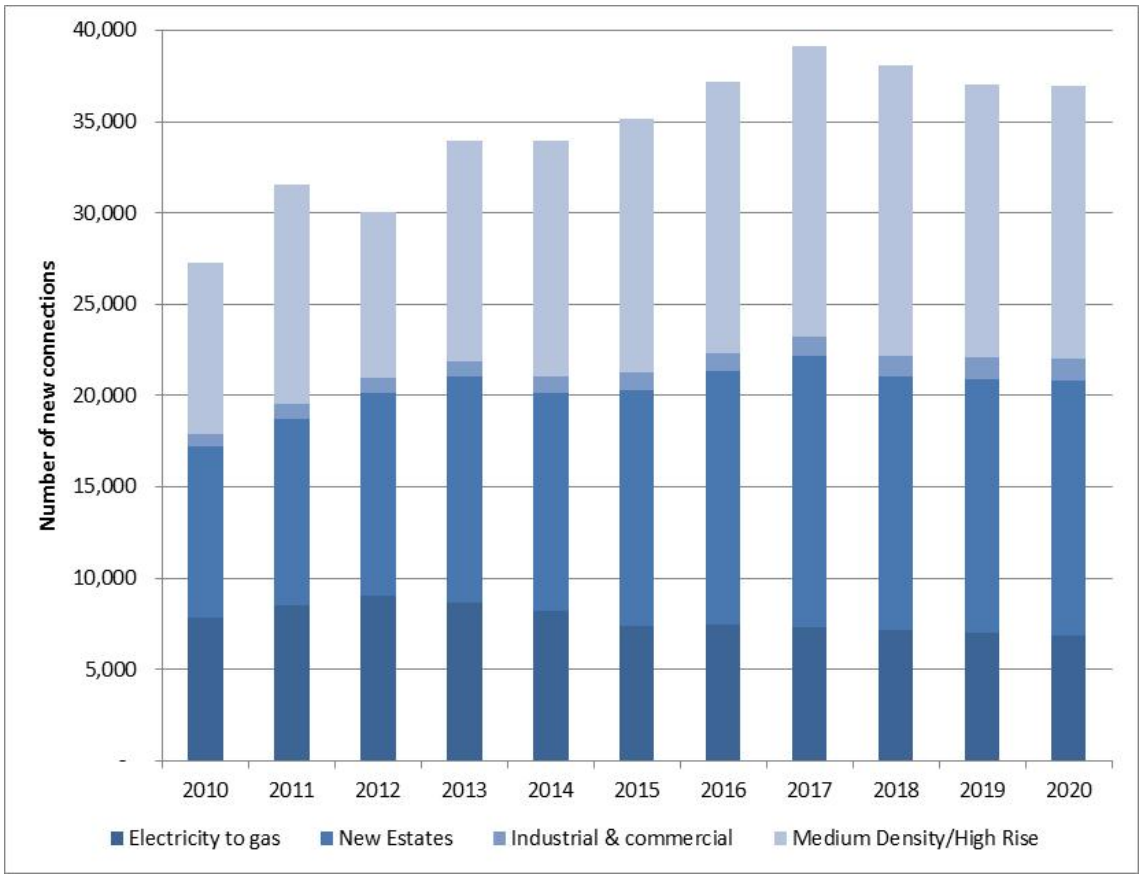


Table 4–3: New connections – actual and forecast

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
E to G	7,848	8,475	9,030	8,649	8,217	7,395	7,426	7,285	7,148	7,013	6,881
New estates	9,343	10,233	11,125	12,391	11,920	12,913	13,906	14,899	13,906	13,906	13,906
Industrial and commercial	714	868	815	825	876	930	988	1,050	1,116	1,186	1,262
Medium density/high rise	9,387	11,994	9,119	12,110	12,913	13,906	14,899	15,893	15,893	14,899	14,899
Total	**27,292**	**31,570**	**30,089**	**33,975**	**33,925**	**35,144**	**37,219**	**39,127**	**38,062**	**37,005**	**36,948**

41. Forecast new connections are based on Core Energy's forecast for demand and connections.[2] These have revised upwards to reflect JGN's forecast of the effect of a step change in marketing expenditure that is being proposed as part of the proposed forecast operating expenditure. The details of this step change in marketing expenditure and the resulting increase in connection numbers are set out in the operating expenditure step change report (appendix 7.3 of the AAI).

42. Section 3 of JGN's AMP covers all aspects of planning for ME.

[2] Core Energy Group, *Demand, Energy and Customer Forecasts, Jemena Gas Networks, NSW Gas Access Arrangement 2015-2020*, April 2014.

4.3.3 ESTIMATION METHODOLOGY

43. Unit rates are based on JGN's historical average for unit rates for each connection type and contract rates applicable from 1 July 2013.[3]

44. Real cost escalation is based on JGN's breakdown of estimated connection costs into labour, materials and overhead with escalators provided by BIS Shrapnel (refer to AAI appendix 6.10)

4.3.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

45. JGN's actual and forecast ME capex for 2011-20 is presented in Figure 4–5 and Table 4–4.

Figure 4–5: ME capex 2011-20

Table 4–4: ME capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/ estimate	64.27	70.69	80.64	94.94	89.56	400.11	86.47	91.13	91.49	90.34	91.49	450.91	50.80
Approved	65.76	76.33	78.41	91.57	100.22	412.29							38.62

46. There is a 13 per cent increase in total ME capex between the current and next AA periods. This reflects a 15 per cent increase in the number of connections forecast.

[3] Jemena Asset Management has three contracts for operational and construction services to JGN, which includes new connections.

47. The increase is in both new estate (20 per cent) and medium density housing (22 per cent) as a result of increases in the numbers of new dwellings forecast to be constructed in NSW.[4] This is driven by expected land release and increases in house prices providing an economic environment that stimulates new estate development.

48. Small industrial and commercial connections are also forecast to increase reflecting the historical compound annual growth rate for this segment of approximately five per cent p.a.

4.4 CAPACITY DEVELOPMENT

49. Capacity development projects (**CDP**) comprise expansions to the capacity of the gas network. Capacity for this purpose is measured as the peak hourly flow rate that the network can deliver, as opposed to the annual or daily throughput of the network. Capacity needs to be available to meet reasonably foreseeable variations in weather. Designing the network to meet an average winter would result in a high probability that parts of the network would have insufficient capacity to supply existing customers. As a consequence JGN assesses requirements to meet a 1-in-10 winter scenario reducing the poor supply risk to 10 per cent.

50. Capacity development is required to maintain supply to existing customers within JGN's minimum pressure requirements based on historical network performance measures and to ensure the ongoing reliability and integrity of the network. Capacity development involves installing additional or higher capacity mains, and/or adding new pressure reduction stations or increasing the capacity of existing stations.

51. Forecast capacity development capex represents 10 per cent of forecast total capex requirements in next AA period.

4.4.1 JUSTIFICATION

52. JGN invests in CDP for the following reasons:

- supply security and maintenance of supply reliability, pursuant to rule 79(2)(c)(ii)
- to maintain its capacity to supply existing services and is justified under rule 79(2)(c)(iv).

4.4.2 DRIVERS

53. JGN identifies CDP through its capacity planning process, which includes its annual planning cycle. Capacity development is directed towards meeting growth in peak hourly demand on the distribution network. Peak load growth is clearly linked to consumption profiles of existing customers as a result of appliance changes or additions. Peak load is also impacted by the number of connections to the network. For example, continuous flow hot water appliances are characterised by peakier consumption than the storage hot water heaters installed historically. This trend is observed for all classes of market growth and expansion:

- *organic growth of existing consumers*—there has been a pattern of increased peak load attributed to existing users. This is due to the change in hot water appliances that have a higher peak consumption rate but lower overall consumption. There are also likely to be some customers adding appliances as old electric appliances need replacing

[4] Core Energy Group, *Demand, Energy and Customer Forecasts, Jemena Gas Networks, NSW Gas Access Arrangement 2015-2020*, April 2014, pp57ff (AAI appendix 5.1)

- *E to G connections*—JGN has automated processes to enable the connection of these new consumers, to ensure efficient connection of new consumers on line-of-main. As new consumers add new load to an existing area, system reinforcement may be required. Significantly, new loads tend to be for new efficient appliances that have higher peak consumption
- *ME*—CDP are also required to provide deep system augmentation to support on-going ME, such as new estates or medium density connections. Significantly, new housing estates are heavily influenced by the NSW BASIX regulation[5] that requires installation of new efficient appliances that have higher peak consumption.

54. The capacity planning process uses the following inputs and analyses:

- network pressure monitoring—collecting data from SCADA, telemetry and winter pressure gauging
- local network forecasts—includes top down and bottom up forecasts, load and customer growth trends in established and developing areas
- review of gas supply requests
- review of poor/loss of supply statistics
- network modelling—including validation against actual measurements and forecast.

55. Outputs of the capacity planning process are:

- risk-based capacity assessments based on network monitoring and modelling
- capacity development plans for short term (two year program of works), medium term (six year AMP) and long term conceptual plans (20 years)
- annual review and confirmation of timing for prudency assessment
- consideration of staging options
- capacity management reviews for winter peak management, provision of operational support and recommendations for improvement of network utilisation.

56. The capacity planning process occurs over an annual planning cycle that provides timely updating of plans and management of capacity development investment decisions. Table 4–5 sets out the profile of CDP.

57. There will be variation in timing of CDP that are forecast up to seven years ahead as monitoring of network performance indicates the need to bring forward some projects while others may be prudently deferred. This approach allows JGN to incur expenditure efficiently, through having a flexible planning approach. JGN can achieve effective overall design of network capacity development with short term variations in timing so that actual investments are made at the optimal time.

Table 4–5: Profile of CDP – project profile – next AA period

Project size	Number	Value ($M)
>$1.0M	32	95.45
$0.2M to $1.0M	30	13.14
<$0.2M	30	2.85

[5] Information on BASIX is available at https://www.basix.nsw.gov.au/basixcms/

58. Attachment B sets out JGN's capacity development process and annual planning cycle.

4.4.3 ESTIMATION METHODOLOGY

59. JGN also includes a minor capital allocation for CDP. This allocation is for small projects that involve less than 100 m of pipe for interconnections that will expand the capacity of a local area of network. The projects are identified on an as-needed basis, most often in response to low local pressures during the winter peak season. These allocations are estimated on the basis of the previous five years' expenditure for minor capital allocations for capacity development, which is considered reasonable because actual annual expenditure tends to be reasonably consistent over time.

60. The FAs, OBs and OB+s for forecast CDP are provided in response to schedule 1, clause 6.15 of the RIN.

4.4.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

61. JGN's actual and forecast capacity development capex for the period 2011-20 is set out in Figure 4–6 and Table 4–6.

Figure 4–6: Capacity development capex 2011-20

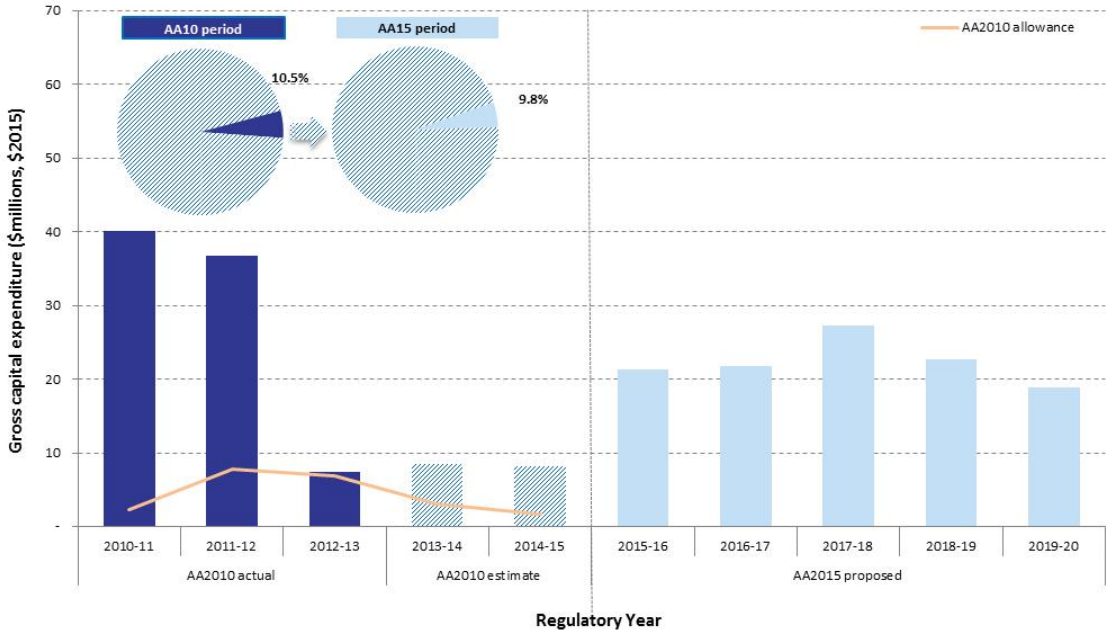


Table 4–6: Capacity development capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/ Estimate	40.09	36.78	7.49	8.49	8.16	101.02	21.29	21.78	27.30	22.76	18.87	111.99	10.98
Approved	30.72	21.75	8.09	7.44	10.23	78.22							33.78

62. Compared to the current AA period, JGN forecasts an 11 per cent increase in capacity development capex in the next AA period.

63. The drivers for CDP are increases in peak consumption of existing users, additional customers on line-of-main as a result of E to G connections and urban development. These drivers overlay a network that has been developed over a long period so that capacity constraints are a routine occurrence. The level of expenditure required to address those constraints will fluctuate over time depending on which major projects are required to maintain the level of service in a particular network area. Subject to the risk (and/or opportunity) of supply reliability, the profile of the expenditure over the next AA period reflects JGN's ability to reschedule the portfolio of the projects by a year or two to prudently manage resources applied. While it can do this to a certain extent within a five year period this will not change the variation in projects between AA periods.

4.5 MAINS AND SERVICES RENEWAL

64. JGN renews low and medium pressure gas mains and services as they are reaching the end of their economic life, when necessary to maintain:

- public and employee safety
- levels of reliability
- economic levels of serviceability—that is where operating and maintenance costs become excessive.

65. The great majority of renewal activity is planned with the remainder being reactive in nature. Mains renewal or replacement has historically been required for old cast iron or in some cases galvanised or unprotected steel mains that have high levels of gas leakage due to joint degradation or corrosion resulting in holes in the mains. Mains renewal is also conducted for older grades of plastic mains, which are susceptible to brittle fracturing, or that have joining methods that have an unacceptable risk of failure and are now deemed substandard.

66. Mains are generally renewed by inserting existing pipes with polyethylene or nylon pipes. This method of renewal has very significant advantages over laying new pipes. It involves holes being dug at intervals along the length of the mains, instead of trenches, to break into the existing pipes and insert the new ones, and to connect the new services, which are also inserted through the existing services. The main benefits are minimisation of disruption of the streetscape and considerably lower cost. The inserted mains can also be operated at higher pressures so that they have greater capacity than the existing pipes despite their smaller diameter.

67. JGN has a long history of rehabilitating mains and services, dating back to the early 1980s. JGN has tried and proven processes for identifying and prioritising areas for rehabilitation and the subsequent planning and implementation of these types of projects. This enables it to plan and deliver such projects effectively and efficiently.

68. In some cases mains are replaced by trenching and laying a new pipe rather inserting a new pipe into an old one. This is where insertion is not feasible or it is simply more efficient to lay new mains.

69. Table 4–7 provides the profile of mains and services renewal projects.

Table 4–7: Mains and services renewal – project profile – next AA period

Project size	Number	Value ($M)
>$1.0M	21	67.79
$0.2M to $1.0M	7	3.99
<$0.2M	0	0.00

70. Forecast mains and renewal capex represents six per cent of forecast total capex requirements in the next AA period.

4.5.1 JUSTIFICATION

71. Capex on mains renewal may be justified on a range bases:

- rule 79(2)(b) where the NPV of the cost savings on maintenance, unaccounted for gas **(UAG)** and carbon costs exceeds the capital cost of renewal of mains services or where renewing mains increases the capacity of a local network deferring the need for capacity development expenditure
- rule 79(2)(c)(i) where there are significant public safety issues
- rule 79(2)(c)(ii) where supply reliability is significantly compromised
- rule 79(2)(c)(iii) where JGN is obliged to meet the requirements of the Gas Supply (Safety and Network Management) Regulation, AS 4645 and its approved Safety and Operating Plan
- rule 79(2)(c)(iv) where mains have become unserviceable because of degradation and need replacement.

4.5.2 DRIVERS

72. As part of its asset management processes, JGN is constantly monitoring the condition of older sections of network to determine when mains and services should be renewed to ensure the safety and reliability of services and to deliver a universal quality of service as supported by customers. JGN uses a range of information to make these assessments that form part of a 20 year view of mains renewal requirements. This includes both primary and secondary information:

- primary:
  - public leakage reports
  - supply interruption reports
  - maintenance records from JGN's works management system
  - programmed leakage surveys
  - leakage tests the amount of leakage from suspect sections of the gas network is measured
  - localised supply constraints, which, if left unresolved, would result in some customers receiving inferior levels of service than those available to the majority of customers. Areas that have not been rehabilitated, such as Kensington in Sydney, are supplied by cast iron mains that can only operate effectively on lower pressures. Many newer, and therefore more efficient appliances require operating pressures higher than are available in these areas and thus customers are restricted in their choice of appliances. Customers support making the expenditure required to deliver a consistent level of service to all customers
- secondary:
  - growth forecasts leading to potential capacity constraints
  - project delivery efficiency—synergies with similar areas, contractor rates, or restoration works by councils, etc.

4.5.3 ESTIMATION METHODOLOGY

73. Cost estimates are based on historical unit rates from prior projects and current contractor panel unit rates, with larger projects (>$0.2M) being estimated using the PEM.

74. JGN also includes a minor capital allocation for mains and services renewal. This allowance is for reactive minor renewal projects typically of up to 250 m of pipe or individual services that pose an unacceptable risk or have reached their economic life. These arise from time to time when short sections of network with significant leakage are identified and are not part of a planned project area that has been identified for mains renewal. In some circumstances undertaking a minor, capital rehabilitation can also defer the requirement for rehabilitation of a wider area.

4.5.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

75. JGN's mains replacement and renewal capex actuals and forecast for the period 2011-20 is set out in Figure 4–7 and Table 4–8.

Figure 4–7: Mains and services renewal capex 2011-20

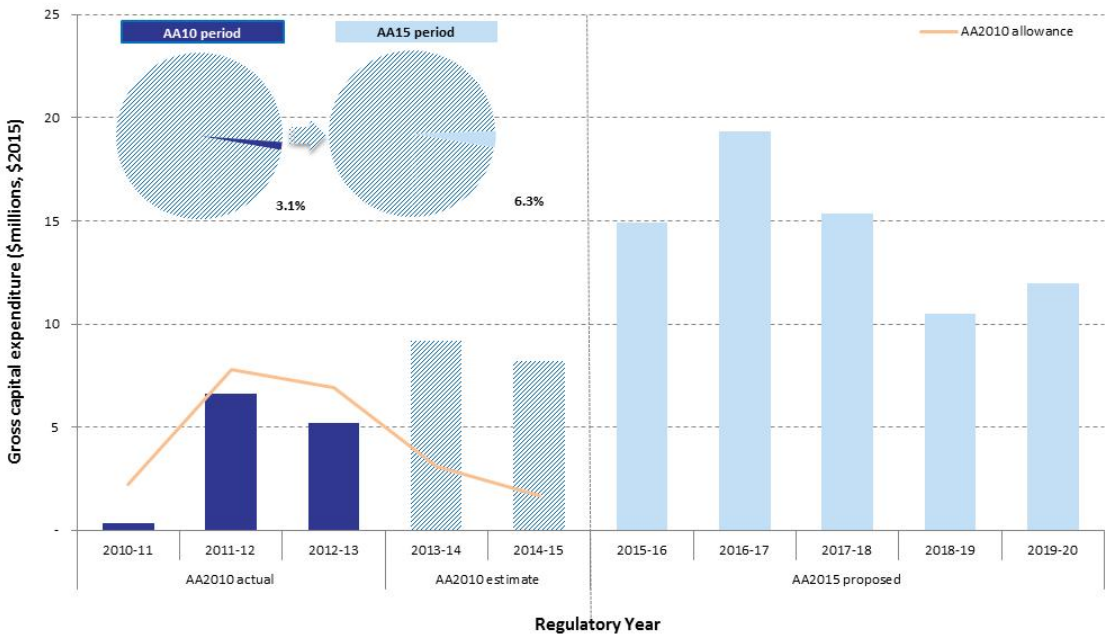


Table 4–8: Mains and service renewal capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	0.35	6.61	5.20	9.17	8.19	29.52	14.92	19.33	15.37	10.51	11.99	72.13	42.61
Approved	2.23	7.82	6.93	3.09	1.67	21.74							50.39

76. JGN is proposing to increase capex for mains renewal from an average ~$5.0M p.a. to ~$10.0M p.a. The increase is due to the following:

- *Mt Druitt steel replacement program*—this project is estimated at ~$13.0M over the next AA period. The project is a one-off project requiring the replacement of 10 km of steel main, which was constructed for medium pressure service before the arrival of natural gas and did not have the level of cathodic protection given to high pressure (secondary) mains. Insertion of the existing main with plastic is not an option in this case because of the specific circumstances and configuration of the steel main.
- *Penrith primary mains thin wall replacement*—this main was originally built as a secondary main and subsequently converted to a primary main. However, recent changes to AS 2885 coupled with a safety management study and subsequent investigations led JGN to conclude that to continue to operate the main at primary main pressures represents an unacceptable level of risk and that it must therefore be replaced.

4.6 FACILITIES RENEWAL AND UPGRADE

77. This category of capex covers a range of activities related to condition assessment, refurbishment and replacement of facilities (mainly pressure reduction stations) on trunk pipelines and primary and secondary mains, and medium pressure isolation valves, to maintain the safety and integrity of services. It also includes capex on high pressure mains generally related to integrity inspection of trunk and primary mains.

78. A large proportion of JGN's high pressure network was constructed up to, and soon after, the introduction of natural gas to NSW in December 1976. Consequently many of the assets are approximately 35 years old and are approaching the end of their economic lives[6], or, are reaching a stage where much more intensive monitoring and maintenance is required. Additionally, some of JGN's network facilities are experiencing urban encroachment and must be upgraded to meet safety and integrity requirements in this environment.

79. Table 4–9 provides a project profile for facilities renewal and upgrade projects.

Table 4–9: Facilities Renewal and Upgrade – project profile – next AA period

Project size	Number	Value ($M)
>$1.0M	54	129.88
$0.2M to $1.0M	23	12.35
<$0.2M	16	1.73

80. Forecast facilities renewal and upgrade capex represents 13 per cent of forecast total capex requirements in the next AA2015 period.

4.6.1 JUSTIFICATION

81. Facilities renewal and upgrade capex is justified under rules 79(2)(c)(i) – (iv). It is required to maintain the integrity and safety of JGN's network and to ensure continued provision of existing services. The expenditure is also required to comply with obligations under the NSW Gas Supply Act 1996, Gas Supply (Safety and Network Management) Regulation including AS 4645 and JGN's approved Safety and Operating Plan, and obligations under the Pipeline Act 1967 and the Pipeline Regulations including AS 2885.

[6] The age profiles of assets in each asset category are presented in JGN's 20 year asset strategy (AAI appendix 6.1).

4.6.2 DRIVERS

82. The main drivers of capex on facilities renewal and upgrade are the aging of the assets and/or increasing safety and environmental obligations:

- *useful life*—useful life is a driver for the refurbishment of aging pressure reducing stations (trunk receiving stations (**TRS**s), primary receiving stations (**PRS**s) and secondary district regulator sets (**SDRS**s)) for which key equipment has reached the end of its useful life and needs replacing. Useful life is informed by:
  - the age at which there is an unacceptable risk of equipment failure with consequent adverse effects on supply reliability
  - manufacturers of equipment ceasing to provide spare parts and other maintenance support making equipment obsolete
  - the potential for degradation of equipment installed in below-ground pits. Whenever work is done at these locations, JGN assesses the condition of the station and its ancillary equipment and will take the opportunity to replace degraded equipment thereby avoiding a return visit to the site.
- *external drivers*—external drivers such as changes to upstream infrastructure. For example off-take stations (TRSs and Packaged Off-take Stations (**POTS**)) may have to be upgraded to safely handle higher inlet pressures determined by the operation of upstream infrastructure
- *integrity management*—integrity management is a driver for projects that include:
  - installation of pig launchers and receivers, which enable in-line inspection of high pressure pipelines (in JGN's case its primary main system)
  - intelligent pigging (in-line inspection) and validation digs, which enables JGN to assess the condition of its high pressure pipelines. Integrity digs involve the excavation at selected sites to validate the results of in-line inspection
  - integrity digs enable JGN to assess the condition of its high pressure pipelines where pipeline configuration prevents the use of intelligent pigging.
- *public safety*—public safety is a driver for installation of isolation valves on the medium pressure network, where it traverses or supplies zones of high community risk (typically near shopping centres and schools) so that the area can be isolated in the event of a mains failure.

4.6.3 ESTIMATION METHODOLOGY

83. Cost estimates for facilities renewal and upgrade are developed as part of either an OB+ or an FA, depending on complexity and size of the project. Any projects greater than $0.2M are costed using the PEM.[7]

84. This category also includes a minor capital allocation for reactive minor renewal projects typically below $0.1M. These arise from time to time and are not part of a planned facilities renewal or upgrade project.

4.6.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

85. JGN's facilities renewal and upgrade capex actuals and forecast for the period 2011-20 is set out in Figure 4–8 and Table 4–10.

[7] Note that there are three facilities renewal projects that are already in progress and will continue into the 2015-20 AA period—PRS Valves (C425-1.001 – 1.004), Eastern Creek (C424-19) and ALBV Stage1 (C462-31).

Figure 4–8: Facilities renewal and upgrade capex 2011-20

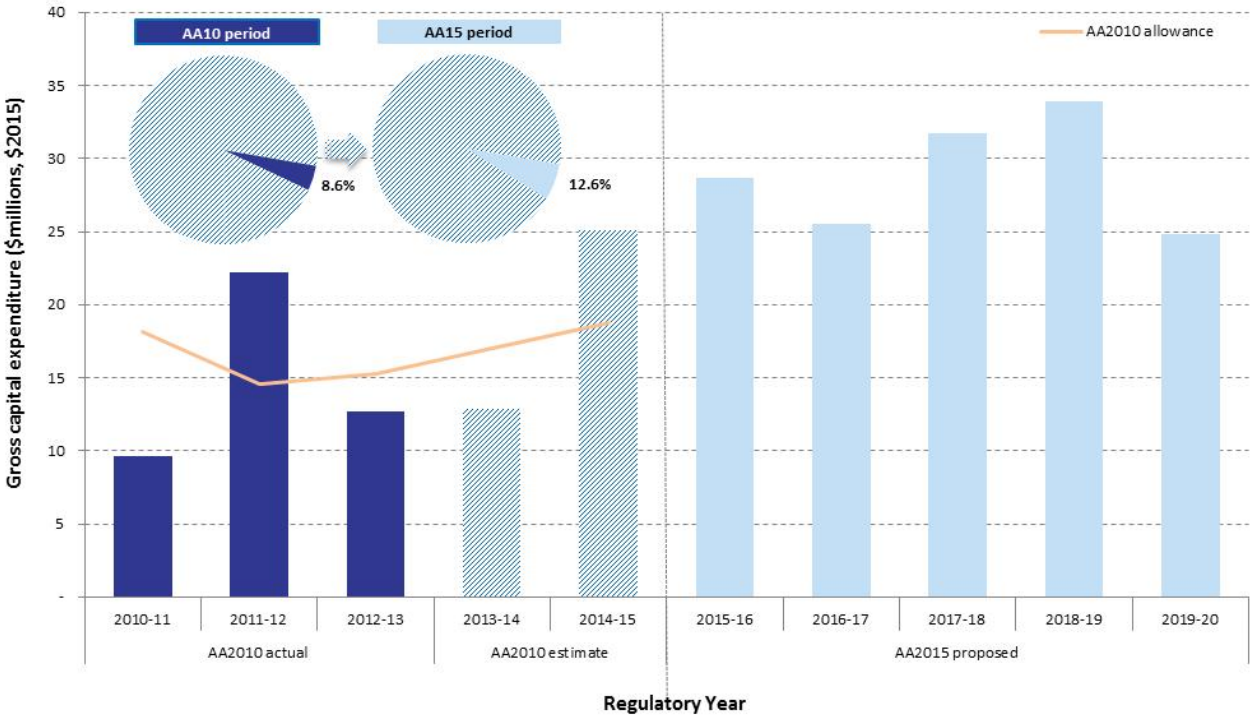


Table 4–10: Facilities renewal and upgrade capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	9.64	22.19	12.70	12.90	25.11	82.54	28.67	25.52	31.75	33.94	24.82	144.70	62.15
Approved	18.16	14.60	15.30	17.06	18.73	83.85							60.85

86. Compared to the current AA period, JGN forecasts a 75 per cent increase in expenditure on facilities renewal and refurbishment over the next AA period.

87. As with capacity development this category tends to be variable and “lumpy” with specific projects determining the overall expenditure profile.

88. The increase in this category is due to:

- projects prudently deferred from the current AA period accounting for $37.4M
- the capitalisation of integrity projects, being the in-line-inspection (‘pigging’), validation digs and integrity digs projects, accounting for $32M. The value of these investigations is applied over the period between successive rounds of activity. This is consistent with JGN’s accounting practice and recent AER decisions. In its 2010 JGN decision the AER required those costs to be treated as opex. However, in subsequent decisions for APA GasNet and the Roma to Brisbane Pipeline, the AER accepted capitalisation of those costs

- The Northern Trunk pressure increase mitigation project accounting for $13M. This project comprises the upgrade of JGN's stations on the Northern Trunk to handle pressures up to 6,000 kPa that are expected when new supply sources are connected to the the vicinity of Newcastle. This connection is expected to come from coal seam gas developments in the Northern Sydney, Gloucester Basin and/or the Gunnedah Basin.

89. As with CDP, there will be variation in timing of facilities renewal projects that are forecast seven years ahead as monitoring of network performance indicates the need to bring forwards some projects while others may be prudently deferred. The proposed expenditure includes projects that were included in the current AA period allowance and were prudently deferred as follows:

- *pigging facilities for Sydney primary main*—delayed as investigative works identified a level of complexity that needed to be resolved before the project could commence. Complexity included land acquisition and difficulty determining the configuration of the 40 year old main and whether a pig can navigate the tight bends in certain locations along the main. These matters had not been identified because the detailed investigations necessary had not commenced.
- *Riverina HP facilities upgrade stage 2: upgrade of TRSs and POTS supplying towns off APA's Riverina lateral*—upgrade the TRSs and POTS supplying towns off APA's Riverina Lateral. JGN will need to upgrade its facilities when APA increases the operating pressure in the lateral or removes the 'temporary' pressure control station at Burnt Creek. APA had forecast its intention to increase the pressure in the Riverina lateral during the current AA period, but this has not occurred and is now expected to occur within the next AA period as APA increases its utilisation of the NSW Victoria Interconnect. This project has been deferred from the current AA period, because APA has been able to delay increasing pressures on the Riverina Lateral.
- *refurbishment of Auburn, Banksmeadow, Haberfield, and Windsor TRSs*—during the review of options, more prudent options became apparent and the planning of these is currently being finalised. Additionally, land considerations are currently being resolved.
- *automatic line break valve* (***ALBV***) *refurbishment*—scope and delivery strategy was amended to ensure a more efficient delivery of the project. This arose as detailed investigative indicated the need for the amendments.
- *Penrith primary main pigging*—not undertaken because the primary main is incomplete pending agreement with the NSW Government to allow it to cross the rail line. Agreement has recently been reached and will allow the project to proceed.
- *Pigging facilities for the Mount Kiera to Wollongong section of the Wilton to Wollongong Trunk main*—delayed as JGN is currently operating the pressure at well below its maximum allowable operating pressure (**MAOP**).

90. The Northern Trunk Pressure Mitigation Project will upgrade JGN's receiving stations on the trunk to be capable of handling pressures of up to 6,000 kPa that are expected when a new supply source is connected to the trunk system in the vicinity of Newcastle. This connection is expected to come from coal seam gas developments in the Northern Sydney Basin, Gloucester Basin and/or the Gunnedah Basin.

91. JGN's facilities renewal and upgrade capex forecast includes projects that the AER has previously treated as opex:

- in-line inspection (pigging)
- integrity digs.

92. These activities do not produce a fixed asset, but are undertaken on a periodic basis typically every ten years and their value is in enabling the life of the pipeline to be extended and is applied over the period between each round of activity. It is normal statutory accounting practice to capitalise these activities.[8]

4.7 METER RENEWAL AND UPGRADE

93. JGN replaces and upgrades meters and related equipment (including filter/regulator or separate filter and regulator, data logging or telemetry equipment where applicable) when necessary to maintain the integrity of measurement of gas delivered and/or the safety of the metering installation. This ensures accurate metering of gas delivered which is necessary for customer billing by retailers.

94. JGN manages residential gas meters in accordance with the requirements of AS 4944. This standard requires replacement of meters after 15 years unless granted a life extension. Life extensions are allowed (and advised to the NSW Department of Fair Trading) on the basis of statistical sampling studies. Residential meters typically remain within the statutorily required limits of accuracy between 20 and 25 years. However, beyond this age a sufficient number become inaccurate to justify their replacement.

95. Residential and I&C diaphragm meters are divided into like families for statistical sampling. This is undertaken on an annual basis, with families retested each year for meters reaching their 'in-service' test life. Based upon the test results the next 'in-service' test is reset for these families. JGN has been undertaking this statistical testing of various meter families for many years and thus has an understanding of the potential for the various families test results to lead to an 'extension of life'. The forecast for the meter replacement capital for the residential and I&C diaphragm is based upon JGN's experience with the statistical sampling of the meter families that over the course of the next AA period will reach a 'in-service' test life. Although, as each family is retested on an annual basis, there is a potential for families that have historically not been eligible for 'life-extension' to become eligible and vice versa.

96. Replacement activity is largely planned, but with some reactive replacement. This category of expenditure does not include new meters installed as part of new connection work. Capex on new connection meters is included in the ME capex forecast.

97. Forecast capex represents 17 per cent of forecast total capex requirements in the next AA period.

4.7.1 JUSTIFICATION

98. Meter renewal capex is required to replace aging and degrading meters and to meet the requirements of the NSW Gas Supply Act, the Gas Supply (Consumer Safety) Regulation and the NSW Department of Fair Trading, which administers the regulation. Accordingly, it is justified as conforming capital expenditure under rules 79(2)(c)(ii), 79(2)(c)(iii) 79(c)(iv). JGN has adopted the best practice of AS 4944 to ensure compliance.

4.7.2 DRIVERS

99. Meter renewal capex is driven by the volume of meters reaching the age at which they will fail the regulatory requirements as defined in AS 4944. The condition of each meter type is monitored and frequencies of replacement are based on these condition assessments. The frequency of meter replacement varies depending on the type of meter as follows:

[8] The AER has approved capitalisation of these costs for other service providers including APA GasNet in Victoria and APT Petroleum Pipelines Limited in Queensland.

- *residential diaphragm meters and regulators*—replaced on reaching 20 years or 25 years of age depending on meter type, plus defective meters and meters removed as part of the residential meter statistical sampling program. Sixty per cent of filter/regulators are replaced at the same time as the meters. 274,000 residential meter replacements are forecast for the next AA period compared with 161,000 for the current AA period
- *residential hot water meters*—JGN has a six-year plan to replace approximately 150,000 aging and prematurely defective hot water meters, based on replacement of 23,000 meters each year
- *I&C diaphragm meters*—A majority of meters are normally replaced after 15 years of service. One particular model (approximately 50 per cent of the population) has a life extension of 5 years. Regulators are replaced as required
- *rotary meters*—most rotary meters are replaced after ten years of service. Not all of these meters require regulators. Regulators are replaced as required
- *Turbine meters*—replaced every five years. These meters do not require regulators
- *Meter data loggers (***MDL***)*—replaced on failure or at 15 years age due a range of factors largely oriented around obsolescence
- I&C gas volume correction equipment is replaced on failure.

100. Figure 4–9 and Table 4–11 set out the pattern of meter replacements over the 2011-20 period.

Figure 4–9: Meter renewal volumes

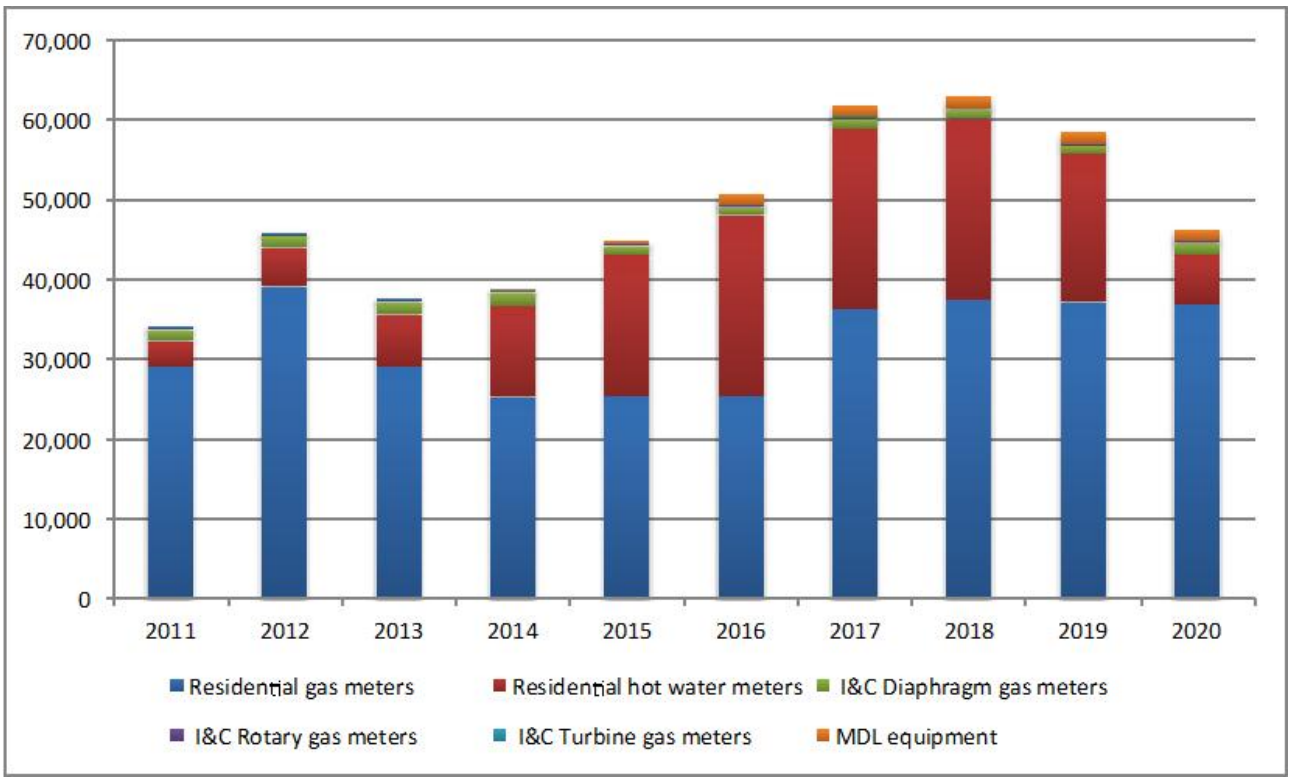


Table 4–11: Meter renewal volumes

Metering equipment	RY11	RY12	RY13	RY14	RY15	RY16	RY17	RY18	RY19	RY20
Residential gas meters	29,024	39,004	29,041	25,191	25,376	25,367	36,243	37,425	37,102	36,853
Residential hot water meters	3,227	4,922	6,532	11,457	17,651	22,654	22,603	22,603	18,583	6,215
I&C diaphragm gas meters	1,357	1,446	1,560	1,626	1,046	945	1,190	1,211	1,005	1,387
I&C rotary gas meters	196	171	122	124	261	207	147	106	165	251
I&C turbine gas meters	26	50	52	32	33	29	29	28	28	28
MDL equipment	N/A	N/A	N/A	260	375	1,503	1,500	1,500	1,500	1,500

4.7.3 ESTIMATION METHODOLOGY

101. Meter renewal and upgrade capex is forecast using a volume driven estimation approach. Volumes are forecast based on the number of meters expected to require replacement to meet regulatory requirements.

102. Unit rates applied to the volumes are based on current rates for purchase.

103. JGN also includes a minor capex allocation in the meter renewal category. This allowance is for unplanned meter replacements arising from meters that fail, stop registering, or fail a customer requested meter test.

4.7.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

104. JGN's meter renewal capex actuals and forecast for the 2010-20 period is set out in Figure 4–10 and Table 4–12.

Figure 4–10: Meter renewal and upgrade capex 2011-20

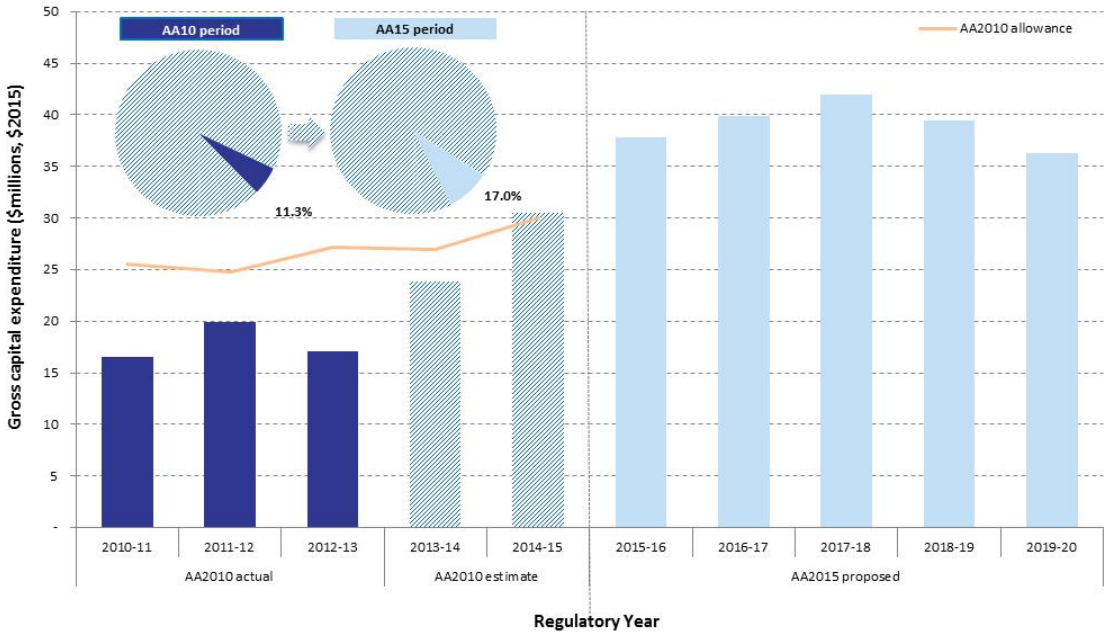


Table 4–12: Meter renewal and upgrade capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/ Estimate	16.52	19.90	17.08	23.78	30.50	107.79	37.85	39.88	41.93	39.45	36.24	195.35	87.56
Approved	25.54	24.83	27.18	26.97	30.05	134.56							60.79

105. Figure 4–10 and Table 4–12 show an 81 per cent increase in capex between the current and next AA period.

106. This increase results from two effects. The first is the result of the meter life extension program allowed under AS 4944. Under the program, JGN was able to defer meter replacements (initially to 20 years life and then further extended to 25 years life), which led to a significant reduction in the number of residential meters being replaced. This reduced level of replacement has continued for approximately ten years from when the program began in the early 2000s. With the first group of meter replacement deferrals reaching 25 years life, these meters now need to be replaced. This results in an increase in replacements commensurate with the decrease approximately ten years ago.

107. The second effect is the result of significant growth in customers that took place from the late 1980s into the early 2000s. Some of this growth was from AGL's Goldline project under which there was a significant push to connect new customers at the same time as the mains were being renewed. In addition, the opportunity of being present on site during the Goldline project was used to replace meters that either near to their replacement age or where meter installations needed major reconstruction. The other major growth element resulted from the establishment of new regional networks, such as the Riverina and Central West, and growth in residential development in the greater Sydney area.

4.8 GOVERNMENT AUTHORITY WORK

108. From time to time, government authorities or private landowners require JGN to move its gas mains or facilities to enable the authority to perform works such as road re-alignment or widening, or to make way for activities that the property owner has planned. Where arrangements with the relevant authority or landowner do not provide JGN with a right guaranteeing the location of its assets, JGN is bound to relocate them as required by the authority or landowner at its own expense. In cases where JGN does have rights it will recover the cost of relocation from the authority or landowner.

109. Forecast capex for GAW[9] represents less than one per cent of forecast total capex requirements in the AA2015 period.

4.8.1 JUSTIFICATION

110. JGN's capex for GAW (including private landowners) is necessary to maintain continuity of supply and is therefore justified under rule 79(2)(c)(iv).

[9] GAW which is to be included as conforming capital expenditure is a small proportion of all government authority expenditure. The remainder is funded from organisations requiring mains and other relocation work.

4.8.2 DRIVERS AND RELATIONSHIP TO AMP

111. Timing of relocations is dependent on the requirements of the relevant authority or landowner and is generally not predictable.

4.8.3 ASSESSMENT AND ESTIMATION METHODOLOGY

112. The costs estimates for government authority work are minor capital allocations with an amount of $0.6M p.a., based on historical levels of expenditure. As the scope of the identified works is confirmed, the project cost will be estimated using JGN's PEM.

4.8.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

113. JGN's GAW capex actual and forecast for the period 2011-20 period is set out in Figure 4–11 and Table 4–13.

Figure 4–11: Government authority work capex 2011-20

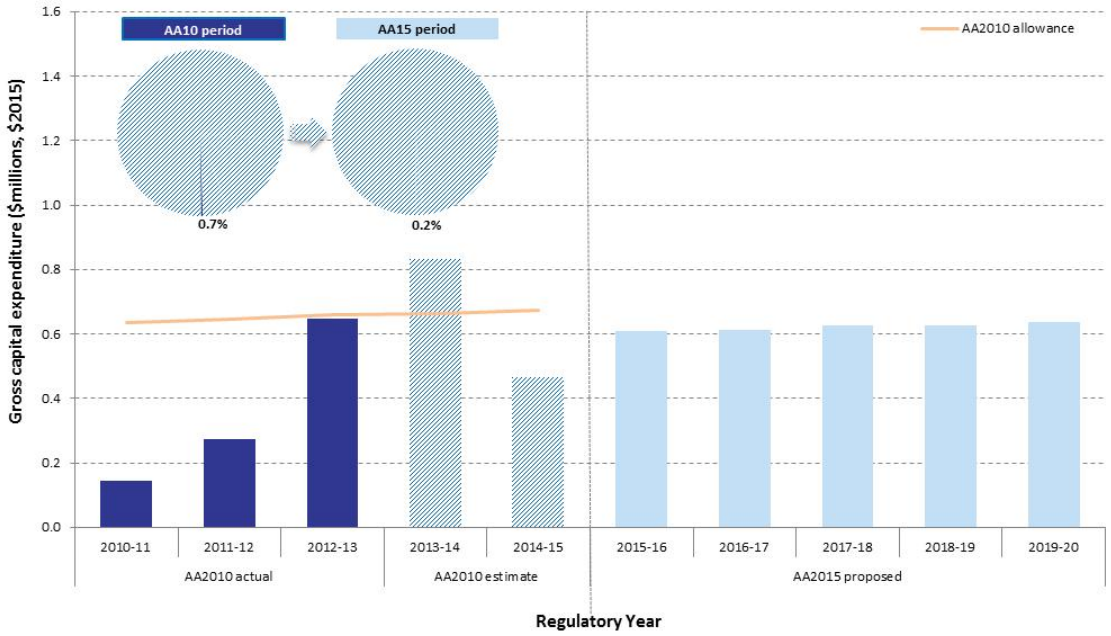


Table 4–13: Government authority work capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	0.15	0.28	0.65	0.83	0.47	2.37	0.61	0.61	0.63	0.63	0.64	3.11	0.74
Approved	0.64	0.65	0.66	0.66	0.67	3.28							-0.17

114. The forecast increase between the current and next AA period is not material and reflects a similar level of activity to that approved for the current AA period.

4.9 MINE SUBSIDENCE

115. Portions of JGN's high pressure (trunk) system traverse zones where subsurface coal mining occurs. Parts of the trunk between Wilton and Horsley Park will be affected by BHP Billiton's Westcliff mine in the southern coalfields during the 2015-20 AA period. Coal mining results in movement or subsidence of the ground as coal is removed. This has the effect of displacing the pipe at these locations, subjecting it to stress that may jeopardise the integrity of the pipe. To maintain the integrity of services, JGN manages and mitigates these effects on the pipeline. JGN must also monitor the pipeline's condition where subsidence is anticipated.

116. For some of the zones where mine subsidence occurs JGN is effectively indemnified for the costs of protective works by either the mining company involved or the Mine Subsidence Board (**MSB**). For other zones, JGN is either partially indemnified or not at all. Indemnities have been the subject of litigation between JGN and the MSB. Financial receipts from these companies or the MSB are recognised as capital contributions in JGN's regulatory asset base.

117. Three pipelines (JGN Trunk, Eastern Gas Pipeline and Gorodok Ethane Pipeline) run in a corridor, each with its own easement, and remediation works are performed for all three pipelines at once. The cost of remediation works is shared between the three pipelines on an equitable basis.

118. The issue of inclusion of mine subsidence as conforming capital expenditure (as opposed to opex) has been the subject of a merits review before the Australian Competition Tribunal.[10] The result of this merits review was that mine subsidence protection works and monitoring work directly resulting in mines subsidence protection works are properly categorised as conforming capital expenditure for the purposes of the NGR.

119. Forecast capex for mine subsidence represents less than one per cent of forecast total capex requirements in the next AA period.

4.9.1 JUSTIFICATION

120. JGN's forecast mines subsidence project costs are necessary to maintain the public safety of the trunk pipeline and integrity of service through avoidance of damage to it. It is also necessary for JGN to comply with its licence obligations. Accordingly all mine subsidence capex net of indemnity payments and tax, are justified as conforming capital expenditure under rules 79(2)(c)(i), (ii) and (iii).

4.9.2 DRIVERS

121. Mine subsidence capex is driven by the incidence of mining beneath or near JGN's trunk pipelines. The extent to which JGN is liable for costs arising from mine subsidence is dependent of the extent to which the MSB or the relevant mining company has prior legal rights in relation to mine subsidence. This varies along the length of the trunk.

4.9.3 ESTIMATION METHODOLOGY

122. The cost estimates for mine subsidence capex are not developed using one of JGN's individual assessment methodologies, because of the nature of the work. By its nature mine subsidence remediation work depends on the circumstances and extent of the subsidence, which cannot be predicted with any certainty. JGN has based the estimate on the cost of work done at previously completed sites, adjusted to reflect the circumstances of the Westcliff mine subsidence sites.

[10] Application by Jemena Gas Networks (NSW) (No 3) [2011] ACompT 6, paras 38, 39

123. The amounts for mine subsidence capex are an estimate of JGN's share of the costs (the other shares being allocated to EGP and Gorodok). These amounts are gross before any reimbursement from BHP Billiton or the MSB. Reimbursements are treated as capital contributions.

124. The timing of capex is driven by the long-wall mining schedule and agreement with owners of other assets impacted by mine subsidence.

4.9.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

125. JGN's mine subsidence capex actuals and forecast for the period 2011 to 2020 is set out in Figure 4–12 and Table 4–14.

Figure 4–12: Mine subsidence capex 2011-20

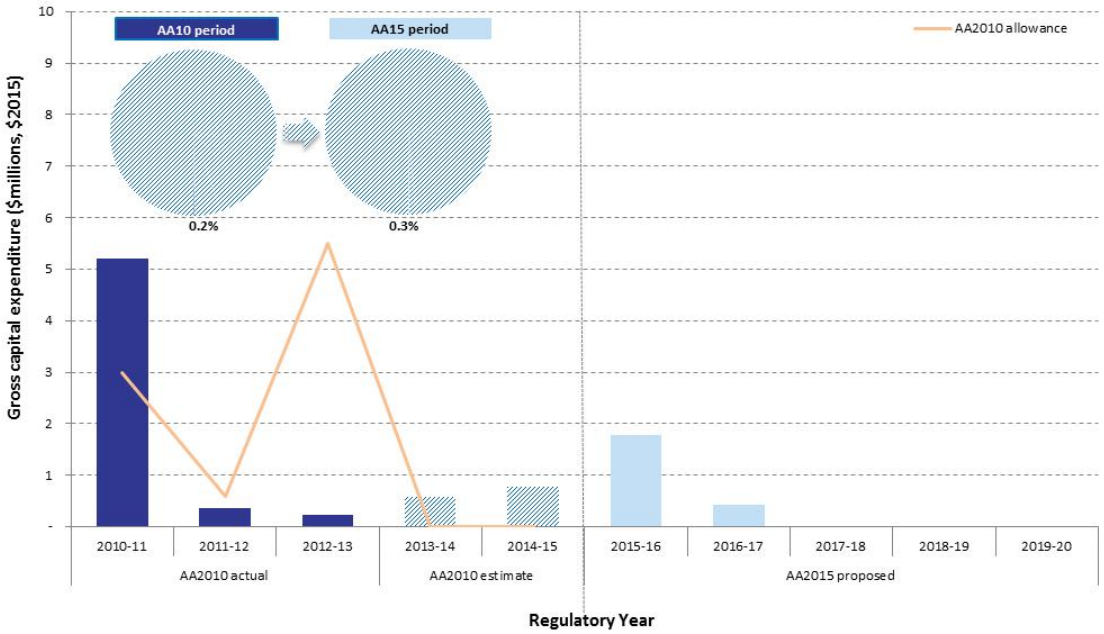


Table 4–14: Mine Subsidence Capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	5.20	0.36	0.24	0.58	0.78	7.14	1.79	0.42	-	-	-	2.21	-4.94
Approved	3.00	0.60	5.49	-	-	9.09							-6.89

126. The reduction in capex for mine subsidence between the two periods reflects that BHP Billiton's mining at its Westcliff mine will be complete in 2016 and no other mining activity is anticipated in the vicinity of the trunk pipeline during the next AA period.

4.10 INFORMATION TECHNOLOGY [11]

127. IT capex is necessary to ensure that JGN has the systems it requires to operate its business, grow the network, connect new customers, provide network services, provide data to gas market participants, the Australian Energy Market Operator and the AER, and meet regulatory obligations. IT capex encompasses expenditure on systems application software, hardware infrastructure, communications and technology services. The principal categories of IT capex are described in Table 4–15.

Table 4–15: IT system categories

Classification	Description
Regulatory requirements and market operation services	The regulatory and market services encompass information systems functions and facilities required to meet national and jurisdictional energy regulation including energy market obligations and to comply with all non-energy government regulation such as taxation and accounting.
Corporate and enterprise systems	The corporate and enterprise systems encompass the corporate and back office functions of JGN. The enterprise systems cover IT solutions used by the entire business including office systems, intranet and general reference information. The functions include, finance and accounting, treasury, human resources, payroll, occupational health and safety, office administration.
Customer systems	The customer systems encompass all interaction between JGN and its customers. The systems consist of those systems required to engage with and service end customers, retailers, and connected transmission businesses.
Network distribution systems	The distribution network systems are those systems that manage the network as a physical asset and including network operation
Metering and real time systems	The metering systems encompass all IT functions relating to the provision of gas meters, their operation, maintenance and support and include management of meter data. Jemena's IT division provides technology platforms and communication for real time systems including SCADA.
Content management, records management and business intelligence systems	The content management, records and business intelligence systems asset category encompasses all systems that manage, enable and support business needs
Geospatial systems	The geospatial asset class encompasses all solutions that provide geographic location information, mapping, asset images, aerial images, geological images, geographic related asset data and integration with external parties. Those parties include Government departments, service providers, sub-contractors and construction partners.
Asset construction and mobility systems	The asset construction and mobility systems assets encompass program, portfolio and project management solutions. The field services assets are those software applications and mobility technologies used by managers, supervisors and workers in the field for planning and construction and for works management including maintenance, inspections, outages and materials management.
IT infrastructure management	The IT infrastructure category encompasses all hardware technology platforms, communications, operating environments and data systems needs to operate the application solutions.

[11] This section should be read in conjunction with the IT AMP (AAI appendix 6.3).

4.10.1 JUSTIFICATION

128. IT systems are essential for JGN to operate and maintain the network. IT capex is required to develop and maintain IT capacity and deliver improved IT capabilities necessary to support business operations, including to ensure compliance with regulatory requirements. IT systems are necessary to maintain system safety, to ensure the integrity of services and to meet regulatory obligations. The expenditure is justified under rules 79(2)(c)(i), (ii) and (iii).

4.10.2 DRIVERS

129. JGN classifies IT capex according to drivers as summarised in Table 4–16.

Table 4–16: IT capex classes

Category	Description/consequence
New capability	A new system required to meet new regulatory obligations, improve efficiency, mitigate risk and align JGN to the systems capability levels of peer energy distribution businesses in Australia.
Extend, remediate and change	Extensions consist of increasing the usage of a current solution or technology to more parts of the business, developing additional functionality and utilising previously unused software functionality Remediate consists of investing to ensure that systems meet the required service and stability standards that are sometimes impaired by business changes and increasing processing loads. Change involves changing an existing system to respond to external changes such as new or changed regulation, or to improve effectiveness and efficiency
Growth	Investment driven by growth in the energy market in the form of customers, connections and the size of the distribution network. Growth affects IT systems through additional user staff, and requirements for increased processing power and data capacity.
Upgrade	Upgrading of a software application, technical software and hardware infrastructure typically performed on a three to five year cycle depending on the level of disruption, vendor cycles, Jemena policies and the need to introduce new functionality and overcome known problems. Upgrades do not include replacement systems from the same vendor where the vendor has retired an existing product and is providing a new version that requires a new implementation.
End of life replacements and retirements	Replacing a software application or multiple applications that form a solution and the replacement of infrastructure technologies that have reached their end of life. Retirement is the orderly shutting down, data archival, securing and safe disposal of an obsolete IT asset that is no longer used but still operational. Some systems remain operational despite staged and gradual reduction of usage and transition to new systems and may be retained post replacement for risk management reasons for a limited time.

4.10.3 ESTIMATION METHODOLOGY

130. The cost methods and metrics applied to cost the IT capex program of work are:

- business cases for projects and investments that are already in progress at the beginning of the next AA period
- solution options and project studies with cost estimates conducted by Jemena and with external advisory organisations for pre business case projects
- systems upgrades which are calculated at 10 per cent of the original project cost for the more recently implemented solutions. For legacy systems and in-house developed systems, the costs of an upgrade has been calculated by the project team's work days and daily rate for each system or technology

- extend, remediate and change provisions are based on three per cent per annum of the most recent project cost to implement the solution. For legacy systems this type of expenditure is calculated by the number of full time equivalent staff members or contractors required times the daily rate based on the recent historical trend in demand and actual expenditure per system
- growth factors are based on the following cost drivers and metrics:
  - for customers and connections, software and technical licensing is a one to one relationship. For the next AA period customers and connections are forecast to grow by an average of 2.5 per cent per annum.
  - the number of internal users is the most common mechanism used by software application vendors for charging for licences. The IT AMP assumes that user growth will be 1.5 per cent per annum calculated at 1 per cent less than customer connections growth of 2.5 per cent.

131. The forecast cost of the IT program for the 2015-20 AA period is supported by:

- past business cases where that project will be replicated as part of the end of life replacement in future years such as the IT infrastructure refresh and standard operating environment replacement projects
- the GASS+ replacement business case
- growth plans provided by the business which have also had input from external consulting specialists in energy demand and demographics
- the existing business case for the geographic information system project deferred from 2010-15 AA period to 2015-20 AA period
- formal studies into the solutions and options available with cost estimates for those projects that are pre business case or have no prior history with Jemena
- project profiles that provide a business case style project definition with options analysis and costs model. The project profiles are prepared as supporting material for the IT AMP
- for items that are incremental capex such as additional licences and data storage capacity, current cost rates, current purchasing agreements or recent acquisition history
- consulting organisations who provide advice and data for IT and energy industry trends, metrics and benchmarking.

IT Shared Services Cost Allocation

132. JGN's information technologies and services are provided by the Jemena Information Technology Division using a mix of shared services, common software applications and systems specific to the NSW gas network.

133. The allocation of capital costs for systems shared by the Jemena group of businesses are based on the following principles and calculations:

- project costs are allocated on a case by case basis taking into account a combination of usage metrics and which businesses in the Jemena group benefit from the solutions delivered by the project
- cost rates and time sheets are provided by internal and external staff and tracked against plans and budgets
- incremental costs for capital items purchased that are not projects, such as systems licences and additional data storage capacity are allocated to JGN according to the percentages below.

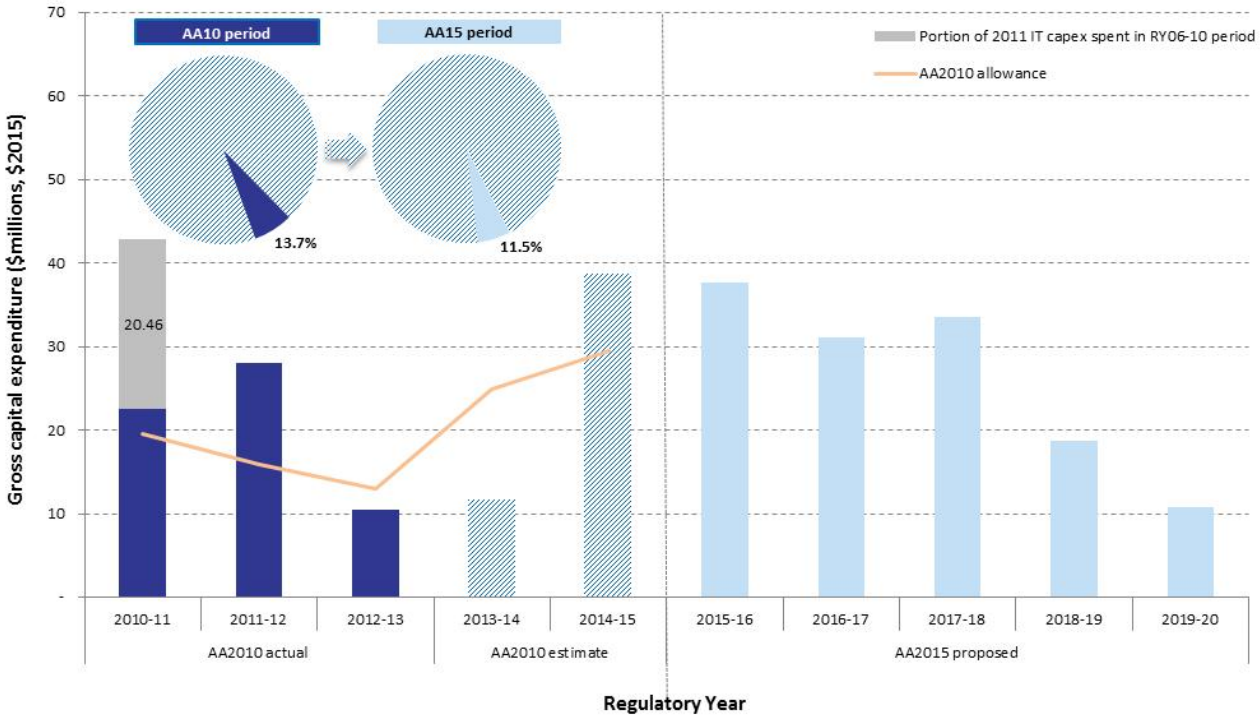
Table 4–17: IT capex cost allocation (per cent), 2015-20

	JGN allocation
Application solutions	51.5
IT infrastructure	40.0

4.10.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

134. JGN's actual and forecast IT capex for the period 2011-20 is set out in Figure 4–13 and Table 4–18.

Figure 4–13: IT capex 2011-20



(1) As reported in JGN's annual RIN response for 2010-11, IT capex for 2011 includes an amount, shown here as $20.46M, that was spent in the 2005-10 AA period.

Table 4–18: IT Capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/ Estimate	42.93	28.02	10.51	11.59	38.64	131.69	37.63	31.04	33.47	18.66	10.82	131.61	-0.08
Approved	19.61	15.83	12.99	24.93	29.57	102.92							28.69

135. Proposed IT capex for the 2015-20 AA period is essentially the same as actual/estimated for the current period, and $20.4M or 18 per cent above the actual/estimated amount for the current period if expenditure incurred in the prior period but capitalised in the current period is excluded.

136. The principal IT projects and programs planned for the next AA period are a mix of:

- sustaining the ongoing asset base through upgrades, optimising asset performance and providing for energy market growth
- completing the large scale GASS+ replacement with new SAP systems. The project commenced in the current AA period with a two stage implementation from 2014 to 2017
- implementing field mobility, business intelligence and document management projects which were deferred from the current regulatory period as a result of the decision, made after the AER's final decision, to implement the National Energy Customer Framework (**NECF**) in NSW
- replacing systems that have come to the end of their useful life
- retiring end of life systems and technologies that have gradually become redundant as new systems replace their business and technical purpose
- adding new systems and technologies to bring JGN up to the capability level of other energy distribution businesses, including in the areas of geographic information systems, field mobility and business intelligence and analytics.

137. Forecast IT capex by system category is shown in Table 4–19. The cost profile reflects the scale and importance of the core business and IT areas of expenditure on customer and distribution systems, corporate enterprise systems and on IT infrastructure.

Table 4–19: Proposed IT capex by category – $millions, $2015

	2015-16	2016-17	2017-18	2018-19	2019-20	Total 2016-20
Regulatory systems and market services systems	1.03	1.13	1.15	1.16	1.17	5.63
Corporate and enterprise systems	3.80	2.25	3.49	1.98	1.30	12.83
Customer systems	0.66	2.94	2.99	2.33	0.96	9.89
Distribution network systems	19.06	1.39	5.23	4.53	2.08	32.30
Metering systems	0.08	6.22	3.34	0.80	0.60	11.03
Content management and business intelligence systems	2.22	1.92	3.40	2.32	0.95	10.81
Geospatial Information systems and mapping and asset imaging	1.79	4.25	4.11	0.46	0.26	10.86
Asset construction and field services systems	1.27	1.86	1.88	0.21	0.21	5.44
IT infrastructure	7.72	9.07	7.87	4.86	3.29	32.81
Total	**37.63**	**31.04**	**33.47**	**18.66**	**10.82**	**131.61**

4.11 SCADA

138. SCADA capex relates to replacement of or upgrades to JGN SCADA and communication hardware and software assets.

139. SCADA is the computer-based control system that remotely monitors and controls the JGN network. It includes:

- the master control station which oversees the operation of the network
- remote telemetry units **(RTU)** that are the local interface with each station and relay data and control signals to the master station
- associated communications equipment.

140. Forecast capex in this category represents approximately one per cent of forecast total capex requirements in the next AA period.

4.11.1 JUSTIFICATION

141. The SCADA system is critical infrastructure used to monitor and control JGN gas network assets and the performance of the distribution network, and is integral to other core business functions such as capacity development planning, billing, gas despatch/distribution and demand and emergency management. Accordingly ongoing replacement and upgrading of SCADA components is necessary to maintain the integrity of the system and is justified under rules 79(2)(c)(i), (ii) and (iv).

4.11.2 DRIVERS

142. Key drivers to SCADA capex are:

- gas network growth which requires additional RTUs to monitor and, in some cases, control new network assets
- replacement of aging hardware
- replacement and updating of SCADA software.

143. Additional telemetry requirements to monitor network terminal points are determined on the basis of network configuration, type and number of customers supplied by the given network. Requirements for each network are assessed and reviewed as part of the network validation and capacity assessment and planning process. The following criteria are applied to telemeter installation:

- all isolated secondary networks should have a terminal point telemeter, unless they supply less than 3,000 customers and which have a downstream network with a terminal point telemeter
- larger interconnected secondary networks should have at least one telemetry point for every 20,000 customers
- isolated medium pressure networks in Sydney, Newcastle, central Coast, Wollongong supplying in excess of 500 customers should have a terminal point telemeter
- isolated networks in the country region supplying in excess of 200 customers should have a terminal point telemeter
- larger interconnected medium pressure networks should have at least one telemetry point for every 10,000 customers.

144. New telemeters are forecast as an allocation for five new points per year, and their location is confirmed based on actual growth areas in the network. In new estate areas, telemeters are installed once the growth is stabilised, to capture all new mains in the area.

145. Table 4–20 set out the profile of SCADA capex projects.

Table 4–20: SCADA – Project profile – 2015-2020

Project size ($)	Number	Value ($M)
>$1.0M	1	6.33
$0.2M to $1.0M	5	2.60
<$0.2M	13	0.79

4.11.3 ESTIMATION METHODOLOGY

146. The need for replacement of SCADA and communications software and hardware is detailed in the AMP based on the expected operating life of individual elements of the SCADA and communications systems, adjusted for particular assets that have identified maintenance problems. This is supplemented by estimates of growth related assets (largely RTUs) that will be needed to monitor new network assets.

147. OBs have been prepared for each of the sub-categories of SCADA with allowances for breakdown of equipment. Cost estimates are based on a combination of historical project costs, preliminary quotes and high level estimates of labour requirements.

4.11.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

148. JGN's SCADA capex actuals and forecast for the period 2011-20 is set out in Figure 4–14 and Table 4–21.

Figure 4–14: SCADA capex 2011-20

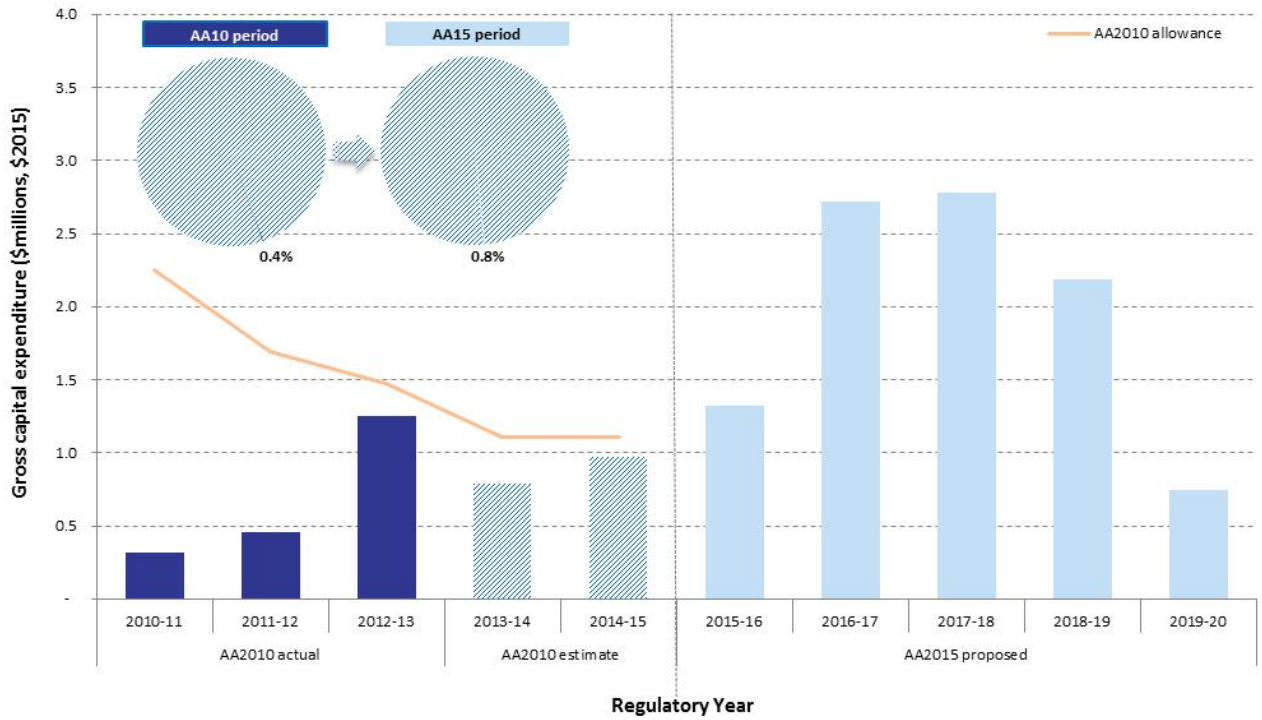


Table 4–21: SCADA capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	0.32	0.46	1.25	0.79	0.97	3.79	1.32	2.72	2.78	2.19	0.75	9.76	5.97
Approved	2.25	1.69	1.48	1.11	1.11	7.64							2.12

149. The comparison between actual and forecast shows a 145 per cent increase between actual/estimate cost for the current period and the proposed forecast for the next AA period. The largest component of this increase is for replacement of SCADA master station hardware and software, which will reach the end of their designed product life in 2018.

4.12 MOTOR VEHICLES/FLEET

150. JGN operates a fleet covering a range of vehicles for operational purposes. Table 4–22 shows the composition of the fleet as at January 2014.

Table 4–22: Fleet profile as at January 2014

Vehicle Type	Total
Heavy commercial vehicles	19
Light commercial vehicles	205
Passenger vehicles	29
Plant	13
Trailers	40
Total	**306**

151. Capex on motor vehicles/fleet represents approximately one per cent of the total proposed capex.

152. Jemena has outsourced certain the fleet management functions to Interleasing. Jemena retains the high level fleet management functions, such as developing the fleet management strategy, fleet plant and equipment assessments and developing sound and rigorous procurement processes. Interleasing undertakes the more operational fleet management tasks such as managing fleet management costs and reporting on fleet management performance.

4.12.1 JUSTIFICATION

153. JGN's vehicle fleet is necessary to manage and operate its network. Vehicles are replaced in accordance with good industry practice that reflects the lowest sustainable cost of vehicle operations. Accordingly, motor vehicle/fleet capex is justified under rule 79(2)(c)(iv).

4.12.2 DRIVERS

154. The main driver of motor vehicle/fleet capex is the number of vehicles needing replacement over the next AA period. Replacement frequency varies with vehicle type.

155. Table 4–23 provides the age profile of the JGN fleet.

Table 4–23: Vehicle fleet age profile as at January 2014

Vehicle type	< 1 year	1-3 years	3-5 years	> 5 years
Heavy commercial vehicles	0	3	15	1
Light commercial vehicles	11	69	116	9
Passenger vehicles	1	11	17	0
Plant	0	7	4	2
Trailers	1	5	4	30
Total	**13**	**95**	**156**	**42**

156. The fleet management strategy for vehicle replacement is based around the following principles

- fit for purpose vehicle selected for the task at hand
- least cent per kilometre methodology
- up to date safety features
- mitigation of age related failures and potential consequences of personnel and third party injury
- decreased response times to vehicle breakdown and
- reduction in operational costs (service, repairs and fuel).

157. Table 4–24 provides the vehicle replacement numbers by vehicle type over the next AA period.

Table 4–24: Vehicle replacement plan - next AA period

Vehicle type	2016	2017	2018	2019	2020
Heavy commercial vehicles	0	0	0	2	12
Light commercial vehicles	29	33	32	88	22
Passenger vehicles	9	2	7	12	7
Plant and trailers	2	1	2	4	2
Total	**40**	**36**	**41**	**106**	**43**

4.12.3 ASSESSMENT AND ESTIMATION METHODOLOGY

158. The numbers of vehicles to be replaced are based on the age profile of each vehicle type and the replacement age for that type. Unit rates are based on current replacement cost for vehicles JGN is able to secure for its fleet.

4.12.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

159. JGN's motor vehicles/fleet capex actuals and forecast for the period 2011-2020 is set out in Figure 4–15 and Table 4–25.

Figure 4–15: Fleet capex 2011-20

Table 4–25: Motor vehicles/fleet capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/Forecast	3.80	2.94	2.14	6.90	2.53	18.31	2.53	2.07	2.74	6.16	3.42	16.93	-1.38
Approved	3.65	1.74	2.43	6.07	2.15	16.04							0.88

160. The comparison between actual and forecast shows a eight per cent decrease between the current AA period and the proposed forecast for the next AA period. This reflects the changes in the age profile of vehicles relative to their replacement ages as vehicles have been replaced.

4.13 PROPERTY

161. JGN's property portfolio comprises:

- the lease of North Sydney site, JGN's principal office in NSW
- the lease the Sydney Olympic Park site, the principal operational facility servicing JGN
- an allocation of the Melbourne head office costs representing the portion of those costs attributed to JGN activities.

162. JGN's two principal NSW leases in North Sydney and Sydney Olympic Park are terminating during 2015 leaving JGN with no choice but to consider alternative property options. Based on market tested outcomes, JGN's proposed property strategy is to:

- consolidate NSW office based functions into one leased property for a 13 year term, plus two five year options

- purchase a site in metropolitan Sydney by JGN and build a depot to:
  - accommodate JGN's NSW gas operational requirements (including warehousing and hardstand areas currently provided at the Sydney Olympic Park facility)
  - consolidate into this new site various training and storage facilities currently provided from other leased premises.

163. In addition, Jemena's Melbourne office leases are also expiring in 2015 and Jemena must seek alternate office accommodation. JGN is to be allocated 38.32 per cent of the new Melbourne head office costs based on a cost allocation approach described in the business case for the project.

164. Jemena will consolidate its NSW and Victorian fitouts to achieve benefits from economies of scale.

4.13.1 JUSTIFICATION

NSW property

165. In addition to the purchase of land, implementation of the property strategy requires capex by Jemena on the office fit-out (estimated $15M) and in building the depot and training centre (estimated $13.5M including fit-out). Jemena expects to have market tested quotes for the depot by the end of May and for the NSW fit-out by the end of July 2014.

166. JGN would be unable to maintain or improve the safety of its services or maintain the integrity of these services without appropriate depot and office facilities and therefore the expenditure is justified under rule 79(2)(c).

167. Furthermore, the market tested outcomes for the acquisition of land demonstrate that the recommended property best contributes to the achievement of JGN providing services at the lowest sustainable cost complying with rule 79(1)(a).

168. Costs incurred on the fit-out and the depot build will also be tested through competitive market outcomes adhering to Jemena's procurement policy. Further, the fit-outs are expected to benefit from economies of scale resulting from consolidating the NSW and Victorian fit-outs. Therefore, capex on the fit-outs and depot build are expected to meet rule 79(1)(a) requirements and best contribute to the achievement of JGN providing services at the lowest sustainable cost.

Victorian property

169. The Victorian office fit-out is estimated at $35.7M. Jemena expects to have market tested quotes for the Victorian fit-out by the end of July 14.

170. The provision of appropriate office accommodation that encourages employee efficiency is justified under rule 79(2)(c) and the resulting competitive market outcomes from economies of scale, and Jemena's prudent management of the fit-out costs (including competitive offers in accordance with Jemena's procurement policy), will meet rule 79(1)(a) requirements.

4.13.2 DRIVERS

171. The main drivers of property capex are the expiry of current leases and the need for new property options.

172. Jemena's current NSW property arrangements are set out in Table 4–26.

Table 4–26: Current NSW property arrangements

Property	Space occupied (sq metres)	Number of staff	Number of car spaces	Lease expiry
North Sydney (office)	981	64	6	30 Jun 15
Sydney Olympic Park **(SOP)** (depot and office)	3,892	323	220	30 Apr 15 (termination by lessor)
TOTAL	4,873	387	226	

(1) There are another 20 operational staff over various small locations

(2) The existing North Sydney office is far too small to accommodate the SOP office staff.

173. Jemena's current Victorian office property arrangements are set out in Table 4–27.

Table 4–27: Current Victorian office property arrangements

Property	Space occupied (sq metres)	Number of staff	Number of car spaces	Lease expiry
Mount Waverley	7,893 (3 floors) plus 251 storage space	559	479	31 Oct 15
Forest Hill	4,550 (2 floors)	179	242	31 May 15
Bourke St, Docklands (Jemena's share)	2,080 (1.5 floors for Jemena)	150	7	30 Oct 15 (termination)
TOTAL	14,523	888	728	

174. In relation to the above three leases:

- *Mount Waverley*—Jemena has an option to extend the current lease for a period of three years from 31 October 2015 to October 2018. Jemena cannot trigger the extension until October 2014 and at this stage Jemena is unable to confirm with the landlord whether it is willing to negotiate or enter into a lease past 2018. A three year extension does not give Jemena any certainty of long-term tenure. In any case, the current lease is not fit for purpose for Jemena's Victorian requirements given the need to accommodate staff currently at Forest Hill.
- *Forest Hill*—Jemena is currently negotiating with the landlord to extend the lease to align with the expiry dates of the Mount Waverley and Bourke Street sites. The landlord is not willing to negotiate or enter into a lease past 2017.
- *Bourke Street, Docklands*—this site is leased by Enterprise Business Services **(EBS)** and accommodates staff that provide IT support services to Jemena and SP AusNet. SP AusNet terminated the IT Services Agreement between itself and EBS effective 31 March 2014, and consequently IT services currently provided to Jemena by EBS will transition to Jemena during 2014. Jemena needs to accommodate these EBS employees.

4.13.3 ASSESSMENT AND ESTIMATION METHODOLOGY

175. Jemena's fit-out estimates ($15M for NSW and $35.7M for Victoria) have been developed by Jemena's external property consultants based on preliminary concepts that were developed by Jemena and its consultants. Jemena has established a project to efficiently manage its office fit-out to achieve the expected benefits from economies of scale and achieve a smooth transition. As part of the project Jemena plans to refine the preliminary concepts based on consultation with stakeholders (including staff and Council) and then obtain

market quotes in accordance with Jemena's procurement policy. Jemena's average fit-out cost of $2,580 per square metre compares favourably with recent A-Grade fit-outs ranging from $2,200 to $3,250 per square metre. Jemena expects to have market-tested costings by the end of July 2014.

176. Jemena's initial estimate for the depot and training build and associated fit-out costs of $13.5M has been developed by Jemena's external consultants based on Jemena's high level depot and training specification and preliminary plans. Jemena has established a project to efficiently manage the depot build and fit-out to achieve the expected benefits from economies of scale and achieve a smooth transition. As part of the project Jemena plans to finalise the depot plans based on consultation with stakeholders (including staff and Council) and then obtain market quotes for the construction of the depot, in accordance with Jemena's procurement policy.

4.13.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

Figure 4–16: Property expenditure 2011-20

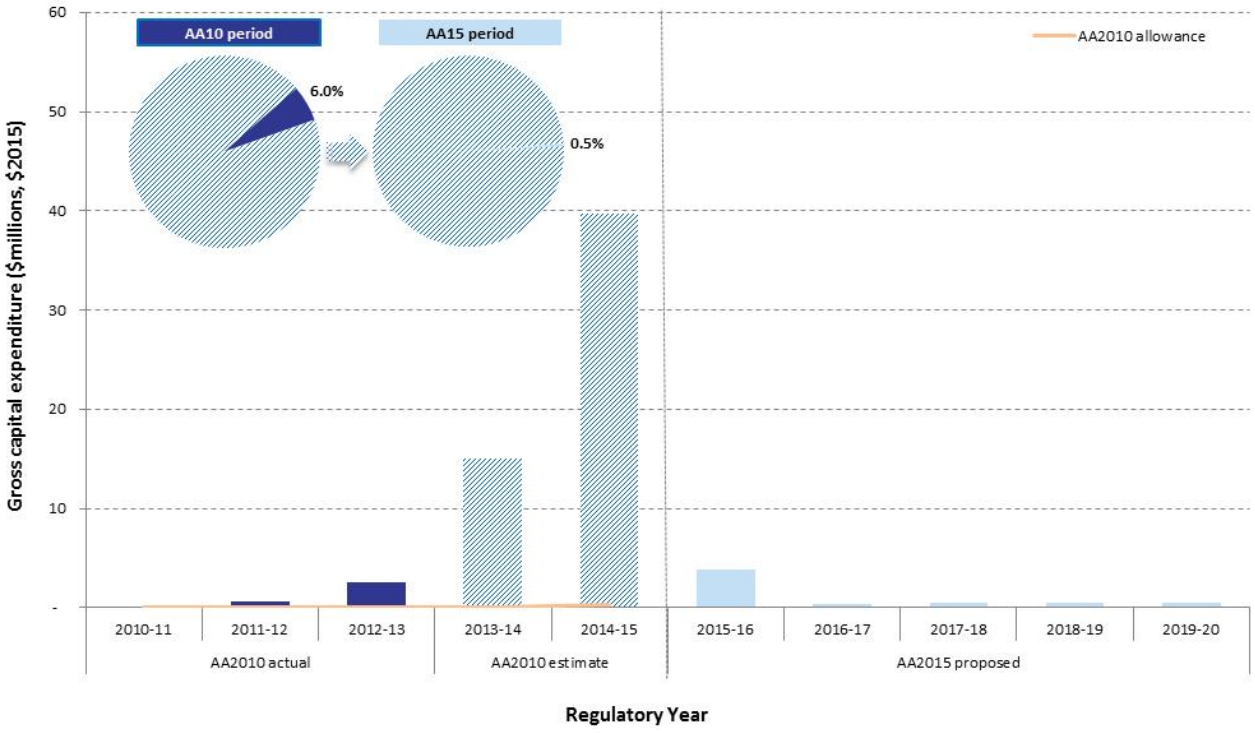


Table 4–28: Property Expenditure – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	-	0.63	2.58	14.99	39.71	57.90	3.81	0.43	0.48	0.48	0.48	5.68	-52.22
Approved	0.03	-	-	0.08	0.32	0.44							5.24

177. Property capex represents less than 0.5 per cent of the total proposed capex for the next AA period.

4.14 OTHER CAPITAL EXPENDITURE

178. Other capex covers a range of minor equipment and tools necessary to operate the gas network, such as tools, gas masks, gas detectors, bench grinders, heavy duty battery drills, road drillers, wet and dry vacuums, safety equipment, purge burners, temperature probes and Drager gauges.

179. Historically, this category has also included capitalised costs associated with JGN's AA obligations including development of JGN's AA submission, preparation of RINs, ring fencing and other compliance and reporting. For the next AA period these costs will be treated as opex (refer opex step change report provided as AAI appendix 7.3).

180. Other capex represents less than 0.5 per cent of the total proposed capex.

4.14.1 JUSTIFICATION

181. Other capex is necessary for JGN's field personnel to undertake their roles in developing, operating and maintaining the gas network and is therefore justified under rule 79(2)(c)(iv).

4.14.2 DRIVERS

182. The minor equipment and tools covered by the other capex category need to be replaced periodically as a result of wear and tear. The operating lives of the various types of equipment are different and estimates of the cost for this category are based on historical expenditure.

183. Due to its minor nature and short asset lives this category of capex is not covered by JGN's AMP.

4.14.3 ESTIMATION METHODOLOGY

184. JGN estimates the requirement for this category based on historical expenditure profiles for minor equipment and tools.

4.14.4 COMPARISON AGAINST PREVIOUS ACCESS ARRANGEMENT PERIOD

185. JGN's other capex actuals and forecast for the period 2011 to 2020 is set out in Figure 4–17 and Table 4–29.

Figure 4–17: Other capex 2011-20

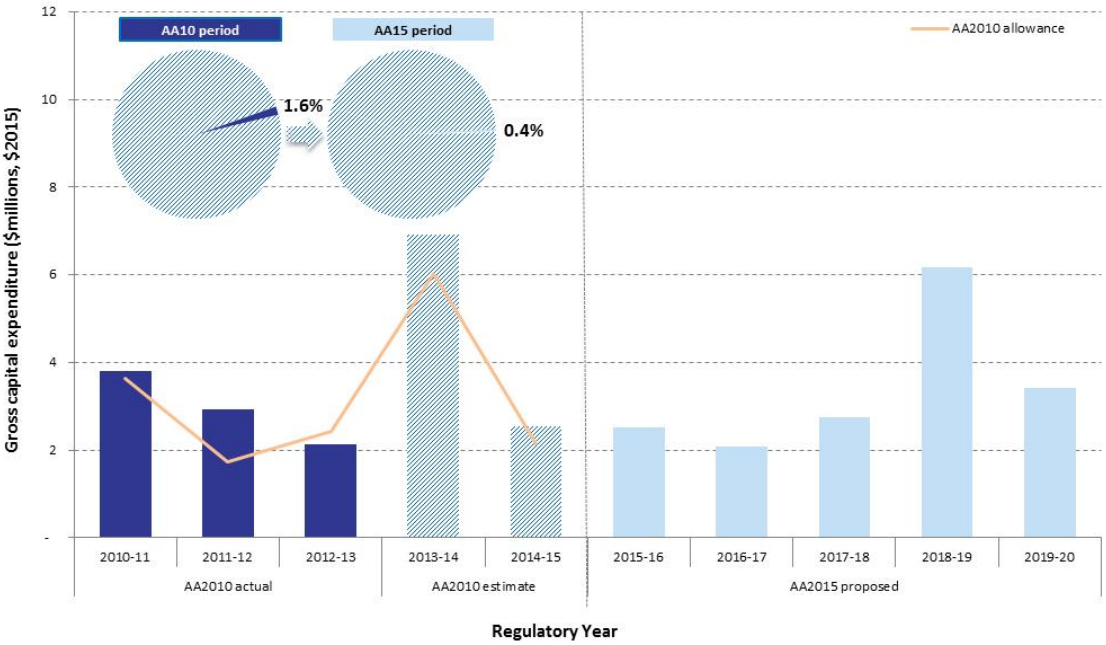


Table 4–29: Other Capex – $millions, $2015

	Access Arrangement 2010						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Actual/estimate	2.22	0.25	2.79	6.05	4.39	15.69	1.01	0.76	0.78	0.80	0.82	4.16	-11.53
Approved	0.25	0.37	1.18	3.51	3.60	8.91							-4.75

186. The comparison between actual and forecast shows an 80 per cent decrease between current AA period and next AA period. This reflects the changed treatment of AA-related expenditure as opex. The forecast for other capex reflects JGN's historical expenditure on tools and minor equipment of approximately $3.0M over five years.

5. KEY INPUTS, MODELS AND METHODS

187. To assist in assessing whether JGN's forecast capex meets rule 74, JGN provides the following information on key inputs, methods and models which have been applied in developing the capex forecasts.

5.1 DEMAND FORECASTS

188. Forecasts of new connections required for the ME category have been developed by industry expert demand forecasters Core Energy (see AAI appendix 5.1).

189. Demand forecasts for the purposes of CDP capex are derived separately to the ME forecast by JGN's capacity planning group using a range of data including pressure monitoring and network modelling. There are at least two practical reasons for these forecast being developed separately:

- the demand, energy and connection forecasts developed by Core Energy are for the whole of JGN's network and are designed to reflect the range of macro factors that affect annual energy, demand and connections. CDP forecasts are a function of peak demand in specific network segments where capacity is forecast to be constrained and a CDP project is required. The CDP forecast reflects demand growth in specific network segments, which is not characteristic of the network as a whole. Some segments of the network will be relatively immature with significant growth from new customers as new estates are connected. Other segments will be more mature and demand growth will be much lower.
- the demand being considered in each local segment is not the annual demand, but the peak winter demand. Experience shows that peak usage is growing at a higher rate than annual usage as customers replace their appliances with more efficient models. This is particularly true where instantaneous hot water units are replacing storage hot water units. Instantaneous hot water units are inherently more efficient than storage units because water is only heated to the required temperature (typically around 40 degrees Celsius) rather than the storage temperature (typically 65 – 80 degrees Celsius) and because it is heated as it is used rather than stored thus avoiding heat loss during storage. JGN expects that in areas where there is significant new estate development demand will be more peaky as customers install modern high efficiency gas appliances. In contrast, more mature areas will see a progressive replacement of older, less efficient gas appliances with more efficient high demand capacity ones.

5.2 UNIT RATES

190. Capex for largely uniform, high volume activities is based on unit rates set in contracts. The majority of these contracts apply for the next AA period. These unit rates relate to main and service construction for projects less than $0.5M each.

191. In 2012, JGN developed a procurement strategy that was designed to establish market-based prices based on an open competitive tender for asset services obtained by the asset management businesses.

192. This procurement strategy consisted of:

- separating JGN's operation into northern and southern regions
- establishing contracts for the northern region through an open competitive tender with non-Zinfra asset services providers
- using the unit rates derived from the northern area (adjusted for differences in operating conditions) as the basis for unit rates agreed with Zinfra for the southern region.

193. The process of developing the contracts for both the northern region contractors and for Zinfra for the southern region were reviewed by E&P to assess whether the prices in the contracts will deliver the services at market competitive prices. E&P concluded that the approach adopted by JGN was reasonable. Further detail is provided in AAI appendix 4.2.

194. The unit rates applied to estimate the forecast capex are those arrived at from the open competitive tender for the Northern region.

5.3 ESCALATION WEIGHTS

195. The mix of costs in each distribution capex category is derived from the actual split for Jemena's financial year ending 31 March 2013 (FY13) and the most appropriate assumptions in consultation with project managers and key related personnel.

196. The FY13 distribution of capex actuals was extracted from JGN's accounting system by work breakdown structure (**WBS**) account and general ledger (**GL**) accounts into the following:

- CATS (Jemena timesheet system labour)
- contractor (contract labour and materials provided by contractors)
- restoration
- materials (materials provided by Jemena)
- overhead and other.

197. GL accounts of CATS, contractor, restoration and materials are further split into:

- Enterprise Bargaining Agreement (**EBA**) and non-EBA labour
- materials—steel, plastic, concrete, aluminium and other.

198. CATS amounts for Jemena labour are split into EBA and non-EBA based on the most appropriate assumptions developed in consultation with project managers and the key related personnel.

199. Contractor costs consist of contract labour and materials. The ratios of labour and materials vary depending on pipe sizes and material types. The mix of pipe sizes was determined from actual pipe movements in FY13 and used as the basis to determine the ratio of contract labour/materials/margins for each pipe size. Contract labour is assumed to escalate at the same rate as EBA labour. The contractor costs are further split according to the various material types by applying the FY13 actual material breakdown. This method is applied consistently to the other distribution categories.

200. Other assumptions about short to long services, pipe sizes and share trenching for ME activities have been developed, to reflect the cost composition of those activities. Attachment C provides a more detailed explanation of the escalation weights derivation process.

5.4 INPUT COST ESCALATION

201. JGN recognises that the Consumer Price Index (**CPI**) does not adequately reflect the rate at which its costs escalate. This is because the components of the CPI do not bear resemblance to JGN's input costs.

Accordingly, JGN has sought expert advice from BIS Shrapnel on forecast escalators for the major groupings of its inputs cost (see AAI appendix 6.10). Table 5.1 shows JGN's estimated input escalators.

Table 5–1: Real cost escalators (per cent) – summary

Escalators	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
EBA	0.80	0.64	1.23	1.75	1.97	2.19	2.27
Non-EBA	0.22	0.54	1.24	1.61	1.52	1.19	1.45
Concrete	-0.87	3.74	4.71	-0.25	-1.70	-0.77	0.83
Steel	7.46	4.59	1.08	-0.08	8.07	-8.69	-4.92
Plastic	6.44	1.04	-1.07	-0.21	6.51	-6.19	-3.54
Aluminium	4.76	1.45	5.56	3.86	11.00	-6.53	-2.44
Brass	7.88	3.39	1.94	2.13	9.53	-8.84	-5.31

202. Each component of each capex category—determined using the estimation weights as described in section 5.3—is escalated in real terms ($2013) by applying the relevant escalator.

203. Application of real input cost escalation increases the forecast capex for the next AA period by 6.1 per cent.

5.5 OVERHEADS

204. JGN's treatment of overhead allocation and capitalisation is detailed in the AA RIN response.

5.6 CAPITAL EXPENDITURE MODEL

205. JGN's capex model is developed to forecast JGN's capex, with outputs underpinning the AMP and budgeting and forecasting process as well as regulatory submissions. The model:

- is a bottom up build of the capital program, including specific capital projects and sub-programs
- takes into consideration real cost escalation and CPI inflation

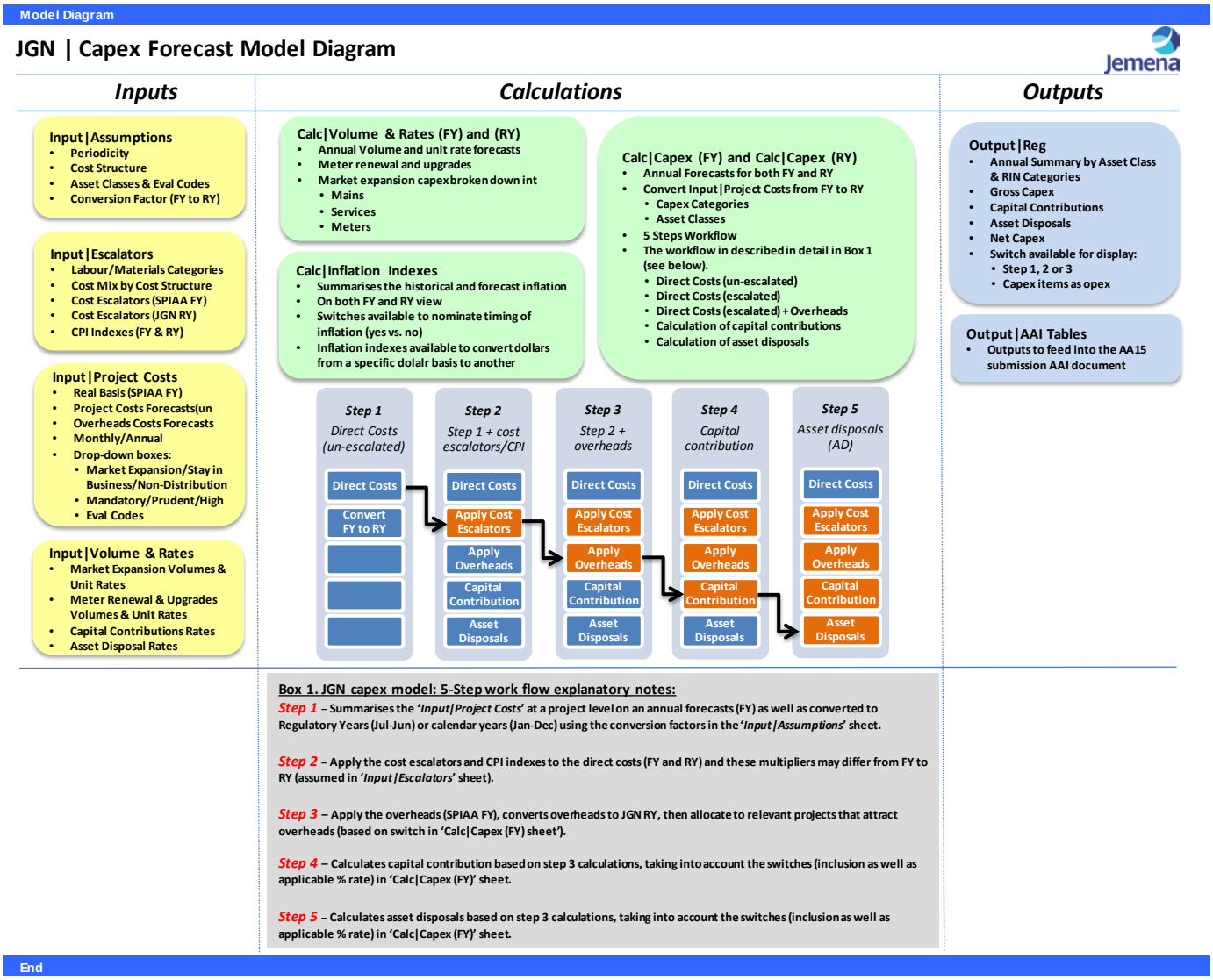
206. Inputs to the model include:

- volumes and unit rates for low complexity routine programs
- individually estimated project costs
- overheads
- cost mix by capex category
- real cost escalators
- CPI
- a conversion factor to convert from Jemena financial years (1 April to 31 March) to regulatory years.

207. Inputs are taken through a series of transparent and traceable steps to develop the capex forecasts. The capex model is provided as AAI appendix 6.4.

208. Figure 5–1 depicts the operation of the capex forecast model in schematic form.

Figure 5–1: JGN capex forecast model



6. PROGRAM ANALYSIS

6.1 BENEFITS TO CUSTOMERS

209. JGN's capital program is, by nature, directed towards the interests of the customers connected to the gas network and to new customers that can be connected on an economically efficient basis. This is because capex is essential either for the continued safe, reliable, environmentally sustainable and efficient delivery of gas to existing customers, or as providing supply to additional customers where the direct cost of connecting those customers will be exceeded by the revenue derived from them.

210. Clearly, new customers benefit from access to gas supply as an option to meet their energy needs. However, existing customers also benefit, because adding new customers enables JGN to capture the economies of scale inherent in gas network infrastructure that will have the effect of reducing the average cost of supply. These economies of scale will be passed on to existing customers through reductions in gas network prices. These are anticipated in each AA submission as both new growth-related capex and the increased demand that results from it will be incorporated in the proposed price paths.

211. As is reported in section 6.4 of the AAI, JGN has analysed a number of scenarios[12] to assess the long term outcome for customers, as measured by required revenue per customer, of varying capex.

- *scenario 1*—service levels maintained within the range of current acceptable limits – this scenario is the base case for the scenario analysis
- *scenario 2*—a permanent service reduction – assessing the effect of reducing capex with a consequential reduction in the level of service
- *scenario 3*—temporary service reduction – a short term reduction in capex requiring catch-up at a later time to maintain service standards
- *scenario 4*—growth reduction – the effect of curtailing investment in growth
- scenario 5—providing a consistent level of service to all customers – to assess the long term cost of expenditure to rehabilitate areas of the network where quality of service is currently sub-standard.

212. In each of scenarios 2, 3 and 4, customers face higher costs in the long-term than in the base case. Scenario 5 shows that expenditure required to provide a consistent level of service to all customers results in only a modest cost increase for customers generally.

213. Comparing the scenarios, scenario 5 is assessed to deliver the most preferable long-term outcome for customers. Those customers and customer representatives that JGN has consulted support this view.

214. JGN's investment in its gas distribution business also has wider economic benefits to upstream and downstream stakeholders. In addition to end users/customers these include:

- producer/explorers
- gas transmission businesses
- gas retailers

[12] This analysis is described in greater detail in appendix 6.1

215. In particular, these groups benefit from continued and increased gas demand that is largely a result of the availability of the gas network and the access it provides to new and existing customers. Each of these groups will benefit from the margins accruing to them through increased sales.

6.2 DELIVERABILITY

216. JGN notes that the proposed forecast capex for the next AA period is a step change relative to expenditure for the current AA period. Forecast capex for the next AA period is 20 per cent above the actual and estimated expenditure for the current AA period.

217. The increase reflects a significant increase in the number and size of capital projects that will depend on JGN's existing resources, its ability to call on new resources and to manage a much larger capital program. It is reasonable that JGN should demonstrate that it is able to undertake the proposed capital program, consistent with acting as "a prudent service provider acting efficiently in accordance with good and accepted industry practice, to achieve the lowest sustainable cost of providing services" as required by rule 79(1).

218. JGN has assessed its organisational capability to undertake the propose capex. Its assessment is set out in its report FY15-21 distribution capital program deliverability report, provided in JGN's response to schedule 1, clause 6.16 of the RIN. This report considers JGN's organisational arrangements, including project governance and project management, key organisational roles and responsibilities, human resource management and procurement management, and whether they are sufficiently well established and sufficiently resilient to cater for the requirements of the proposed capital program.

219. JGN has also undertaken a review of resourcing requirements for its proposed capex program. Its assessment is set out in its report FY15-21 JGN distribution capital program delivery plan, provided in JGN's response to schedule 1, clause 6.16 of the RIN. The report also considers required resourcing levels, JGN's current level of resources and its ability to source the additional resources required. It concludes that JGN does have the capability to manage the program and access to the resources necessary to deliver the proposed capital program.

6.3 CONSEQUENCES OF UNDER-INVESTMENT

220. Table 6–1 describes, for each capex category, the likely consequences of under-investment.

Table 6–1: Capex categories and consequences of under-investment

Category	Consequence of under-investment
Distribution capital	
Market expansion	JGN would not be able to economically extend and expand the distribution network to increase efficient network utilisation and lower average network prices in the long-term interests of customers.
Capacity development	Expected peak demand would not be met as a result of the deferral of capacity development expenditure. Customers would be more likely to experience lower levels of supply reliability during periods of colder than average temperatures. Long-term performance against the 'poor supply/1000 customers' measure would deteriorate and consumer perception of the quality of natural gas and the value it delivers is likely to fall. This has adverse consequences for JGN's ability to attract new customers to the network.

Category	Consequence of under-investment
Mains and services renewal	JGN would not provide a safe and reliable universal level of service, that supports public amenity and environmental objectives through low levels of gas leakage. Overall safety performance is driven in the long term by the application of integrity management planning and prudent investment in asset replacement expenditure. While increased publically reported gas escapes and disruptions/street closures resulting from emergency response to reported gas escapes could be seen as a safety issue, it also has a serious impact on the amenity of the community through nuisance smells, traffic disruptions and the perception of an increased level of safety risk. Failure to adequately invest in mains and service renewals will lead to increased reactive maintenance and emergency response costs and would have a negative impact on consumer perceptions of the quality of natural gas and the value it delivers, reducing JGN's ability to attract new customers to the network.
Facilities renewal and refurbishment	Facilities such as pressure reduction stations and associated equipment are critical to maintaining the integrity and reliability of gas supply. These assets are hazardous plant. Failure to replace aging and obsolete facilities results in increased planned and reactive maintenance costs to maintain acceptable levels of risk, and is likely to result in lower levels of supply reliability as aging plant fails in service.
Meter renewal and upgrade	JGN would breach its metering regulatory obligations and failed meters would not be replaced. Meters would not read with appropriate accuracy to support customer billing, undermining allocative efficiency objectives.
Government authority work	JGN would not be able to relocate assets to comply with contractual, legislative or regulatory obligations, so that JGN could provide safe and reliable network services in a compliant manner.
Mines subsidence	JGN would not be able to manage and mitigate the significant effect that mining can have on our network assets, to ensure JGN continues to provide safe and reliable network services.
Non-distribution capital	
Information technology	JGN would operate with out-dated and inefficient systems compromising the efficiency and safety of delivered network services.
SCADA	JGN would not be able to promptly respond to network issues that would compromise the safe and reliable provision of services to customers.
Other non-distribution	JGN would not have the necessary supporting equipment and depots to operate its network and transport its staff across the network to support the provision of safe, reliable and efficient network services.

Attachment A
Capital expenditure breakdown by category

Jemena

A1. CAPITAL EXPENDITURE BREAKDOWN BY CATEGORY - $2015, $MILLIONS

	Access Arrangement 2010 Actual/estimate						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Market expansion	64.27	70.69	80.64	94.94	89.56	400.11	86.47	91.13	91.49	90.34	91.49	450.91	50.80
Capacity development	40.09	36.78	7.49	8.49	8.16	101.02	21.29	21.78	27.30	22.76	18.87	111.99	10.98
Mains and services renewal	0.35	6.61	5.20	9.17	8.19	29.52	14.92	19.33	15.37	10.51	11.99	72.13	42.61
Facilities renewal and refurbishment	9.64	22.19	12.70	12.90	25.11	82.54	28.67	25.52	31.75	33.94	24.82	144.70	62.15
Meter renewal	16.52	19.90	17.08	23.78	30.50	107.79	37.85	39.88	41.93	39.45	36.24	195.35	87.56
Mines subsidence	5.20	0.36	0.24	0.58	0.78	7.14	1.79	0.42	-	-	-	2.21	-4.94
Government authority work	0.15	0.28	0.65	0.83	0.47	2.37	0.61	0.61	0.63	0.63	0.64	3.11	0.74
Information technology	42.93	28.02	10.51	11.59	38.64	131.69	37.63	31.04	33.47	18.66	10.82	131.61	-0.08
SCADA	0.32	0.46	1.25	0.79	0.97	3.79	1.32	2.72	2.78	2.19	0.75	9.76	5.97
Motor vehicles/fleet	3.80	2.94	2.14	6.90	2.53	18.31	2.53	2.07	2.74	6.16	3.42	16.93	-1.38
Property and buildings	-	0.63	2.58	14.99	39.71	57.90	3.81	0.43	0.48	0.48	0.48	5.68	-52.22
Other capexs	2.22	0.25	2.79	6.05	4.39	15.69	1.01	0.76	0.78	0.80	0.82	4.16	-11.53
Total	**185.48**	**189.11**	**143.26**	**191.02**	**248.99**	**957.87**	**237.91**	**235.69**	**248.71**	**225.91**	**200.32**	**1,148.54**	**190.67**

	Access Arrangement 2010 Allowance						Access Arrangement 2015 Proposed Forecast						Change
	2011	2012	2013	2014	2015	Total	2016	2017	2018	2019	2020	Total	
Market expansion	65.76	76.33	78.41	91.57	100.22	412.29	86.47	91.13	91.49	90.34	91.49	450.91	38.62
Capacity development	30.72	21.75	8.09	7.44	10.23	78.22	21.29	21.78	27.30	22.76	18.87	111.99	33.78
Mains and services renewal	2.23	7.82	6.93	3.09	1.67	21.74	14.92	19.33	15.37	10.51	11.99	72.13	50.39
Facilities renewal and refurbishment	18.16	14.60	15.30	17.06	18.73	83.85	28.67	25.52	31.75	33.94	24.82	144.70	60.85
Meter renewal	25.54	24.83	27.18	26.97	30.05	134.56	37.85	39.88	41.93	39.45	36.24	195.35	60.79
Mines subsidence	3.00	0.60	5.49	-	-	9.09	1.79	0.42	-	-	-	2.21	-6.89
Government authority work	0.64	0.65	0.66	0.66	0.67	3.28	0.61	0.61	0.63	0.63	0.64	3.11	-0.17
Information technology	19.61	15.83	12.99	24.93	29.57	102.92	37.63	31.04	33.47	18.66	10.82	131.61	28.69
SCADA	2.25	1.69	1.48	1.11	1.11	7.64	1.32	2.72	2.78	2.19	0.75	9.76	2.12
Motor vehicles/fleet	3.65	1.74	2.43	6.07	2.15	16.04	2.53	2.07	2.74	6.16	3.42	16.93	0.88
Property and buildings	0.03	-	-	0.08	0.32	0.44	3.81	0.43	0.48	0.48	0.48	5.68	5.24
Other capexs	0.25	0.37	1.18	3.51	3.60	8.91	1.01	0.76	0.78	0.80	0.82	4.16	-4.75
Total	**171.84**	**166.20**	**160.14**	**182.48**	**198.32**	**878.99**	**237.91**	**235.69**	**248.71**	**225.91**	**200.32**	**1,148.54**	**269.55**

Attachment B
JGN's approach to capacity development

B1. JGN'S APPROACH TO CAPACITY DEVELOPMENT

Figure B1–1: JGN's approach to capacity development

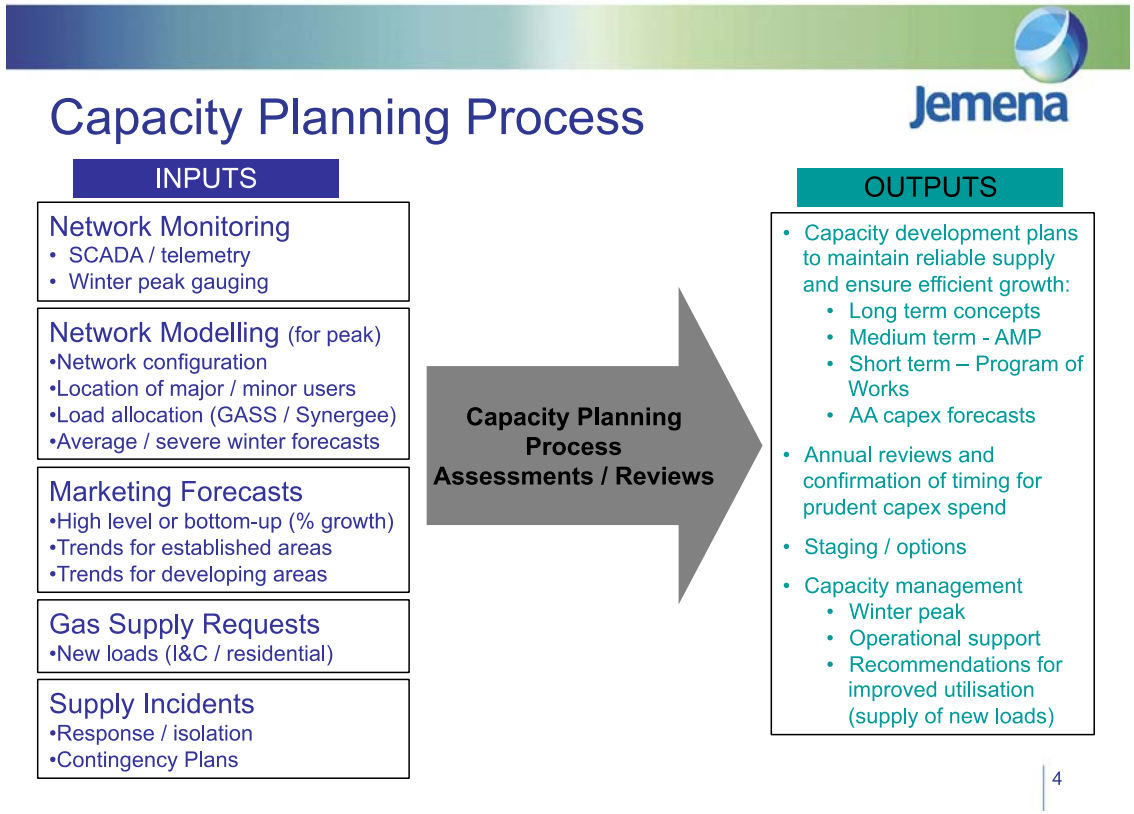
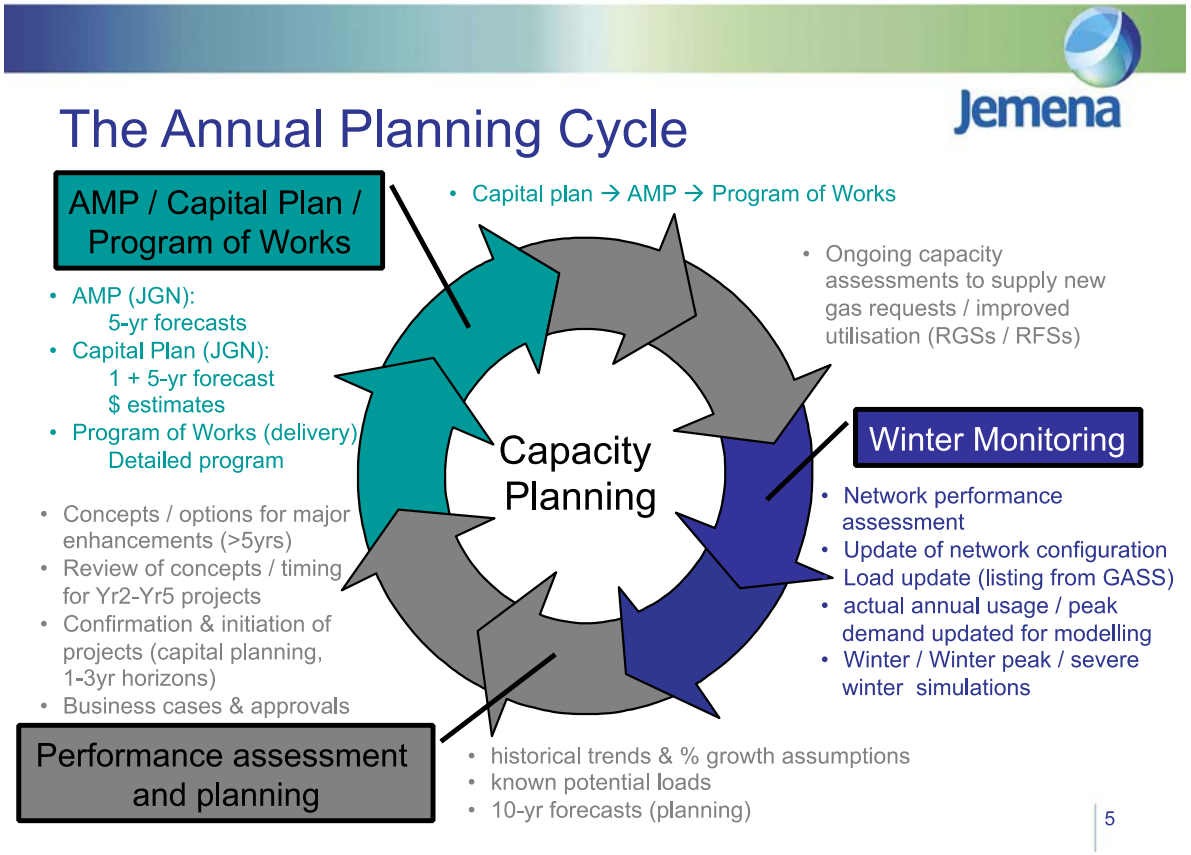


Figure B1–2: JGN's annual planning cycle



Attachment C
Overview of escalation weight derivation process

Jemena

C1. OVERVIEW OF ESCALATION WEIGHT DERIVATION PROCESS

JSAP 1.0 cost collection per WBS activity	Definitions	Issues	Approach taken
CATS	Jemena labour costs, either EBA or non-EBA structure wages.	The split between EBA and non-EBA Jemena labour can be obtained through extensive analysis of CATS reports, which is down to person and WBS activity performed. This will be a lengthy process.	Assumptions were made for each capex category on the split of Jemena labour into EBA and non-EBA by consultation with various groups in Works Delivery. Most routine works were assumed to involve EBA labour, whereas non-routine works were assumed to involve mainly non-EBA labour.
Contractors	Costs paid to contractors including contract labour, equipment and materials provided by contractors, and contractor overheads and margin.	The cost captured is the total cost paid to contractors. There is no information as to the split of contractor labour and materials provided by contractors. This split varies per WBS activity per pipe size. For works on plastic mains, the materials are normally included in the contractors' unit rates or project quotes. For works on steel mains and meters, the materials are normally provided through the Jemena stores where costs are captured in the "Materials". In additional, this cost also includes the plant and equipment provided by contractors, their overheads and margins.	ROUTINE Assumptions for the split of contractor labour and materials were made based on the new unit rates in the Greater Sydney North, effective from 1 July 2013. The difference in rates between the various regions in Sydney north and south was assumed to be minimal. The composition of pipe size by actual pipe movements in FY13 was used as the basis to determine the ratio of contract labour/materials/margins per each WBS activity. The type of materials provided by contractors was assumed per scope nature of the WBS activity and through consultations with experts in the subject matters. Contract labour was assumed to be EBA wage structure. Contractor margins were assumed to be spread proportionally on contract labour and materials. NON-ROUTINE Project scope for projects with actuals >$100k was considered for analysis of contractor cost splits.
Restoration	Restoration costs.	Restorations were mainly carried out by respective councils to their specifications. There is no report on the type of restoration.	All restoration costs were assumed to be 'concrete'.

JSAP 1.0 cost collection per WBS activity	Definitions	Issues	Approach taken
Materials	Materials provided by Jemena.	The type of materials provided through Jemena stores can be verified by extensive GASS reports linking the PMOs to WBSs.	The “6100” GASS Report for FY13 store items confirmed that all materials were either meter-related or ≥1,050kPa system-related. Valid assumption was made that all costs captured under “Materials” were either related to ‘aluminium’, ‘steel’ and ‘brass’ for respective meters of residential gas, I&C gas and water, or ‘steel’ for ≥1,050kPa system works, which were indicated by the WBS activity.
Overhead	Jemena overheads.		The escalation weight for overheads is assumed to be labour-related.
Other	Other.		This includes electronic materials, testing costs and other direct project costs related to fleet, store, property and non-labour components.