



Jemena Gas Networks (NSW) Ltd

Investment Brief Metering I&C Meter Reading Systems



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Glossary

2020-25 regulatory period	The period covering 1 July 2020 to 30 June 2025
Current regulatory period	The period covering 1 July 2015 to 30 June 2020
ICT	Information and Communications Technology
I&C	Industrial and commercial
JGN	Jemena Gas Networks (NSW) Ltd
MDHR	Medium density / high-rise residential
NGR	National Gas Rules
RMP	Retail Market Procedures (NSW)
RSA	Reference Service Agreement
RYxx	Regulatory year covering the 12 months to 30 June of year 20xx. For example, RY20 covers 1 July 2019 to 30 June 2020.
STTM	Short Term Trading Market

1. Maintain I&C Meter Reading Backend Systems

Issue	<p>The meter reading solution that Jemena Gas Networks (NSW) Ltd (JGN) uses for Industrial and Commercial (I&C) demand customers which supports the daily measurement and reporting of 65% of all gas volumes transported through the JGN system, operates on an obsolete IT platform and represents an unacceptable risk to the ongoing gas market commercial operations.</p>
Objective	<p>The objective of this investment brief is to efficiently maintain the back-end system of the meter reading solution for I&C customers in order to maintain current service levels provided to customers and meet JGN's regulatory obligations.</p>
Background	<p>JGN has regulatory obligations to provide meter readings for market settlement and customer billing, which consist of the following customer segments:</p> <ul style="list-style-type: none"> • I&C • medium-density/-high rise (MDHR) residential • mass market (new and existing residential homes or residential non-MDHR). <p>JGN meets its regulatory obligations for the above customer segments using independent metering solutions and different equipment types, communications systems, back end systems and vendors.</p> <p>JGN's systems to provide the meter readings are aged and in need of update. JGN's current meter reading and data transfer technologies are dependent on legacy applications and infrastructures, and coupled with technological obsolescence, they expose JGN to security vulnerabilities and increased risks to operational reliability and uptime. Legacy meter arrangements will also be affected by the progressive decommissioning of the communication infrastructure used to poll the meters (eg: 3G, CSD, PSTN). Continued reliance on existing systems will increase the risk that JGN will not be able to maintain the current integrity of its metering services over the 2020-25 regulatory period. For example, failure to maintain the accuracy of meters to the required standards increases the likelihood of customers being charged the estimated amount for gas usage, which is one of the greatest causes of customer concern.</p> <p>JGN currently uses the [REDACTED] meter reading solution for I&C demand customers. [REDACTED]</p> <p>The system relies on multiple components to function correctly including:</p> <p>[REDACTED] munications</p> <p>[REDACTED]</p> <p>The Public Switched Telephone Network (PSTN) is being progressively deprecated with the NBN rollout and Telstra (and other carriers) flagging that 3G will be discontinued post 2024¹. Therefore, the existing communication infrastructure needs to be replaced.</p> <p>Ausmeter is the Honeywell agent responsible for the sales and service of Honeywell metering products to JGN. [REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>

¹In an email from [REDACTED] dated 12 November 2019 12:05pm, Telstra confirmed that 'the CSD (Circuit Switched Data) support will continue and align to the exit of the 3G network in 2024. Telstra will not be supporting CSD beyond this point.'

	<p>[REDACTED]</p> <p>Because of the changes and upgrades to the technologies throughout their lives, three different systems exist for accessing these meters. [REDACTED]</p> <p>[REDACTED]</p> <p>JGN does not currently have any contracts in place for long-term support for the Honeywell Power Spring back-end system. In order to manage the controls and mitigate future risks, JGN needs to arrange to have a contract in place with Ausmeter and/or consider switching to an alternative back-end system.</p>
Regulatory obligations	<p>JGN is obliged to read the gas meter at customers' premises or, where it is unable to do so, to estimate the meter reading Retail Market Procedures² (RMP, Chapter 3) and Reference Service Agreement (RSA, clause 17.1). Use of actual meter readings, rather than an estimate, improves the accuracy of billing.</p> <p>Under clause 3.1.6(b) of AEMO's RMP JGN must provide daily meter readings for some users including hourly pressure and temperature readings. These readings are used to inform the balancing and distribution system allocations within the Short Term Trading Market (STTM) and can account for up to 70% of all gas consumption on a given gas day. Failure to provide these reads would prevent the estimation and reconciliation of transactions on the STTM, resulting in large commercial losses, safety risk and reputational damage to JGN.</p>
Current IT systems	<p>The current Power Spring system is licensed on a device subscription basis. Failure to renew a subscription results in a loss of meter communications. The device subscription model allows the system provider to force upgrades on software packages that it no longer supports. The flow on effect of these forced system changes is that both the native operating system and MS SQL server also require an additional upgrade meaning additional costs are incurred to maintain the integrity of the meter reading systems.</p> <p>The system last underwent an upgrade in CY16 and it will require an upgrade in CY20 to address new software releases.</p>
Customer Importance	<p>This system directly impacts 480 of JGN's I&C customers as it calculates gas usage for billing and demand planning purposes. I&C customers use large volumes of gas generally above 10TJ per annum. Due to the large volumes of gas, any failure of this system would lead to significant financial consequences for customers and have flow on effects to supply and demand forecasting and unaccounted for gas effecting the whole STTM. These effects could also have impacts on other linked energy markets as gas fired electricity and gas fired steam generators are included within the I&C customer category.</p> <p>The I&C meter reading systems also serve primary safety and operational functions. Twelve regulating stations on JGN's network are monitored only by the I&C meter reading systems and there are also an additional 14 regional regulating stations where the system can be used as a backup if the SCADA telemetry systems fail. Failure of I&C metering systems will prevent alarms relating to inter-stage pressure, safety slam-shut and regulating station outlet pressures being received, meaning regulating station failures and network issues could go on unidentified.</p> <p>In switching any backend system JGN recognises an opportunity to integrate new systems into a more standardised architecture. This will allow JGN to integrate new devices easily protecting against both ongoing supplier and technology risk. By adapting a standard metering platform JGN can avoid future integration costs for new devices while maintaining a competitive tension with data logger suppliers.</p>
Strategic Approach	<p>Ensuring this system functions correctly is critical to ensuring JGN meets its regulatory obligations with respect to accurate billing of I&C customers. The system also has implications for the safety and integrity of services, safety, security and reliable network operations for all customers on the network. JGN aims to maintain the current system functions of network monitoring and billing while capturing the additional</p>

² <https://www.aemo.com.au/Gas/Retail-markets-and-metering/Market-procedures/New-South-Wales-and-ACT>

benefits of a standardised backend and mitigating the risk of future technology, supplier, cyber-security and telecommunications interruptions.

Options

JGN has considered two options for the I&C meter reading solution. These are:

- 1) Upgrade and retain the current system and defer replacement until the next regulation period.
- 2) Replace the current system with a product from an alternate vendor.

Option 1: Continue using the current meter reading solution for I&C customers

Description

This option involves JGN continuing to use the existing meter reading solution, with the addition of agreeing a service level agreement with Ausmeter with guaranteed support and supply over the product lifecycle,

The back-end will be updated in RY22 as per JGN's expectations based on previous life cycle updates. A full replacement will then be deferred into the following period.

Direct Unescalated Costs (mid-year 2018)

(\$2018)	RY21	RY22	RY23	RY24	RY25	RY26	RY27	RY28	RY29	RY30
Recurrent										
Lifecycle remediation		671,078					671,078			
Other										
Ausmeter support	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000

The cost of this option totals \$1.3m for the life cycle updates of existing meter reading solution occurring in RY22 and RY27. This cost is estimated based on previous updates to this software, occurring five-yearly. The timing will minimise the risks of the software becoming unsupported by the vendor before it is upgraded.

JGN will also require a support contract from the current supplier. This will increase opex by \$20k per annum and has been based on a 2019 quotation of \$20,442 provided for license fees from August 2019 to June 2020.

Other costs are assumed to be the same across all options so have not been included here.

Risks

An outline of this solution on the basis of residual risk to safety and integrity of service or a failure to comply with regulatory obligations is given below:

Risk Category	Risk Comparison to Option 2	Commentary
Regulatory Obligation	Higher	JGN is at risk of failing to meet regulatory requirements (in particular AMEO's RMP and the RSA) with respect to delivery of information to the STTM as the use of different systems increases the modes of failure.
Network Operation	Higher	Network operations is reliant on current meter system to provide primary and secondary readouts for ensuring the network operates as intended and customers receive safe and reliable supply.
Safety	Higher	Failure of these systems could result in inter-stage pressure, safety slam-shut and station outlet pressures alarms failing to be recognised.
Cyber-Security	Higher	Aged and obsolescent systems provide increased security risk with respect to software vulnerabilities and the lack of monitoring and patch support available.

Vendor	Higher	JGN remains reliant on the existing vendor or back-end software which does not address the current service shortcomings. Remaining with the current system will also mean that JGN will not gain the option to consider the benefits of alternative technologies, systems and vendors that will provide benefits to JGN and its customers. This includes options for the installation of any replacements to the existing gas volume correctors. JGN will be limited to a single supplier that sells products compatible with the current back-end system, which may result in adverse pricing outcomes.
Technology	Higher	With the reliance on single supplier JGN is unable to exploit additional technology benefits that may be available from other suppliers for example a transition to more accurate Ultrasonic meters or the deployment of temperature and pressure compensation on all meter sets.
Telecommunications	Higher	Remaining risk with shutdown of the 3G network in June 2024. The solution proposed by the current supplier is on the 4G network which is already a generation behind the current 5G consumer band. JGN considers the use of consumer band telecommunications high risk of disruption than the more stable machine to machine technologies (e.g. NB-IOT or CAT-M)

Benefits

There are no benefits to this option as the option is about maintaining the safety and integrity of services.

NPV Analysis

This option has an NPV of \$-1,271,626.

See attached spreadsheet “JGN IR029 – Attachment 5 (Q20)-ICT-NPV-IC” – NPV Calc|Option 1.

Summary

Option 1 aims to maintain the existing metering service levels provided to the I&C customer category and will incur the least amount of costs. However, this option has unacceptable risk to the safety and integrity of JGN’s services, and unacceptable compliance risk associated with JGN’s regulatory obligations for meter reading when the 3G telecommunications network is shutdown in June 2024. JGN will also be constrained in the selection of related systems and this will restrict the ability to incorporate devices that would add value to both JGN and its customers, and limit opportunities to realise future I&C metering efficiencies.

Option 2: Upgrade the meter reading solution for I&C customers and enter into a contract with an alternate vendor

Description

This option is to source a replacement back-end system to replace Power Spring. The replacement will reduce some of the risks to JGN not meeting its current regulatory obligations as compared to the current Power Spring solution. This option will include entering into a supply agreement contract stipulating service levels and support with any vendors.

The existing Power Spring system has a low level of functionality compared to other products on the market. Alternative vendors are expected to provide future opportunities for JGN to invest in projects that would improve productivity and/or provide benefits to customers.

JGN has developed a requirements list for a replacement system. These benefits are aimed at addressing the unacceptable risks with current system which will offset the additional cost of a replacement compared to the alternative of updating and/or life cycling the existing system. These requirements for the replacement back-end solution are:

- Must be compatible new ‘gas volume correctors’ that will replace the current gas volume correctors which are no longer be supported by the vendor after 2020
- Must enable deployment of energy management information to smaller I&C customers (not provided by current system)

- Must support the transition of analogue/PSTN to NBN reliably
- Must function with ‘machine to machine’ telecommunications technology that will replace currently used 3G cellular modems
- Must be compatible with additional devices that may be required for deployment to non-I&C difficult to access sites

See the Appendix for JGN’s approach to future metering system upgrades.

Direct Unescalated Costs (mid-year 2018)

	RY21	RY22	RY23	RY24	RY25	RY26	RY27	RY28	RY29	RY30
Non-recurrent										
Replacement		1,105,104	1,105,104							
Recurrent										
Lifecycle					400,752			400,752		

This option (Project ID ITGG23) has a non-recurrent capital cost of \$2.2m, which will be incurred during RY22 and RY23. This timing coincides with investments in back-end systems of other customer categories to realise optimal program delivery. This cost was estimated using JGN’s IT project estimation tool as described in the Technology Plan under the section on Forecasting Method. Based on experience with the size and complexity of the current system, Jemena assesses that this is a very large project that will take up to 2 years to implement and is of significant complexity.

JGN will also incur a three-yearly recurrent lifecycle cost in RY25 and RY28 of \$401k. These costs are based on the same estimator tool and historical costs with a small to medium sized project to update the software that will take up to 6 months to implement and is of medium complexity.

Conforming capital expenditure

Rule 79(1)(a) of the National Gas Rules (NGR) states:

The capital expenditure must be such as would be incurred by a prudent service provider acting efficiently, in accordance with accepted good industry practice, to achieve the lowest sustainable cost of providing services.

In undertaking Option 2, the proposed capital expenditure would be consistent with NGR rule 79 in so far as it is:

1. Prudent – The expenditure is necessary to maintain and improve the safety and integrity of services. This is achieved by enhancing network operation through simplified interfaces, reducing software failure points & cyber-attack surface by merging metering systems, ensuring adequate vendor support and protecting against technology changes including telecommunication network changes.
2. Efficient – The option selected is the most cost effective long term option that meets the necessary operational requirements for meeting compliance with legislative, regulatory obligations and Australian Standards.
3. Consistent with accepted and good industry practice – Addressing the risks associated with network operation & safety, cyber-security, third party suppliers, technology and telecommunications that are consistent with good industry practice. In addition to the reduction of risk as low as reasonably practicable in a manner that balances cost and risk is consistent with Jemena Risk Management Manual and AS2885.

The project is also consistent with NGR rule 79(2)(c), because it is necessary to:

1. Maintain and improve the safety of services (79(2)(c)(i)) – Failure to update the meter reading systems from I&C customers increases the occurrence of communication failures which could result in unidentified network operation irregularities including failure to identify critical alarms. Failure to update and merge metering systems also leaves JGN more vulnerable to cyber-attack and privacy

- breaches through an increased application layer attack surface and unsupported software packages that aren't monitored and patched for security vulnerabilities.
2. Maintain the integrity of service (79(2)(c)(ii)) – Where the meter reading systems are not updated to address new technology and telecommunications risk the occurrence of an outage is increased. The current system is used as the primary monitoring system in 12 stations and as a secondary monitoring system for another 14 stations and a failure at any of these stations increases the likelihood of supply failure, particularly in remote and regional areas where telemetry is more critical to network operation.
 3. Comply with a regulatory obligation (79(2)(c)(iii)) – JGN is required to provide accurate meter reading data for market settlement and customer billing. Chapter 3 of the RMP has general obligations in relation to reading meters, including timing for both reading meters and publishing data to the market, and section 4.4 contains provisions in relation to the replacement of aged meters. In addition, clause 17.1 of the RSA requires JGN to read or estimate the meter reading. Under both the RMP and the RSA, users are entitled to request special meter readings for a particular day.

Risks

An outline of how Option 2 mitigates various risks is set out below:

Risk Category	Mitigation
Regulatory Obligation	The replacement and integration of the existing powerspring back-end should allow for improved service levels ensuring JGN meets its regulatory obligations in respect to AMEO's RMP and the RSA, as well as the delivery of information to the STTM.
Network Operation	The replacement of the current powerspring system provides opportunity for the simplification that will improve the reliability of primary and secondary readouts. This will assist with efficient, safe and reliable network operations.
Safety	The simplification and improved reliability of these systems will help to improve operations and network control helping ensure critical network alarms are recognised and actioned.
Cyber-Security	Reducing the number of different systems deployed and maintained will reduce the attack surface of the current applications. Reducing reliance on aged and obsolete systems will also reduce the security vulnerabilities associated with these applications.
Vendor	As JGN engages and assesses new vendors it will be able to assess their suitability and minimise the risk with respect to ensuring vendor suitability and ensuring long term agreements are in place.
Technology	In undertaking the assessment of any new suppliers, JGN will be able to scan and provision for new emerging technologies that can be utilised to improve customer outcomes.
Telecommunications	In identifying and selecting a new vendor JGN can reduce the telecommunications risks posed to the current solution by selecting appropriate networks, with low risk of disruption to prevent the need to make further changes and upgrades to network technologies in the future.

	<p>Benefits</p> <p>The risks to compliance to regulatory requirements for metering with respect to I&C customers will be minimised. Additionally, the improvements to the safety and integrity of the services provided to all customers will be improved as the network operational, safety, cyber security, vendor, technology and telecommunications risks will be minimised.</p> <p>The new system will also provide the flexibility to allow for smaller non-I&C customers to be integrated using the same technology in cases where an application is deemed critical or a meter is large (e.g. boundary meters serving many customers). This will assist JGN in addressing sites that cannot have their meters read due to inaccessibility by the meter reader and reduce the number of bills based on estimated meter readings.</p> <p>NPV Analysis</p> <p>This option has an NPV of \$-2,550,121.</p> <p>See attached spreadsheet “JGN IR029 – Attachment 5 (Q20)-ICT-NPV-IC” – NPV Calc Option 2.</p> <p>Summary</p> <p>Option 2 will replace the existing back end software for I&C customer metering with a new product that is fully supported by the vendor however at a higher capital cost. This option also addresses the risks with relation to compliance to regulatory obligations and the safety and integrity of network operations.</p> <p>This option also provides opportunities for additional customer benefits including addressing smaller non-I&C customer meter reading requirements and technology enhancements.</p>												
Options Summary	<p>The table below summarises the quantitative and qualitative differences between the analysed options.</p> <table border="1"> <thead> <tr> <th></th> <th>NPV \$2018</th> <th>Qualitative Risks</th> <th>Qualitative Benefits</th> </tr> </thead> <tbody> <tr> <td>Option 1</td> <td>-1,271,626</td> <td>High</td> <td>None</td> </tr> <tr> <td>Option 2</td> <td>-2,550,121</td> <td>None</td> <td>High</td> </tr> </tbody> </table> <p>JGN selects its preferred option by considering the direct differences between the options as expressed in the NPV analysis and indirect or qualitative differences in risks and benefits.</p>		NPV \$2018	Qualitative Risks	Qualitative Benefits	Option 1	-1,271,626	High	None	Option 2	-2,550,121	None	High
	NPV \$2018	Qualitative Risks	Qualitative Benefits										
Option 1	-1,271,626	High	None										
Option 2	-2,550,121	None	High										
What We Are Recommending	<p>Option 2 is recommended. This option will address the unacceptable risks to regulatory compliance for meter reads while maintaining and enhancing the safety and integrity of network operations. Option 2 will also enable additional options to address meter access issues in the mass-market customer category and exploit other technology benefits for customers in the future.</p>												
Relationship to ICT Capital Forecast	<p>The preferred option for this business case is contained in the ICT AMP as a non-recurrent project under Project ID ITGG23.</p>												

Appendix: JGN's approach to future metering system upgrades

Consistent with good industry practice, in upgrading its metering systems JGN plans to prudently take an integrated metering systems view supported by industry accepted architectural principles. As IoT (Internet of Things) offerings continues to be increasingly widespread, the need for connectivity solutions grows to ensure that the metering devices are working correctly, accurately capturing and analysing data, as well as securely managing data. Adapting IoT as part of JGN's future meter reading and transfer solution will maintain JGN's service level agreements and uphold its regulatory obligations while providing ease to maintenance and future upgrades and monitoring capabilities to address security vulnerabilities.

JGN will intrinsically apply similar design and implementations principles in the next wave of solutions upgrades, installations and remediations across its metering systems (I&C (Metretek), residential and medium-density/high rise residential (MDL)). This means that JGN's proposed metering solution will entail the following principles:

1. A focus on vendor-agnostic solutions rather than single vendor end-to-end solution for long-term contracts
2. Interoperable tele-communication and open source standards (maximises adaptability and enables seamless integration with existing end to end metering topologies)
3. Flexible deployment options - on-premise or cloud-based
4. Importance of the partner ecosystem (a group of solution aggregator and partners that have the resources, expertise, and service offerings needed to deliver holistic, end-to-end solutions).

The above principles are also founded on customer behaviour, which is central to the technology design and implementation.

With a fully integrated platform for data collection and management, and ability to remote meter monitor, JGN can improve the output from metering assets, avoid unplanned downtime, implement preventive maintenance, and better equipped for future upgrades and address security threats.