Jemena Gas Networks (NSW) Ltd

IT Investment Brief – Network Management Advanced Analytics

Non-Recurrent – New Capability

Jemena
bringing energy to life

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Glossary

ACCU	Australian Carbon Credit Unit
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
capex	Capital Expenditure
Cth	Commonwealth
Current regulatory period	The period covering 1 Jul 2020 to 30 Jun 2025
EAM	Enterprise Asset Management
GIS	Geospatial Information System
ICT	Information and Communications Technology
IoT	Internet of Things
Jemena	Refers to the parent company of Jemena Gas Networks
JGN	Jemena Gas Networks
Next regulatory period	The period covering 1 Jul 2025 to 30 Jun 2030
opex	Operating Expenditure
RYxx	The regulatory year covering the 12 months to 30 June of year 20xx for years in a Regulatory Period. For example, RY25 covers 1 July 2024 to 30 June 2025
SAP	SAP accounting and ERP software
SCADA	Supervisory Control and Data Acquisition System
Totex	Total Expenditure
UAG	Unaccounted for Gas

Network Management Advanced Analytics

Objective	The objective of this initiative is to implement a set of integrated analytics capabilities within Jemena Gas Networks (**JGN**), consistent with good industry practice. These new capabilities will support decision making and achieve the lowest sustainable cost of providing services.		
Non-recurrent ICT sub-categorisation	☐ Maintaining existing services, functionalities, capability, and/or market benefits	☐ Complying with new/altered regulatory obligations/requirements	☒ New or expanded ICT capability, functions, and services
Background	**Increasing complex environment requires changes in operational, commercial and asset management strategies** Australia is undergoing an energy market transition. Both the Commonwealth and New South Wales Governments have set interim and 2050 emission reduction targets. While the goal of net-zero by 2050 is clear, JGN's role in a decarbonised future is not. In response to this uncertainty JGN engaged an Expert Panel of seven independent energy industry leaders to co-design plausible scenarios for the NSW energy system. The outcome of this process was four scenarios: 1. **Electric Hare –** where decarbonisation is supported by strong government policy driving electrification across industry and residential customers, with limited use of renewable fuels for hard to abate sectors. 2. **Big Hydrogen –** where government policy support underpins a hydrogen export economy with a renewable gas target and certification, subsidies, and tax-offsets, driving down the cost of hydrogen production. 3. **Electric Tortoise –** where residential customers slowly electrify and industrial users transition to biomethane, and in which hydrogen remains not commercially viable. Transition is driven by business and community investment. 4. **Market Hydrogen –** where a near-term technological breakthrough driven by the market results in renewable gases becoming competitive with electrification, creating a diverse but fragmented energy mix. Notably, there is no 'business as usual' scenario, and it is not clear what scenario is most likely. Each of these scenarios materially differ from JGN's current and historic operating environment. As a result, in all plausible futures, JGN will need to make substantial changes to current operational, commercial and asset management strategies and practices. **Big challenges ahead** Along with an uncertain future, JGN also faces: • Record inflationary pressure which is increasing the cost of living for consumers as well as the costs to undertake and deliver projects. AEMO, for instance, has found that electricity transmission construction costs have increased by 30% in two years in real (after inflation) terms.[1] Accordingly, the benefits of optimising asset investment to minimise costs have never been higher. • Increasing risks from a large ageing network which our customers continue to rely on until at least 2040 in all of the Expert Panel scenarios. The JGN network is the largest in Australia with 26,000 km of pipelines (including high pressure transmission trunk and high-pressure pipelines in suburban areas) and 700 city/gates and regulators which supply over 1.5 million customers and transport 90 PJs of gas each year. Together these factors mean JGN needs to navigate an increasingly dynamic, complex and uncertain future, minimise cost increases, manage risks from an ageing network and continue to provide energy which our customers rely on while keeping the community safe. It also means that our current strategies and practices operating in a relative steady state are unlikely to remain fit-for-purpose. We will need to adapt and develop new strategies and approaches.		

[1] AEMO 2023, *2023 Transmission Expansion Options Report,* p.27. Available here.

We will need to work through challenges such as how to manage:

- **Costs –** Through optimisation of program delivery to constrain network cost increases.
- **Customer fairness and outcomes –** By improving our understanding of cost drivers and revenues, across different scenarios, to better inform our customer connection offers and optimise our connection costs while ensuring fair access to the network.
- **An ageing network –** By identifying optimal asset management strategies to manage risks from our ageing network and understanding how they differ by scenario.
- **Emission reductions –** Which will require understanding opportunities to reduce JGN's emissions to support the achievement of net-zero. Including:
    - Improving emissions measurement and reporting.
    - Developing strategies and delivering activities to reduce emissions. For instance, what changes to maintenance, investment and operating practices are viable.
    - Developing a deeper understanding of the interrelationships between network assets, customer usage and emissions.
- **Renewable gas injections –** Which will require improved network capability and optimisation to accommodate injection of green gases such as biomethane and hydrogen. For instance, how to ensure optimal blending across our network, compliance with gas quality specifications and the optimal approach to meet our reporting obligations (which require reporting on blending levels, facility curtailment etc.)[2]
- **Declines in volumes and connection –** For instance, to identify which network sections will be most affected and how we should manage the transition.

Answers to each of these challenges cannot be found in a narrow lens or a single data set. They each require considering issues from several angles and in turn require joining data from multiple systems and then testing how the answers change depending on different scenarios and assumptions.

As an example, identifying optimal emissions reduction activities will depend on direct measures of emissions, operational data (such as leaks, repairs and pressure levels), asset data and location (type and location of mains) together with forecast volumes and sales by section (customer data) as well as assumptions around the future (around forecast ACCUs, volumes connections and disconnections).

Ensuring that JGN is fully informed to make decisions which deliver the lowest sustainable cost of delivering services requires an uplift in analytical capability which has not been previously required.

Good industry practice

To achieve the lowest sustainable cost of delivering services, utilities around the world are investing in improving their analytical capabilities to take advantage of data collected and to surmount increasingly complex challenges. Recent examples include:

- Ausgrid's $30 million data and analytics program with the objectives to provide data in the right channels and format to empower customers, enhance internal capabilities to meet the changing needs of the community and undertake scenario-based optimisation to improve operational efficiency and safety outcomes. New capabilities include a data lake expansion as well as data to intelligence, asset data analytics and predictive maintenance capabilities. Key quantifiable benefits the optimisation of asset management as their field force.[3]
- AusNet's $40 million[4] information management program to extend the information management platform to enable access to timely, accurate data (across all core systems, assets and processes) to enable more advance data analytics and reporting to support better decision making across the gas business.
- ATCO Gas' data and analytics program[5] which enables opportunities to introduce capability to increase productivity, improve forecasting accuracy, understanding of asset performance and proactive maintenance and predict gas leakage through a combination of internal systems and external satellite data.

Ausgrid's and AusNet's programs have been approved by the AER.

Recent experience

	JGN currently has limited analytical capabilities. Over the 2020-25 period JGN piloted a light-weight Enterprise Asset Management (**EAM**) analytics platform which provides information on our existing assets including their return on investment and the complex relationships between asset age, characteristics, and maintenance activities. This tool has allowed us to focus and optimise our capital expenditure program. For instance, this program has contributed to the optimisation of our mains replacement program for the 2025-30 period. While this system demonstrates the benefits improved analytical capabilities can bring, it also highlights key limitations we face. The current system is limited in terms of data sourcing (and in turn flexibility), integration and kinds of analytical capabilities that can be employed.
Customer Importance	A key activity of JGN's preparation of its 2025-30 Plan has been its engagement with its customers through an extensive program and forums made up of residential and business customers. The residential customer forum provided the following values on what they considered to be the most important in considering various initiatives: • **Affordability** – We heard that balancing the rising cost of living is a priority for our customers so that no one is left behind due to the energy transition. Our customers want us to consider affordability over the short and long-term when making decisions. • **Reliability and safety** - We heard that customers want a safe and reliable gas service. • **Fairness** - Our customers want us to consider fairness in context of the energy transition, and its impacts on both existing and future generations, and on our more price-sensitive customers. • **Access to the gas network (Choice)** – We heard that customers want the choice to be able to use gas both now and into the future, and that there should be diversity of supply. • **Environment** - We heard from customers that they want us to contribute to a more sustainable environment in the future. Notably, delivering on these values in the context of our dynamic and complex operating environment is not straightforward. It will require careful consideration of a range of scenarios, customer factors around the revenue and cost implications of new connections (to achieve fariness) as well as asset information to ensure we maintain our networks currently level of safety and reliability together in a cohesive manner. This initiative will support JGN's decision making capability enabling these values to be achieved. In turn it is expected to lead to: • Reduced costs (helping reduce prices) from an enhanced ability to optimise operations, asset management strategies in the context of a highly uncertain and dynamic operating environment. • A lower cost pathway to net-zero, which may not be achieved without supporting analytics to improve emissions measurement, reporting as well as identification and evaluation of potential emissions reduction activities. • Lower cost and more accurate regulatory reporting to the regulatory and market particiapnts (consistent with the goals of the recent Renewable Gas Reforms). • Improved evaluation of connection applications resulting allowing us to better balance affordability, fairness and access/choice to gas. • Enhance scenario planning capabilities (and in turn result in costs which will deliver lower costs in the short and long-term).
Key Considerations	In considering whether and how to improve JGN's analytical capability to inform decision-making, we have considered various strategic factors including: • Customer values and expectations, in particular with respect to affordability and fairness.

[2] See recommendation 30 on page 64 here.

[3] Ausgrid 2023, *Attachment 5.9.f Data & analytics program*. Available here.

[4] Total program costs across all AusNet businesses. $16.06 million allocated to AusNet's electricity business. Ausnet. (2022). *Information Management*. ASG – GAAR – ICT Program Brief Information Management – 11 July 2022 – PUBLIC.pdf (aer.gov.au)

[5] The total cost of the program is not public. ATCO. (2023). *Gas 2025-29 Plan*. 2025-29 Plan (erawa.com.au)

	• The increasingly complex operating environment and the need to evaluate decisions across mutlple scenarios and assumptions. • The need to undertake emissions reductions activites to reduce safeguard mechanism costs and support the achievement of NSW and Commowealth net-zero targets.[6] • The significant changes in our program of work with a reduction in connection numbers and increasing meter repalcement program and the associated cost risks and opportunities. • The need to manage safety risks from our ageing pipelines and facilities. • The high-cost construction environment and the need to constrain cost increases. • The heightened need for dynamic, responsive and evidenced-based decision making. • The lessons learned from the deployment of our EAM tool. • The anticipated broad and local availability of necessary labour and expertise in the technology sector to implement the new capabilities in JGN's business and network, as the market in Australia for implementing these capabilities is mature. To prepare a set of options, JGN consulted with technological research and consulting firm Gartner who highlighted that the "asset performance management" domain for analytics in gas distribution had two primary vendors, both of which are cloud-based systems (meaning a high proportion of operating expenditure).
Options	JGN has considered three alternatives to deliver the capability articulated above: (1) do nothing, (2) investment in the design and build of an analytics platform based on SAP application components and, (3) build a new JGN network management advanced analytics platform based on the technologies underpinning the early prototype, EAM. **Option 1: Do nothing** **Description** This option requires that no action is taken and results in no enhancement in the analytics platforms supporting JGN's gas distribution network and that JGN continues its current approach to asset investment. **Benefits** By doing nothing, JGN would avoid incurring the costs and many of the risks outlined at Options 2 and 3 below in relation to the proposed initiative. **Risks** In the absence of necessary investment to support JGN's asset investment and optimisation decision-making, there may be the following risks: • JGN may not optimally invest in assets and parts of the gas network in a way that maintains efficient, reliable, and safe gas services to JGN customers as the use of the network changes into the future. For example, JGN may not be able to improve its delivery and asset management approaches resulting in missed opportunities to reduce costs or deliver customer benefits. • JGN may not be able to identify activities to reduce emissions resulting in the non-achievement of net-zero and/or a higher cost decarbonisation pathway. This would also run against stakeholder and customer expectations of JGN to take action to address climate change and environmental impacts of the network. • JGN will not be able to improve its understanding of customer network usage and its relationship with costs. These insights are vital in all plausible futures (for instance to support the roll-out of renewable gases or to plan the future operation of the network if customers begin to disconnect at faster rates) and to improve the accurate of customer connection charges (by

[6] See the emissions targets statement prepared by the Australian Energy Market Commission here.

improving connection and revenue estimates. Less accurate connection charges could lead to higher connection capex or unfairly high connection costs.

Summary

We consider that option does not reflect accepted good industry practice and would not result in the lowest sustainable costs of providing services.

Option 2: Design and build of an analytics platform based on SAP application components

Description

This option looks to extend JGN's SAP application components to include a build out of the advanced analytics use cases. Given JGN's significant investment in SAP as a strategic platform, this option considers investing on the underpinning SAP technologies.

Benefits

The primary benefit of integrated analytics capabilities will be improved decision making and in turn better customer and emission related outcomes. We anticipate that this will lead to lower costs, reduced emissions lower risks and/or better customer outcomes (e.g. avoiding reliability and safety issues from low pressure events).

We expect benefits of the following could be achieved:

- Avoiding the need to undertake a capacity development project in Kotara saving $11.7 million. This project has been identified as being required due to a combination of falling network pressures and anticipated network growth in that pocket of our network. Historically, this would trigger the need for investment to maintain reliability and avoid safety risks from low pressure events on peak days. Given the mix of demand uncertainty and the potential to optimise this investment we have identified it as a project which could be able to be avoided with enhanced analytics. The ultimate solution may involve advanced pressure modelling, more targeted investment, improved demand forecasts or, most likely, a combination to avoid or defer the need for investment.
- Reductions in connection unit costs due to the improved customer analytics. We expect this will improve our ability to consider various demand scenarios, better forecast outturn costs from a particular connection application and in turn calculate more accurate charges in our connection offers (improving affordability and fairness). We expect that this will enable the realisation of capex reductions in the order of $1.0 million per year.
- Avoiding the need to undertake mains rehabilitation in Auburn ($5.3 million). This project was identified as being required to reduce leaks and ensure sufficient capacity (and pressures) given its location and expected growth. Given the mix of emissions, forecast demand and the potential to optimise investments we have identified that this project may be able to be deferred or avoided with enhanced analytical capabilities.

We expect that benefits of a similar magnitude will also be able to be realised in the 2030-35 period.

Given the flexibility risks with the SAP solution in this option we assume that only 50% of these benefits articulated are realised. In present value terms over a 10-year period these benefits will be $16,993,648.

Risks

One major limitation is that there is a broad data set required to address the operational use-cases defined for JGN beyond SAPs data stores which could increase the scope of the project. There are also risks, relative to the other options included in this Investment Brief, which relate to:

- The potential for rework over time once the capability has been developed and implemented. This is because the underpinning SAP technology has changed in recent times and may be subject to further change in the future. Should changes eventuate, further costs may be

incurred through these reworks, and JGN's ability to realise the benefits of the platform may be limited pending this rework.

- Less flexibility on the hosting and management of the platform by basing the solution on SAP application components. This may constrain the potential benefits that the platform could provide in better informing asset investment and optimisation decisions.

- Additional costs involved with this option compared to using other providers. The SAP analytics solution incorporates license costs and an underpinning cloud environment that is more expensive than other cloud providers for comparable capability.

Costs

The estimated costs for this option are outlined in the table below and are based on expert input from JGN's digital team and technology partners in June 2023.

$2023	RY26	RY27	RY28	RY29	RY30
Total Capex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Non-recurrent Opex	[redacted]	[redacted]	[redacted]	[redacted]	
Recurrent step Opex		[redacted]	[redacted]	[redacted]	[redacted]
Total Opex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Totex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

This option will incur non-recurrent capex of [redacted] non-recurrent opex costs of [redacted] and recurrent opex of [redacted] over the 2025-30 period. The present value of these costs over 10 years is [redacted]

Summary

We consider that option does not reflect accepted good industry practice and would not result in the lowest sustainable costs of providing services.

Option 3: JGN Network Management Advanced Analytics platform build

Description

This option would involve implementation of a set of integrated platforms that can link easily into the JGN digital infrastructure, comprising of two key components:

- An engineering planning and simulation component, enabling the modelling of the gas network and the preparation of advanced asset simulations, with a deep level of integration with physical data (sensors, etc). Simulation software is a well-established (and is good practice across several industries) with various products available from established vendors. They differ by the type of modelling enabled, the integration offered with other platform components and the commercial terms of their product. We would select one of these platforms during a competitively tendered procurement process.
- A customer analytics component, enabling customer and individual asset cost and revenue modelling, planning and scenario-based analysis, merging engineering simulation scenarios with commercial scenarios. We anticipate this component would be customised to our asset management practice and will require a level of bespoke development on top of a generic analytics platform solution.

This solution would be designed with the appropriate system governance and access controls, enabling it to be used for future gas distribution, with a wide user base in the JGN business.

Benefits

We expect that we will be able to deliver similar benefits as outlined in Option 2. Specifically:

- Avoiding the need to undertake a capacity development project in Kotara saving $11.7 million.
- Reductions in connection unit costs due to the improved customer analytics which will enable savings in the order of $1.0 million per year.
- Avoiding the need to undertake mains rehabilitation in Auburn ($5.3 million).

We expect that similar benefits of a similar magnitude will be realised for the 2030-35 period. Unlike with option 2 we do not envisage any flexibility limitations preventing the full realisation of benefits. Accordingly, we assume that 100% of the benefits identified are realised.

The present value of these benefits over 10 years is $22,962,642.

Risks

The advanced analytics capability may not be delivered in time to support informed decision-making on key asset investment and optimisation matters. This may in turn raise the risks identified above at Option 1 in the absence of an adequate analytics platform.

Costs

The estimated costs for this option are outlined in the table below, based on the market scan conducted June 2023.

$2023	RY26	RY27	RY28	RY29	RY30
Total Capex	[redacted]	[redacted]	[redacted]	[redacted]	
Non-recurrent Opex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Recurrent step Opex		[redacted]	[redacted]	[redacted]	[redacted]
Total Opex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Totex	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

This option will incur non-recurrent capex of [redacted], non-recurrent totex costs of [redacted] and recurrent step opex o[redacted]over the 2025-30 period. The present value of these costs over 10 years is[redacted].

Summary

This option is recommended as we consider it reflects good industry practice given the benefits and risks outlined above. Furthermore, it provides the lowest sustainable cost.

Options Summary

The table below summarises the quantitative and qualitative differences between the analysed options.

	Capex ($2023)	Project Opex ($2023)	Ongoing opex ($2023)	10-year Net NPV	Residual Risk
Option 1	Not applicable	Not applicable	Not applicable	Not applicable	N/A
Option 2	[redacted]	[redacted]	[redacted]	[redacted]	N/A
Option 3	[redacted]	[redacted]	[redacted]	[redacted]	N/A

What We Are Recommending	JGN proposes to proceed with option 3. Investing in the establishment of an Advanced Analytics platform and capability provides the most comprehensive, relevant, and important strategic and ongoing capability to JGN. We note that the benefits identified in this Investment Brief have been incorporated into JGN's 2025 Plan on the basis that a set of integrated analytics capabilities will be developed. Specifically, JGN's 2025 Plan does not include the alternative Kotara capacity development project ($11.7 million) or the Auburn mains rehabilitation project ($5.3 million). The plan also includes forecast reductions in connection unit costs, of which a proportion of this reduction ($1 million per year) which will require enhanced analytical capabilities to realise. Option 2 is not recommended due to the option being higher cost and lower expected benefits, resulting in a lower NPV than option 3. We also consider that it does not reflect accepted good industry practice as it would provide less flexibility than option 3 and lock JGN into a proprietary software suite that may not deliver future capabilities required in a changing external environment. Option 1 is not recommended largely as it will not enable significant quantifiable benefits to be realised. We also consider that it does not reflect accepted good industry practice as it will not likely lead to other opportunities to reduce or constrain costs to be realised.
Dependencies on other Investment Briefs	This Investment Brief is also related and aligned to the following Investment Briefs for the 2025-30 period: • Data Foundation and Governance - This project is dependent on the data foundation and governance capabilities project proceeding. If that project does not proceed then the costs and benefits outlined in this business case will need to be re-evaluated. • SAP - Investment in advanced analytics will enable the seamless integration of core data such as SAP. • Cybersecurity Program - The Shift Left Model will ensure cybersecurity measures are incorporated into the advanced analytics platform from inception. • Asset Investment Planning (AIP) - Advanced analytics will involve the implementation of a foundation platform for data integration, ingestion, and progressing. The identified projects and programs will then be optimised at the portfolio level in the AIP. • Geospatial Systems - GIS will support critical and ongoing decision-making within the analytics program, aligned to investment decisions related to network planning, e.g. (scenario modelling), investment support and/or predictive maintenance.
Relationship to ICT Capital Forecast	The supporting modelling for this investment brief is contained in following investment framework model: **JGN – IT Investment Brief – Network Management Advanced Analytics – Costs and Benefits Analysis Model**