Jemena Limited

Technology Plan

IT Business Case - SAP Migration

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Glossary

Jemena	The group of companies under the Jemena and related brands, including JEN and JGN.
Current regulatory period	In the case of JGN, the period covering July 2015 to June 2020. In the case of JEN, the period covering Jan 2016 to Dec 2020.[1]
Next regulatory period	In the case of JGN, the period covering July 2020 to June 2025. In the case of JEN, the period covering Jul 2021 to Jun 2026.

[1] The models used to develop this business case are independent of any specific regulatory period, demonstrating the long-term view we take to assessing critical IT investments. The numbers in this business case align to the JGN regulatory period, they are derived by extracting the relevant capital expenditure and operating expenditure from the models.

Abbreviations

AA	Access Arrangement
AEMO	Australian Energy Market Operator
ASD	Australian Signals Directorate
AMI	Advanced Metering Infrastructure
C4C	Cloud for Customer
CRM	Customer Relationship Management
ECC	ERP Central Component
EMCa	Energy Market Consulting Associates
ERP	Enterprise Resource Planning
GIS	Geographical Information System
ICT	Information, Communications and Technology
ISU	Industry Specific Utility
IT	Information Technology
JEN	Jemena Electricity Networks (Vic) Ltd.
JGN	Jemena Gas Network (NSW) Ltd.
NEL	National Electricity Law
NGL	National Gas Law
NPC	Net Present Cost
NPV	Net Present Value
OAIC	Office of the Australian Information Commissioner
RY	Regulatory Year
SAPN	South Australian Power Networks

Overview

This objective of this business case is to ensure that the Jemena Enterprise Resource Planning (**ERP**) system continues to be effectively supported and maintained. The ERP is a critical IT system that is necessary for the safe, secure and reliable operation of Jemena's energy networks as well as the efficient operation of the broader organisation.

In this business case, we have also sought to address the issues identified in the AER's draft 2020-25 Access Arrangement (**AA**) decision[2] for Jemena Gas Networks (NSW) Ltd. (**JGN**) and the questions raised by the AER as outlined in the South Australian Power Networks (**SAPN**) 2020-25 revised electricity distribution price review proposal.[3,4]

Given the breadth of the ERP system and its critical role in the day to day operations of the business, Jemena cannot operate the ERP on an unsupported version, nor a system that is not adequately maintained. In the development of this business case, Jemena has considered both vendor support and equivalent (or as close as available to) support provided by third-party providers. To meet Jemena's technical requirements, a third-party support provider must have the capability to secure the ERP from cyber-attacks, address software vulnerabilities, and ensure the ERP can be customised to meet all potential future legislative, regulatory and compliance obligations. We have also considered alternatives to SAP ERP systems, including Oracle and Microsoft.

Scope

The costs, benefits and risks presented in this business case are taken from a Jemena group perspective.

The scope of activities in this business case encompasses the operating and capital costs related to the Jemena ERP system; these costs are categorised as (i) recurrent capital expenditure, (ii) non-recurrent capital expenditure (maintain) and (iii) some IT operating expenditure for SAP maintenance.

For the following regulated subsidiaries, the capital expenditure falls into several regulatory defined categories; this includes:

- JGN – Conforming capital expenditure
- Jemena Electricity Networks (Vic) Ltd (**JEN**) – Standard control service capital expenditure and Alternative control services (**AMI**) capital expenditure.

Investment Driver

Investing in IT systems is a necessary activity in today's modern society. IT systems are a means by which processes are executed quickly and more efficiently than traditional manual methods, and in doing so, deliver better outcomes to business, customers and other stakeholders. IT systems capture these benefits over time.

Some IT system investments deliver new benefits to customers (akin to the AER's definition of *Non-recurrent – new capability*), and others are merely maintaining older systems as they reach the end of support and superseded by modern equivalents (akin to the AER's definition of *Non-recurrent – maintain* for long-lived IT assets and *recurrent* for shorter life IT assets).

Maintaining IT systems is extremely important. The need for ongoing maintenance and upgrades is driven by necessary changes to related IT systems, cybersecurity threats and customer expectations. Not keeping pace will

2 AER, *Draft Decision, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2020 to 2025, Attachment 5 Capital expenditure*, November 2019, Pg. 5-42 to 5-44.

3 SAPN, *2020-25 Revised Regulatory Proposal, Supporting document 5.29, SAP Upgrade Business Case Addendum*, 10 December 2019, section 2.4.

4 We refer to the SAPN 2020-25 draft decision as the AER has guided us to the same issues during a teleconference held with AER staff on 29 November 2019.

result in falling short of meeting the changing requirements stakeholders and the broader community expects from Jemena.

We consider some specific drivers for the ERP upgrade in more detail below.

End of support date for existing systems

In October 2014, SAP announced that it would support its legacy enterprise software until the end of 2025.[5] For reasons of criticality and adherence to numerous standards and cybersecurity requirements, we do not consider operating a critical system such as our ERP system outside of support to be a viable option. With support for our current version of the SAP ERP coming to an end, Jemena must plan for how to manage the transition to a new and supported environment. In this business case, we investigate several options to transition to a supported system.

Additional information on the need for operating on supported systems is provided in Appendix A.

Lead time for investment

ERP systems are large by nature, and they typically cover many functions within a broader enterprise business. They are also deeply rooted in the way the business functions, supporting many critical functions. To change this, along with the technology suite, is a complex process and we need to get it right, even a short period of not being able to operate can have significant implications on our customers. This issue is acknowledged by the AER's advisor, Energy Market Consulting Associates (**EMCa**), in its report that informed the AER's draft 2020-25 decision for SAPN where concern was expressed for not having enough contingency in the project management timeline.[6]

Consistent with proper program management, and with the conclusions of EMCa, the schedules proposed for the options in this business case include appropriate buffers in the timeline to ensure that the ERP remains supported should the upgrade project encounter unexpected hurdles. The buffer provides time for Jemena to work through issues or to make alternative arrangements to keep the ERP supported.

Importance to customers

Customers expect good service; this is the message we repeatedly heard through our customer engagement activities.[7] Having IT systems that operate effectively is a crucial component to achieving customer services, life-cycling systems to keep pace with evolving customer expectations and to work efficiently is a vital driver of keeping our customers satisfied. This point is identified in many standards, in particular, the Australian Standards on *system life-cycling* which recognises that IT systems themselves are only necessary to achieve the "the ultimate goal of achieving customer satisfaction".[8] That is, life-cycling systems are unnecessary, but for achieving customer satisfaction. Failure to life-cycle systems—particularly critical systems such as SAP—will cause us to fall behind in meeting customer needs.

Our customers also told us that energy affordability is a crucial concern and that we should be mindful of this when making and proposing investment decisions. We are aware of this customer expectation and address this in two key ways:

- We seek out a range of options for IT system implantation and opportunities to meet a customer need. Amongst a variety of potential investment options, we identify the projects with the highest net present value (**NPV**), or lowest Net Present Cost (**NPC**). In the AER's Guidance for assessing ICT expenditure,[9]

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5 https://news.sap.com/2014/10/sap-committed-innovation-choice-sap-business-suite/

6 EMCa, *SAPN Revenue Proposal 2020-25, Review of aspects of SA Power Network's capital expenditure, Report to Australian Energy Regulator from Energy Market Consulting Associates, FINAL, September 2019*, paragraph 145

7 JEN, *Reconvening the Jemena People's Panel, Engagement Summary*, 31 January 2019, section 3.2.

8 Australian Standards, *AS/ISO/IEC/IEEE 12207:2019, System and software engineering – software lifecycle processes*, 11 November 2019.

9 AER, *Non-network ICT capex assessment approach*, November 2019.

the AER recognises (i) NPV analysis is the standard approach to evaluate the merits of a business case and (ii) there will be circumstances where a business case may not always produce a positive NPV.[10,11]

- Only invest where necessary. The recommended case is only to upgrade SAP to a supported version, and there is no intention to introduce new capabilities, if this were the case, then we would seek to identify benefits associated with those capabilities and offset them in the NPV analysis and proposal for a capital expenditure allowance.

Finally, we have certain obligations to our life support customers[12,13] that must be achieved to the highest of standards, reliably and expeditiously. This requirement can only be met by using *fit for purpose* IT systems, which are dependable, and therefore necessarily supported by vendors (this includes having our IT systems on the current version of software to ensure proper levels of support).

We address the service performance expectations of our customers efficiently by delivering against the recommended option (that is the most prudent and efficient) in this SAP business case.

Current SAP Ecosystem

SAP released ERP 6.0 (also referred to as ERP Central Component version 6.0 or **ECC6**) in June 2006 and has been Jemena's ERP platform since 2012, supporting our network, customers and business operations in the following core areas:

- Works and Asset management - encompassing management of physical assets including maintenance to achieve optimal performance throughout their lifecycle[14]
- Metering and network billing and the associated market obligations – providing process-oriented services in the areas of meter management, meter reads, billing, invoicing and payment processes required to be followed to comply with B2B regulatory and market guidelines[15]
- Procurement and warehouse management – provides a mechanism and controls for the procurement and warehousing functions. Ensures monitoring and availability for the supply of goods and services
- Payroll and human resource management - provides payroll for employees, associated reporting and compliance with statutory requirements. The system also manages the monitoring and processing of contractor's lifecycle, providing a central view of all personnel and organisation structure. This forms the basis and structure for driving downstream processes such as workflow approvals and identity management
- Finance – to manage financial processes and controls to enable compliance with statutory and management reporting functions. Processes include accounts payable, accounts receivable and fixed assets
- Regulatory reporting and compliance - controls the integrated processes within the system covering Works and Asset Management, Logistics and Finance to enable the required data to be captured at the "source" to facilitate compliance with regulatory reporting and audit requirements
- Environment, health and management system - provides the reporting and management of health and safety incidents, hazards and near misses
- Multi-resource scheduling system for planning and field force management - manages resources in scheduling work to be completed. This system enables improved utilisation and optimisation in the efficient assignment resources to work requests and increased customer satisfaction. Resources may include people, materials and fleet.

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10 AER, *Non-network ICT capex assessment approach*, November 2019, Pg. 11.

11 Although the non-network ICT capital expenditure assessment approach is only applicable to electricity distribution businesses, it is also informative in making decisions for other regulated entities.

12 Essential Service Commission of Victoria, *Electricity Distribution Code, Version 9A*, August 2018, s 5.6.1. (Vic only)

13 National Electricity Retail Rules, Part 7. (NSW only)

14 JGN did not implement this feature until 2014-15 and 2015-16, following a transition from GASS+.

15 JGN did not implement this feature until 2014-15 and 2015-16, following a transition from GASS+.

SAP ERP 6.0 is a central component in Jemena's IT eco-system and integrates with other critical systems including:

Geographical information system (**GIS**) - The interface provides real-time integration between ERP and GIS for several asset types allowing for visibility across both systems which facilitate operational and safety-related benefits. For example, the ERP operational functions include equipment Lifecycle management, (creation, editing and retirement).

SCADA - The interface facilitates the requesting and receiving of work orders from and to ERP. ERP also provides customer and premise data to SCADA.

AEMO (Market Hub) - Bi-directional interface for all service order requests, meter data and market notifications. For example, meter reads, site access, site, customer details and retailer transfer

- Cloud solutions:
    - *SuccessFactors* - Bi-directional integration of HR and related data. For instance, providing employee payroll information visibility to the central HR solution and receiving the employee and position information, thereby facilitating organisation hierarchy-based workflow approvals within the ERP processes.
    - *Cloud for Customer* - Integration from ERP provides customer records and associated details to Cloud for Customer to enable management of customer claims and queries.
    - *Cloud Platform* - A bi-directional interface that allows for secure access to applications hosted on the cloud.

We consider the ERP platform critical itself with an eight-hour recovery time objective based on the Business Impact Assessment and resultant Business Continuity Plans. Considering the linkages (including transaction flows) into other critical systems—namely, the IT systems that have a direct impact on 'keeping the lights on'—means that its importance in the safe operation of the business is even more critical.

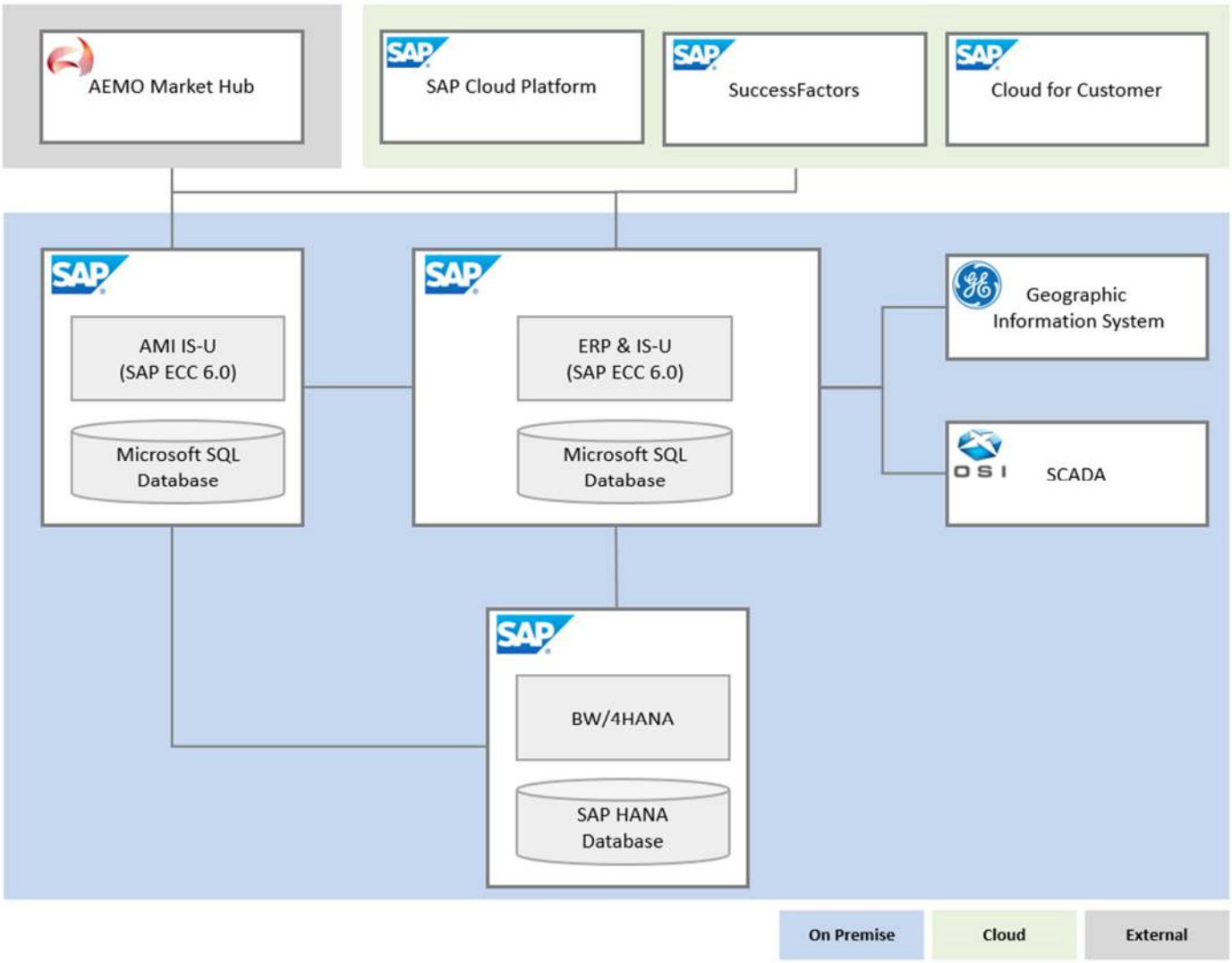
In Figure OV-1, we outline the three instances of SAP that we operate at Jemena, and the underlying databases that support them, these include:

- AMI IS-U – dedicated to meet JEN's AMI obligations
- ERP & IS-U – the core ERP system used across Jemena's businesses
- BW/4 HANA – the SAP system used for reporting, including regulatory reporting.

Relevantly, one of those instances (BW/4 HANA) already runs with the SAP/HANA database.

Figure OV-1 outlines the high-level system architecture of our SAP and related systems.

Figure OV-1: Current SAP Landscape



In **Error! Not a valid bookmark self-reference.**, we describe each component.

Table OV–1: High level system description – existing architecture

#	System / Component	Description
1	SAP ERP & IS-U	Jemena's core ERP platform supports the financial, metering and billing, human capital and asset management operations necessary for the efficient service and planning of our network Environment, health and management system Multi-resource scheduling system for planning and field force management
2	AMI IS-U	AMI SAP manages JEN's smart meter infrastructure, related billing processes and integrates with AEMO's market hub for publishing metering data for market settlement
3	BW/4 HANA	Jemena's analytics platform used for regulatory reporting and corporate dashboards
4	SAP HANA Database	In-memory, relational database management system developed SAP. HANA database for supports SAP's latest solutions such as S/4 HANA and BW/4 HANA
5	GIS	Stores spatial information of the Jemena's Network and integrates with SAP to support asset management and operations

#	System / Component	Description
6	SCADA	Jemena's SCADA system provides real-time monitoring and control for the electricity & gas networks
7	SAP Cloud Platform	SAP's cloud platform hosts Jemena applications - mWorkOrder, portal and the integration service for connecting our cloud solutions (SuccessFactors and C4C) to core ERP and AMI systems
8	SuccessFactors	Cloud-based HR solution for recruitment/onboarding, employee services, performance and learning management
9	Cloud for Customer (**C4C**)	Cloud-based Customer Relationship Management (**CRM**) system to manage customers and support tickets

Recommended SAP Ecosystem

In October 2014, SAP announced[16] that mainstream support for ECC 6.0 would end December 2025. Post-2025, S/4 will be the only supported SAP ERP platform with ongoing access to security, legal/tax changes and innovations to meet our emerging customer and business requirements. Given the lead time announced to retire the ECC 6.0 system is one of the most prolonged timeframes observed amongst similar systems (see Appendix A), we cannot rely on further extension as the basis to defer action any longer.

With ECC 6.0 being unsupported post-2025, in Figure OV-2, the recommended target state SAP landscape upgrades our existing ECC 6.0 and AMI IS-U systems to S/4.

Compared to other options considered, and consistent with the recommendation in section 0, a technical conversion of our existing ERP systems to S/4 is the least cost/complexity to remain on a supported ERP platform.

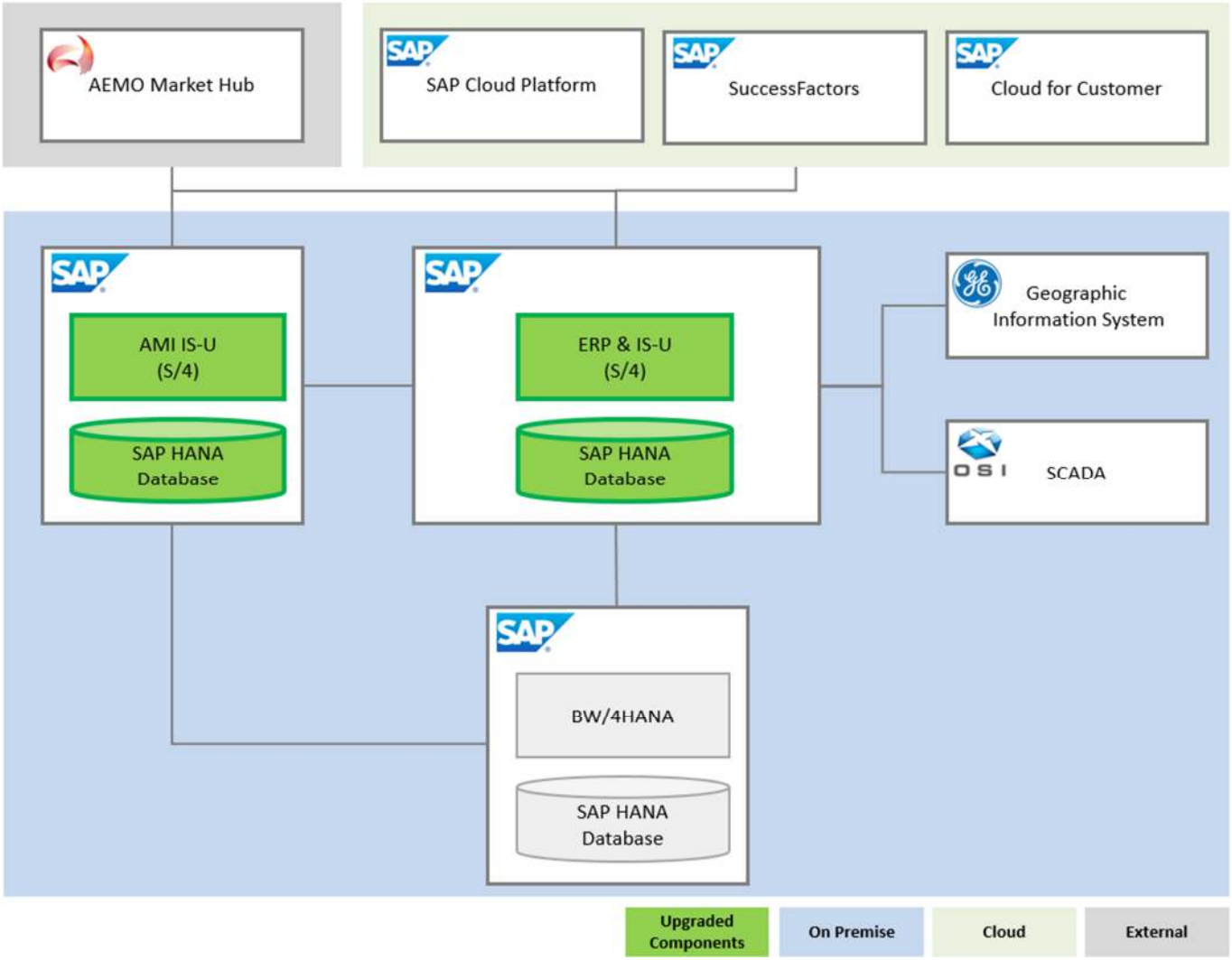
The key benefits include:

- Supported ERP platform ongoing security, legal and tax changes
- Ability to leverage our existing investments from the current ERP systems:
    - Tailored business processes
    - Reuse complex system integrations
    - Leverage existing SAP skills for operational support
- Reduce the change management impact on the business
- Maintain security patching cycles
- Ensures the benefits of interoperability across the broader IT Ecosystem are consistent.

Figure OV-2 outlines the high-level SAP architecture after implementing the recommended solution.

16 https://news.sap.com/2014/10/sap-committed-innovation-choice-sap-business-suite/

Figure OV-2: Recommend SAP landscape



In Table OV–2, we describe the target system under the recommended option.

Table OV–2: system description - Recommended option

System / Component	Description
SAP S/4HANA	S/4 is the successor to the SAP ERP 6.0, and it is optimised to run on a HANA database. S/4 provides a foundation for which Jemena can leverage for meeting current and future customer and business requirements.

Third-Party Maintenance Support Comparison

There are now several providers that compete directly with the ERP vendor for the provision of support services for the SAP version currently used by Jemena. The AER has suggested that Jemena should investigate the viability of these services as an alternative to migrating to the new S/4 ERP platform.

[redacted] We take an in-depth review of whether a third-party maintenance provider could be a viable alternative to vendor support in Section 1.

Cost Allocation

Jemena can ensure expenditure efficiency in its subsidiary businesses—including JEN and JGN—by procuring IT services as a group; this affords us significant scale driven discounts. We pass these benefits on to customers through lower prices driven by lower operating and capital costs.

Jemena allocates costs in accordance with the group (**Jemena**) cost allocation methodology.[17] The costs allocated to each of JEN and JGN (and other Jemena entities) are outlined in Table OV–3.

Table OV–3: Apportionment of SAP system cost across the Jemena group entities (%)

SAP instances	JGN	JEN	Other
SAP ERP	[redacted]		
AMI IS-U	[redacted]		
BW/4HANA	[redacted]		

As noted above, the extent of the scale benefits is significant. Absent this cost-sharing arrangement; each subsidiary would incur the equivalent costs incurred by the Jemena on a stand-alone basis,[18] meaning the cost savings to JEN are 52% and JGN 75%.

Recommended option

In this business case, we have assessed a range of possible options for managing life-cycle changes to ERP and its related software, in each assessment we have considered the risk and opportunities that come with each option. We have considered—at a high level—options around a full change out of our ERP system, partial change over and multiple vendor ERP systems and cloud-based platforms.[19]

We also performed a detailed analysis of three options using the incumbent ERP provider, each having two sub-options of third-party maintenance support provider and with the incumbent being the maintenance support provider.[20]

Table OV–4 summarises each of the detailed options that we considered.

Table OV–4: Option Differences Summary

Option	Option differences summary
1A	**Preferred Option: Upgrade the ERP to a supported version using a brownfield upgrade approach (technical upgrade) before vendor support for the current ERP is withdrawn. The technical upgrade does not include any capability enhancements.**
1B	Similar to Option 1A except after the technical upgrade Jemena makes a capital investment to transition to third-party support and minimise ongoing operational expenditure.
2A	Employs a phased ERP update and business transformation to secure the existing ERP after vendor support is withdrawn.

17 Jemena Ltd, JEM FIN PR0002 *Procedure, Cost Allocation Methodology, version 2.0,* 5 February 2019.

18 There would be some unders (for example, reduced functionality) and overs (loss of licence volume discounts), and therefore it is assumed that a Jemena type IT footprint would be a reasonable proxy to use.

19 See section 2.

20 See section 3.

Option	Option differences summary
2B	Same as Option 2A except after the migration to the new S/4 ERP is complete, Jemena partially transitions to third-party support provider and minimise ongoing operational expenditure (while retaining vendor support for the new S/4 ERP).
3A	Adopts a full ERP update and business transformation, it is a comprehensive greenfield upgrade. The approach should deliver significant productivity benefits to Jemena that justify the additional cost (but these could not be quantified at this point).
3B	Same as Option 3A except after the upgrade is complete Jemena will make a capital investment to transition to third-party support (while retaining vendor support for the new S/4 ERP).

A summary of the options analysis outcomes, including an NPV analysis and risk assessment, is outlined in Table OV–5 below.

Table OV–5: Net present value and risk rating comparison of each option ($2018, $M)

Option	NPV[1]	Risk rating
Option 1A	-73.7	Low
Option 1B	-76.9	Moderate
Option 2A	-155.7	Low
Option 2B	-157.3	Moderate
Option 3A	-168.8	Moderate
Option 3B	-170.8	Significant

Note: (1) Based on 15 years of life commencing at the start of the next regulatory period

After this review process, we identified the most prudent and efficient decision would be to (i) conduct a technical upgrade of systems before the end of support as announced by SAP, and (ii) continue to procure maintenance services from SAP; in this document (Option 1A).

This decision was based on having the best NPV outcome (that is, lowest NPC) and taking action that affords us the best opportunity to manage the relative risks.

Comparison to the position on our previous work

Following feedback from the AER on JGN's capital expenditure allowance sought as a part of the 2020-25 AA submission for SAP system we have undertaken a comprehensive review of (i) our roadmap to moving our platform to S/4 HANA, and (ii) the expected costs benefits from the system migration, particularly in the regulatory following the 2025 planned support closure of SAP ECC6.

The more fundamental outcome of this review found that benefits identified in the whitepaper[21,22] were not sufficiently robust. Given this, we can no longer pursue the recommendations from the whitepaper. Instead—as identified in this business case—we are limiting the SAP expenditure during the next regulatory period to be purely life cycle only.

A comparison of these various programs is outlined in Table OV–6 below.

21 Jemena, *ERP Corporate Whitepaper*, 4 June 2019.

22 Provided to the AER as a part of JGN's 2020-25 Access Arrangement submission.

Table OV–6: Recommended case ($2018)

Comparison Areas[1]	Capital expenditure (2021-2026)	Capital expenditure (2021-2031)	Adjusted capital expenditure[2] (2021-2031[3])
White paper (30 June 2019) - Phased Innovation Platform	$21.8M	$118.1M	-$92.6M
This business case – technical upgrade (recommended approach from this business case)	$26.2M	$33.2M	-$28.9M

Notes:

(1) For comparison, we include only the non-recurrent capital expenditure over the next two regulatory periods.
(2) The *adjusted capital expenditure* is equivalent to the NPV of capital expenditure. Even though we consider operating expenditure in this business case, it was not included in the whitepaper. Therefore, to ensure valid comparability of cases, we only include capital expenditure in this table. (As noted in section 1, the different operating expenditure options have little impact on the economic outcomes of this business case).
(3) We only present the first ten years of discounted capital expenditure—rather than fifteen years as is used in this business case—because then years is the maximum period of analysis in the white-paper, and therefore, the most relevant period for cost comparison purposes.

As can be observed in the comparison of *adjusted capital expenditure* in Table OV–6 above—that is, the most comparable data in equivalence terms between this business case and the recommended case in the whitepaper—there is a material reduction in the life-cycle capital required to maintain the ERP system that is crucial to providing services to our customers.

1. Third-Party Maintenance Support Comparison

There are now several providers that compete directly with ERP vendors for the provision of support services, including for the SAP ERP currently used by Jemena. The AER has suggested[23] that Jemena should investigate the viability of these services. [redacted]

We have undertaken a thorough investigation into the full costs and risks of moving to a third-party maintenance provider under a range in investment scenarios. This analysis has shown that total cost of ownership using third party support is similar to and potentially higher than using a vendor-supported approach due to the presence of costs necessarily incurred but not identified as a part of the change-over plan. In some cases, there can be a need to return to vendor support to upgrade the ERP eventually.

Jemena has considered three options for maintaining ERP support. Within each option, Jemena has assessed two variants, one where support is maintained with SAP as long as available (options signified with an 'A' suffix); and another where assistance from a third-party provider is used as soon as possible (variants identified with a 'B' suffix). The 'B' options only provide small operating cost savings and often higher total cost (operating and capital expenditure) than the standard A options. The B options do not include an eventual return to vendor support, which would more than offset any operating cost savings.

As is detailed in the remainder of this business case, there are other factors to consider when making investment decisions—including operating expenditure and capital expenditure trade-offs[24]—and we elaborate on these to guide our decision on whether to change to a third party SAP maintenance service provider for maintenance service. After going through this extensive analysis, *we do not see a compelling economic case to move to a third-party maintenance service provider (when taking into account the full cost of changing); however, from a risk perspective, we see a strong reason to stay with SAP*.

1.1 Approach to assessing SAP maintenance service providers

Jemena has evaluated the benefits and potential complexities and costs of moving to a third-party maintenance provider. We have also considered the criteria for when its use of a third-party maintenance provider is a prudent option, and how these criteria align to the Jemena ERP ecosystem. We have drawn these issues out based on:

- a critical analysis of IT change programs based on the experience of Jemena
- expert advice from consultancies that deploy SAP upgrades in greenfield, bluefield and brownfield environments
- use of our risk assessment framework
- interviewing several domestic and international businesses that have experience with third-party providers (See Box 2 for example)
- information from other electricity distribution businesses who have faced similar issues
- the detailed investigation of third-party provider options undertaken by SAPN.[25]

[23] AER, *Attachment 5: Capital expenditure| Draft decision–Jemena Gas Networks (NSW) Ltd Access Arrangement 2020-25*, 25 November 2019, Page, 5-44.

[24] A consideration outlined by the AER in *Better Regulation, Expenditure Forecast Assessment Guideline for Electricity Distribution*, November 2013.

[25] SAPN, *2020-25 Revised Regulatory Proposal, Supporting document 5.29, SAP Upgrade Business Case Addendum*, 10 December 2019.

Box 1 – Addressing the case presented by the AER

In its 2020-25 draft decision for JGN, the AER suggested[26] that Jemena should investigate the viability of third-party service providers. The AER has identified an op-ed media article[27] on which it considers a case for moving to third-party providers for several state and federal government departments. The report has two main contentions:

- Extreme levels of cost savings are available to Oracle and SAP customers for maintenance services; and
- The legal case between Rimini and Oracle has no bearing on the services provided by Rimini Street.[28]

We comment on each of these issues below.

Cost savings

[redacted]

Legal case

[redacted]

[redacted]

In short, the article provides insufficient information on which to make a rational economic decision. Moreover, relying on a media article for making decisions is poor regulatory process given the brevity of information, lack of robust analysis and significant lack of evidence required to demonstrate how the solution meets the long-term interests of customers. Despite this, we have undertaken a detailed analysis of these specific issues and addresses each of them in our cost estimations outlined in this business case.

1.2 Complexities and costs of moving to third-party maintenance providers

In this section, we identify risks and costs that must be accounted for when assessing whether to move towards third-party maintenance support for SAP systems. These risks include:

- Cybersecurity patching
- Interoperability with platforms
- Interoperability with other vendor applications
- Interoperability with SAP cloud solutions
- Moving to the cloud
- Maintenance and licencing costs

26 AER, *Attachment 5: Capital expenditure| Draft decision–Jemena Gas Networks (NSW) Ltd Access Arrangement 2020-25*, 25 November 2019, Page, 5-44.

27 Supratim Adhikari, *Rimini Street signs 10 agencies*, 29 January 2019.

28 [redacted]

- Further SAP licencing
- Business transformation
- Support certainty
- Re-sign (reversion) costs
- External financial audit risks

SAPN undertook a similar interview process[29] interviewing eight entities that used or considered using third party support for SAP maintenance services, from this, SAPN developed a robust framework[30] for assessing when best to use third party maintenance service providers. We identified that this framework is similar to the approach we developed outlined below.

1.2.1 Cyber-Security Patching

[redacted]

29 SAPN, *2020-25 Revised Regulatory Proposal, Supporting document 5.29, SAP Upgrade Business Case Addendum*, 10 December 2019, section 3.3.2.

30 Ibid, Table 1.

31 https://www.cyber.gov.au/publications/essential-eight-maturity-model

[redacted]

[redacted]

[redacted]

1.2.2 Interoperability with platforms

Jemena's SAP ECC6 ERP and ISU modules require platforms to run on, and these receive regular updates and patches. The updates and patches include server firmware, Operating Systems and Database Management Systems. [redacted]

1.2.3 Interoperability with other vendor applications

The SAP ECC6 ERP and ISU modules form the core of Jemena's IT landscape and operational footprint. Few software applications in the Jemena IT environment do not have essential connections to it in some way.

[redacted]

Under support, SAP can provide adapters for their own and, for other vendors applications that hook into the core code. Due to SAP's scale and numerous customers with similar requirements, the additional cost for adapters is relatively low. Third-party maintenance companies are not able to build such adapters in the same way and charge extra for their bespoke development, often for individual clients, outside of the SAP system.

1.2.4 Interoperability with SAP Cloud Solutions

Jemena has adopted various cloud-based solutions which interact directly with the ERP. Due to the cloud-based regular patching and update regime of cloud solutions, the interoperability between these and the ERP is maintained via applying periodic vendor-supplied ERP adapter updates.

These updated adapters are in almost all cases provided by SAP under the support agreement and will cease being provided if Jemena shifts to a third-party support model. [redacted]

The cloud solution vendor may also supply adapters. [redacted]

[redacted]

[redacted]

1.2.5 Moving to the Cloud

To move SAP ERP modules from on-premise to cloud platforms, changes to core code are required. SAP provide these changes to customers under support. [redacted]

1.2.6 Maintenance and Licensing Costs

[redacted]

[redacted]

1.2.7 Further SAP Licensing

[redacted]

1.2.8 Business Transformation

Once an SAP ERP environment's codebase has been locked down (a requirement for using third-party support), material changes to business processes can only be accommodated by deploying complex customisations or by switching to alternative products, both of which involve significant costs to implement and maintain.

Jemena's SAP ECC6 ERP and ISU modules are inextricably tied to our compliance with almost all our regulatory obligations. Changes to regulatory requirements are a common and frequent part of doing business and therefore, will inevitably require changes to business processes. This is an additional cost that is borne in full by the client business rather than socialised across all of SAP's clients.

1.2.9 Support Certainty

[redacted]

[redacted]

32 [redacted]

[redacted]

1.2.10 Re-Sign (reversion) Cost

[redacted]

1.2.11 External Financial Audit Risk

[redacted]

1.3 When moving to third party maintenance provider makes sense

In section 1.2, we identified several complexities associated with a shift to third party maintenance. Based on this information, we have developed the following circumstances when the use of third-party support is an appropriate option:

1. **Short term cost targeting** – a business that is targeting short-term cost savings and is less concerned with long-term financial impacts may find third-party support a viable alternative. Examples include businesses that are likely to be shut down (minimise outgoings) or sold (improve short term financial measures to increase sale price).

2. **The criticality of the system** – a business that uses its ERP for non-business critical functions and is operated mostly disconnected from the internet will have lower exposure to cybersecurity risk, and third-party security support may be sufficient. Examples include businesses that use non-ERP software for billing and sensitive data is not stored in or passes through the ERP.

3. **Retiring systems** – a business that is retiring its SAP ERP may use third-party support for a period before transitioning to an alternate ERP vendor knowing that back-maintenance will not be payable.

4. **Static ERP environment** – a business that does not connect its ERP to other software systems and operates it mostly in isolation with no intentions of moving to the cloud will not be affected by several limitations associated with being on third-party support.

1.4 Relevant circumstances to move to third-party maintenance do not apply to Jemena

We strongly believe that none of the circumstances outlined in section 1.3 applies to Jemena. A response to each is provided below:

- **Short term cost targeting** – [redacted]
- **The criticality of the system** – [redacted]
- **Retiring systems** – [redacted]
- **Static ERP environment** – [redacted]

Box 2 – A case study [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
    - [redacted]
    - [redacted]
    - [redacted]
- [redacted]
- [redacted]
- [redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]

[33] SAPN, *2020-25 Revised Regulatory Proposal, Supporting document 5.29, SAP Upgrade Business Case Addendum*, 10 December 2019.

2. Alternative ERP solutions

In the AER's draft decision[34] for JGN, we were asked to consider alternative architectural solutions such as cloud and alternative providers for ERP systems such as Oracle and Microsoft. We have considered this question from two perspectives, (i) the architectural design from a cloud to on-premise solutions and (ii) replacing our ERP systems with these alternative provider equivalent systems at a time that aligns with the upgrade of our core SAP system is scheduled to take place.

Cloud solution

Jemena already has a mix of cloud and on-premise SAP solutions. In Figure OV-1, we outline the relevant systems and indicate how each solution is deployed. The transition to the cloud has occurred over some time, usually when those functions are due for upgrade or replacement to ensure the most efficient program is implemented.

In terms of ERP deployment options, there is little cost difference in the options for the on-premise system to be deployed to a private cloud. The customisations and licencing costs are similar, and the hardware is substituted for equivalent online services and the change management activities are effectively the same. This outcome does not come as a surprise to management because the technology solutions offered by service providers is becoming more seamless.

Based on the small cost variance between cloud-based solutions and on-premise solutions, additional options that use cloud solutions have not been included in this business case analysis.

Replacement of our ERP system with an alternative yet equivalent system

The implications of replacing a whole ERP system, which is deeply embedded in the existing business processes and fundamental to the operations of the business, are significant. Replacing such a system is not to be taken lightly because the timing cost and impacts are high. We undertook an exercise of estimating the cost and effort in some of our previous work, in it, we identified an NPV in the range of $144.89 to $188.36M ($2018) [35] over the next two regulatory periods.

When we set out to investigate this question, we anticipated the cost would be significant (we are not surprised by the magnitude of this cost, rebuilding the IT ecosystem, and business model from the ground up is a considerable task), we had in our mind that if the expenses came close to our recommended option costing—that is, within 25%—then we would explore this options further. The 25% range is consistent with the stage gating approach we adopt for investment governance at the first gating stage. With a difference of over 200%, we do not see any further benefit in investigating this alternative approach further.

Partial replacement of our ERP system with an alternative yet equivalent system

We have considered this option and note that this too is unlikely to yield a benefit because:

- We would pay two lots of licence fees
- Our scale discount would be lost
- The management of hardware, security, communications and other overhead activities such as contract management would double
- Complex integrations between the environments would need to be built and maintained.

We do not consider having partial solutions to this to be a viable option, either.

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[34] AER, *Draft Decision, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2020 to 2025, Attachment 5 Capital expenditure*, November 2019, Pg. 5-42 to 5-44.

[35] Jemena, *ERP Corporate Whitepaper*, 4 June 2019.

3. SAP Options Analysis

Jemena has considered three options for maintaining its ERP systems. Within each option, Jemena has assessed two variants, one where maintenance support continues to be provided by SAP (options signified with an 'A' suffix); and another where maintenance support is provided by a third-party provider as soon as possible (variants signified with a 'B' suffix).

Jemena has considered options covering a range of trade-offs between short-term (2021-26 period) and long-term (over 15 years 2021-36) costs and risk. The options are:

1. Minimise the cost of upgrading the ERP to a version with long-term supportability (**Option 1A**/1B)

   1A - This option will minimise long term expenditure and ensure that the ERP remains supported. This will be done by completing a technical upgrade of the ERP during the latter part of the 2021-26 period. The technical upgrade approach is the least cost upgrade approach and foregoes all capability enhancements that would otherwise be undertaken during an upgrade project. Opportunities for adding new capabilities will remain and can be invested in subject to independent NPV positive business cases. This will enable Jemena to maintain existing levels of security for a critical business system while minimising long term costs.

   1B - This option is similar to Option 1A. It will also reduce operating expenditure (relative to Option 1A) over the next 15 years by utilising third party support where possible. However, this will result in additional risks above those Jemena would be exposed to under Option 1A and incur additional capital expenditure to transition to third-party maintenance support provider and will limit Jemena's opportunities to invest in ERP capability enhancements.

2. Upgrade the ERP in 2021-26 and conduct a business transformation (see section 1.2.8), spread over two regulatory periods to reduce the immediate cost (Option 2A/2B)

   2A - This option will allow Jemena to receive the benefits of a full ERP business transformation while deferring most costs beyond the 2021-26 regulatory period by taking a phased approach to a greenfield upgrade. This approach will provide more time to determine the exact scope of the transformation and to model the expected benefits before proceeding. However, additional costs to secure the existing ECC6 ERP after 2025 will be incurred that are avoidable if the transformation were undertaken in full during the 2021-26 regulatory period.

   2B - This option is similar to option 2A. It will also reduce operating expenditure (relative to Option 2A) over the next 15 years by utilising third party support for the new S/4 ERP after the upgrade is complete. However, this will result in additional risks above those Jemena would be exposed to under Option 2A, incur additional capital expenditure to transition to third party support and will limit Jemena's opportunities to invest in ERP capability enhancements.

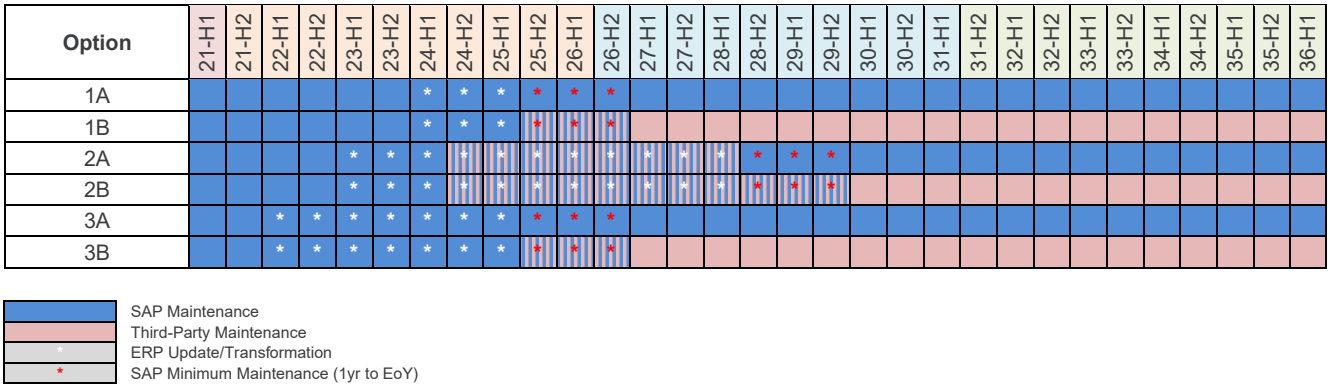
3. Upgrade the ERP in 2021-26 and complete a business transformation during the next regulatory period (Option 3A/3B)

   3A - This option will allow Jemena to receive the benefits of a greenfield ERP upgrade and business transformation as soon as possible by completing the upgrade in the 2021-26 regulatory period. This will also ensure the ERP is fully upgraded before the end of vendor support for ECC6. However, a significant capital outlay will be required during the next regulatory period, and the vast scope of the project will increase deliverability risks and may impact the timelines for other IT projects.

   3B - This option is similar to option 3A. This option will also reduce operating expenditure (relative to Option 3A) over the next 15 years by utilising third party support for the new S/4 ERP after the upgrade is complete. However, this will result in additional risks above those Jemena would be exposed to under Option 3A, incur additional capital expenditure to transition to third party support and will limit Jemena's opportunities to invest in ERP capability enhancements.

Figure 3–1 below shows the timeline for Jemena's use of different support providers under each of the options that have been considered. Jemena currently uses vendor support provided by SAP, but under the alternative options may transition to third party support, or, in the case of Option 1A/B use support provided by an alternative ERP vendor (if Jemena selects a non-SAP vendor for a new ERP).

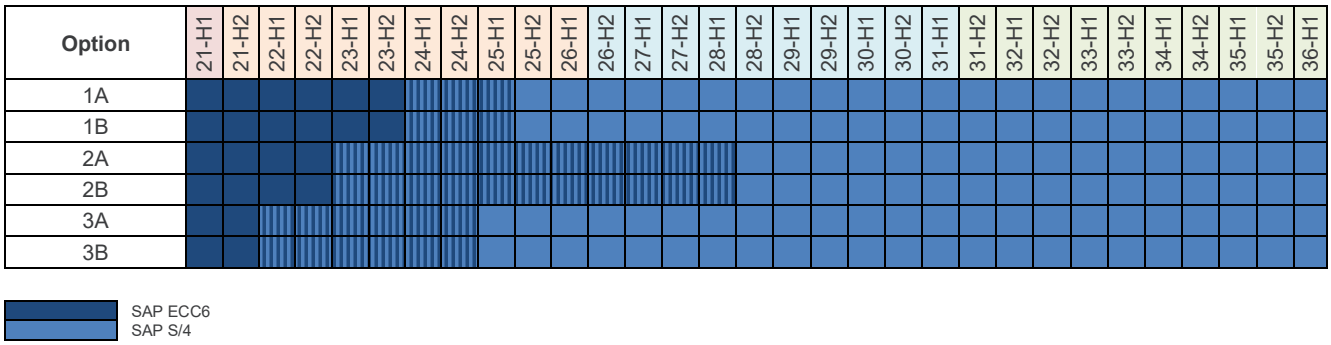
Figure 3–1: Timelines for each maintenance support option



Jemena will be using two support providers at times. This is due to obtaining third-party support before ceasing SAP vendor support to ensure a smooth transition, or contractual requirements requiring vendor support to be paid during upgrades (this support only covers the new ERP, third party support must be retained to support the old ECC6 ERP after 2025).

Figure 3–2 below shows the timeline for ERPs in use by Jemena. The current ERP is SAP ECC6 and this transitions to S/4.

Figure 3–2: Timelines for each upgrade option



3.1 Option 1A: Technical update of ERP

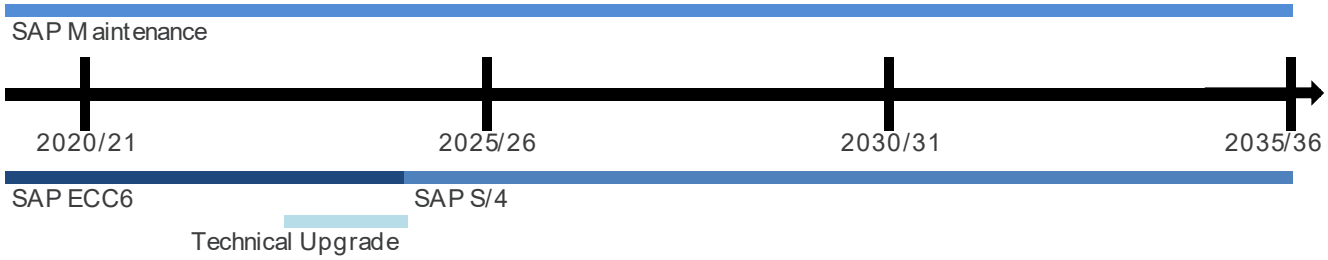
This option is to ensure Jemena's ERP remains on a vendor-supported version while minimising capital expenditure and total lifecycle cost of ownership.

This option is the most efficient way for Jemena to upgrade to an ERP with long-term vendor support and will not require significant additional capital expenditure outlays until at least 2035 and potentially even later as the S/4 ERP is expected to remain supported for a long time to come.

Although this option will enable Jemena to invest in NPV positive enhancements during future regulatory periods, cost efficiencies of implementing these changes during the upgrade process will be lost as additional planning, downtime and system freezes may be required for standalone ERP enhancement projects at the time changes arise. Jemena will still have the opportunity to conduct a business transformation (see section 1.2.8), but the total cost will be higher, and the benefits of the transformation will be deferred, potentially increasing total cost to customers relative to an immediate transformation option (such as Option 3A/B).

Figure 3-3 below shows the timeline of support and significant investment milestones for Option 1A.

Figure 3-3: Timeline of support and significant investment milestones for Option 1A



3.1.1 2021-26 Regulatory Period

As the ERP is a critical system, Jemena cannot risk operating without being on supported versions of the software. SAP will withdraw vendor support for the ECC6 ERP that is used by Jemena at the end of 2025, leaving the ERP vulnerable to security threats and unable to be updated. To ensure that the ERP remains supported, Jemena will perform a technical upgrade from SAP ECC6 to SAP S/4 before 2025. S/4 is expected to be supported into the 2030s and possibly beyond.

Under this option, Jemena will always retain SAP support for the ERP. This outcome will ensure Jemena can update and add to the ERP, and it will also minimise cybersecurity risks.

Jemena will cease lifecycle updates to the current ERP from 2024 to avoid unnecessary expenditure, limiting updates to security patches only. During 2024 and 2025 the ERP will be frozen as the upgrade occurs. Regular lifecycle updates will continue from 2026.

The cost of the ERP upgrade in this option is for a brownfield technical update only. A technical update will be limited to a “lift and shift” of existing capabilities to an S/4 ERP. Changes to business processes and the addition of new modules will be limited to changes that are necessary to operate the upgraded ERP.

The technical upgrade will be possible at least cost because Jemena will be within SAP support and is operating a close to standard implementation of ECC6, with limited complicating factors such as use of other software systems (for example, Jemena uses SAP IS-U for billing rather than integrating the ERP with other software products that provide this functionality). The upgrade process itself is also helped by Jemena keeping both the ERP core and the business-specific modules on the latest lifecycle release versions and most recent security patches.

Even with a technical upgrade, the S/4 ERP is expected to provide some benefits compared to the current ECC6 ERP. However, these will be relatively small and are not likely to influence Jemena’s selection of upgrade pathway. As these benefits are due to a software version upgrade, they will contribute to the operating expenditure productivity requirement for Jemena’s regulated network subsidiaries.[36]

3.1.2 2026-31 and 2031-36 Regulatory Periods

Jemena will continue to pay lifecycle capital expenditure and annual maintenance operating expenditure in the following regulatory periods. Jemena does not expect another significant ERP upgrade before 2036.

This option will enable Jemena to invest in NPV positive capability enhancements that may, over time, deliver some or all the benefits that may be attained from a greenfield upgrade. Any additional investments will require NPV positive business cases.

3.1.3 Costs

Cost estimates for this option are outlined in Table 3–1.

[36] The productivity benefits are outlined in the operating expenditure proposals of JGN and JEN.

Table 3–1: Option 1A – Cost assumptions ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Capital expenditure										
S/4 Technical Update			5.0	10.0		15.0			15.0	(1)
S/4 AMI IS-U Upgrade				7.5		7.5			7.5	(2)
ERP Lifecycle	1.1	1.1	0.1		1.4	3.7	7.0	7.0	17.7	(3)
Total Capital expenditure	*1.1*	*1.1*	*5.1*	*17.5*	*1.4*	*26.2*	*7.0*	*7.0*	*40.2*	
Operating expenditure										
SAP Maintenance	3.1	3.1	3.1	3.1	3.1	15.5	15.5	15.5	46.5	(4)
Total Operating expenditure	*3.1*	*3.1*	*3.1*	*3.1*	*3.1*	*15.5*	*15.5*	*15.5*	*46.5*	
Total Cost	**4.2**	**4.2**	**8.2**	**20.6**	**4.5**	**41.7**	**22.5**	**22.5**	**86.7**	

Capital expenditure:

1. ECC6 to S/4 Brownfield (Technical Update) costs are based on information provided by the vendor (SAP) and ERP upgrade service providers. The upgrade and all associated costs are incurred before the withdrawal of vendor support for ECC6 at the end of 2025
2. S/4 AMI IS-U upgrade cost is attributable to JEN only. Cost estimate based on the preliminary information from an ERP upgrade service provider
3. ERP Lifecycle costs are for the updating of ERP modules. Lifecycle costs are based on the current product lifecycle roadmap until the ERP upgrade project begins. After the upgrade is complete, a typical annual cost is forecast. No lifecycle costs are incurred during the upgrade project

Operating expenditure:

4. SAP Maintenance costs [redacted] This assumes no change in the value of the maintenance base

3.1.4 Risks/Benefits

There are no quantified risks or benefits for this option.

As this option only includes a technical upgrade, only minor productivity benefits are expected. As these productivity benefits are due to a software version upgrade, they will contribute to the operating expenditure productivity requirement for Jemena's regulated network subsidiaries.[37]

Annual benefits for Option 1A/B are expected to be smaller than benefits that may be achieved in all other options. Additional benefits may be possible after 2025, but these will require additional investment supported by separate NPV business cases.

[37] The productivity benefits are outlined in the operating expenditure proposals of JGN and JEN.

3.1.5 Summary

This option will efficiently maintain Jemena's ERP and minimise cybersecurity and other risks. Jemena will retain optionality to invest in productivity improvements and additional modules in future periods. However, cost efficiencies—that can arise with greenfield implementations—of combining business transformation and productivity investments with the ERP upgrade will be forgone.

This option has an NPV of -$73.7m and will require $26.2m of capital expenditure during the 2021-26 regulatory period. The total capital expenditure required for this option over 15 years is $40.2m.

The calculations for NPV are outlined in Table 3–2 below.

Table 3–2: Net present value calculations for Option 1A ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Total Costs	-4.2	-4.2	-8.2	-20.6	-4.5	-41.7	-22.5	-22.5	-86.7
Total Benefits									
Net Value	-4.2	-4.2	-8.2	-20.6	-4.5	-41.7	-22.5	-22.5	-86.7
Present Value	-4.0	-3.9	-7.4	-18.2	-3.9	-37.4	-18.0	-15.9	
NPV[38]	**-73.7**								

[38] NPV is calculated over the 15 year period 2019/20 to 2034/35, aligning with the next three regulatory periods for JGN. All other values are presented for JEN regulatory periods.

3.2 Option 1B: Technical update of ERP then Third-Party Maintenance

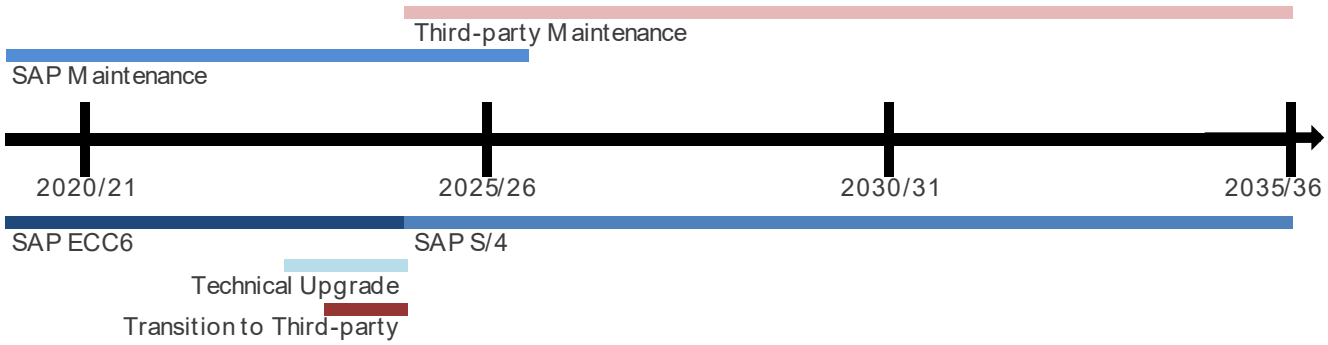
This option is a variant of Option 1A.

Under this option, Jemena will shift to third party support after completing the technical upgrade of the ERP to S/4. Using third-party support will provide a cost-saving but severely limit Jemena's future ability to undertake an ERP business transformation or other productivity-enhancing investments such as adding new modules unless Jemena transitions back to vendor support (business transformation without SAP involvement would be extremely risky and potentially not possible. To undertake such a program later is akin to a greenfield program similar to options 3A/B). Analysis by Jemena has shown that the total cost of ownership is higher for a third-party supported ERPs because of the substantial cost to return to vendor support, so any future ERP business transformation would be more expensive than if vendor support is retained.

This option will lower ERP operating expenditure during the 2026-31 period while managing security risks above minimum acceptable levels. However, the use of third-party maintenance will result in increased cybersecurity risks relative to using vendor support.

Figure 3-4 below shows the timeline of support and significant investment milestones for Option 1B.

Figure 3-4: Timeline of support and significant investment milestones for Option 1B



3.2.1 2021-26 Regulatory Period

Jemena will complete a technical upgrade of the ERP from SAP ECC6 to SAP S/4 using the same timeline as Option 1A. During the late stages of the technical upgrade, Jemena will undertake additional investments required to transition to third party support. This includes a network segmentation to ensure that the third-party virtual patching approach can be used to secure the S/4 ERP.

3.2.2 2026-31 Regulatory Period

Immediately after the technical upgrade is complete, Jemena will engage a third-party support provider [redacted] To ensure a smooth transition to third party support, Jemena will utilise both SAP support and third-party support during this period.

[redacted]

The option will not address productivity limitations after 2025 as the ERP will not be modifiable. Limited changes will be possible using the third-party provider, and workarounds and use of alternative software applications would be required for some tasks.

3.2.3 2031-36 Regulatory Period

Jemena will continue to incur ERP lifecycle costs and third-party support costs and other expenses related to the use of third-party support during the 2031-36 regulatory period. The costings for this option do not include a return to vendor support before RY36. If this were to occur—for a range of reasons—this may increase the costs of future ERP upgrades after RY36 compared to options that retain vendor support.

3.2.4 Costs

Cost estimates for this option are outlined in Table 3–3.

Table 3–3: Option 1B – Cost assumptions ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Capital expenditure										
ERP Lifecycle	1.1	1.1	0.1		1.4	3.7	7.0	7.0	17.7	(1)
S/4 Technical Upgrade			5.0	10.0		15.0			15.0	(2)
S/4 AMI IS-U Upgrade				7.5		7.5			7.5	(3)
Network segmentation				1.8		1.8			1.8	(4)
Third-party transition costs				1.0		1.0			1.0	(5)
Total Capital expenditure	*1.1*	*1.1*	*5.1*	*20.3*	*1.4*	*29.0*	*7.0*	*7.0*	*43.0*	
Operating expenditure										
SAP Maintenance	3.1	3.1	3.1	3.1	3.1	15.5	1.6		17.1	(6)
Third-Party Maintenance					2.0	2.0	10.0	10.0	22.1	(7)
Implementation of third-party patching					0.0	0.0	0.3	0.3	0.5	(8)
Application management tool					0.0	0.0	0.1	0.1	0.3	(9)
Assumed cost to the business, penalties, internal costs, intangible costs					0.0	0.0	0.1	0.1	0.3	(10)
Virtual Patching					0.3	0.3	1.7	2.0	4.0	(11)
Network segmentation – operating expenditure					0.1	0.1	0.5	0.5	1.1	(12)
Total Operating expenditure	*3.1*	*3.1*	*3.1*	*3.1*	*5.6*	*18.0*	*14.3*	*13.1*	*45.3*	
Total Cost	**4.2**	**4.2**	**8.2**	**23.4**	**7.0**	**46.9**	**21.3**	**20.1**	**88.3**	

Capital expenditure:

1. ERP Lifecycle costs are for the updating of ERP modules. Lifecycle costs are based on the current product lifecycle roadmap until the ERP replacement project begins in RY24. After 2025 a typical annual cost is used. After RY26 when support is not provided by SAP and moved to a third party maintenance service provider, comparable costs are expected to be incurred from other parties for customisation of SAP to provide regular function updates or the purchase of non-SAP products that provide functionality not able to be added to SAP because of the constraints of being unsupported
2. ECC6 to S/4 Brownfield (Technical Update) costs are based on information provided by the vendor (SAP) and ERP upgrade service providers. The upgrade and all associated costs are incurred before the withdrawal of vendor support for ECC6 at the end of 2025
3. The S/4 AMI IS-U upgrade cost is attributable to JEN only. Cost estimate based on the preliminary information from an ERP upgrade service provider
4. Network segmentation costs are incurred before the transition to third-party provider support and use of virtual patching for security. The cost is based on a similar project undertaken by Jemena during the current regulatory period
5. Third-party transition costs include capitalised costs for managing the transition to a third-party, inclusive of the development of business cases, selection of preferred provider and integration management

Operating expenditure:

6. [redacted] After 2026 only third-party maintenance costs are incurred.
7. [redacted]
   Cost begins in RY26 so an overlap period with SAP Maintenance to smooth the transition.
8. Patching represents costs to Jemena for managing the patching process with the third-party provider and security software vendor
9. The Application Management Tool provides for centralised real-time monitoring and alerting across the entire SAP on-premise footprint. This cost is for the replacement of the equivalent functionality provided by SAP
10. Penalties, internal costs and miscellaneous is an allowance for additional costs that may be incurred due to the use of third-party maintenance
11. Virtual Patching costs cover the receiving of specific controls from the firewall vendor to address SAP ERP vulnerabilities that may not be addressed in standard controls. This also includes additional staff and contractors with specialist skills to manage the implementation of custom virtual patches. Third-party support vendors only provide information to guide businesses on how to secure the ERP from vulnerabilities using virtual patches. The company (i.e. Jemena) remains responsible for the development, installation and maintenance of virtual patches
12. Network segmentation operating expenditure is for the payment of licence subscription fees for the segmentation and firewall systems and software [redacted]

3.2.5 Risks/Benefits

A summary of the risk rating is outlined in Table 3–4 below.

Table 3–4: Option 1B – Risks/Benefits

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
[redacted]							-0.1	-0.2	-0.2	(1)
[redacted]							-0.3	-0.8	-1.1	(2)
Total Net Risks/ Benefit							**-0.4**	**-0.9**	**-1.4**	

Note: positive values are benefits, negative values are risks

There are two critical risks that Jemena will be exposed to under this option, [redacted]

[redacted]

As this option only includes a technical upgrade, only minor productivity benefits are expected. As these benefits are due to a software version upgrade, they will contribute to the operating expenditure productivity requirement for Jemena's regulated network subsidiaries.

Annual productivity benefits for Option 1A/B are expected to be smaller than benefits that may be achieved in all other options. Additional benefits may be possible after 2025, but these will require additional investment supported by NPV positive business cases.

3.2.6 Summary

This option will efficiently maintain Jemena's ERP and minimise ongoing operating expenditure at the expense of an increase in risk and a loss of optionality to invest in productivity improvements and additional modules in future periods.

This option has an NPV of -$76.9m and will require $29.0m of capital expenditure during the 2021-26 regulatory period. The total capital expenditure required for this option over 15 years is $43.0m.

The calculations for NPV are outlined in Table 3–5 below.

Table 3–5: Net present value calculations for option 1B ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Total Costs	-5.5	-4.2	-4.2	-8.2	-23.4	-4.2	-24.3	-20.0	-89.8
Total Benefits							-0.3	-0.9	-1.2
Net Value	-5.5	-4.2	-4.2	-8.2	-23.4	-4.2	-24.5	-20.9	-91.0
Present Value	-5.4	-4.0	-3.9	-7.4	-20.7	-41.4	-20.3	-15.2	
NPV[39]	**-76.9**								

This option will expose Jemena to heightened security risks that are quantified in the NPV analysis. This option may also expose Jemena to additional risks that are not quantified, and this should be considered before selecting this option.

[39] NPV is calculated over the 15 year period 2019/20 to 2034/35, aligning with the next three regulatory periods for JGN. All other values are presented for JEN regulatory periods.

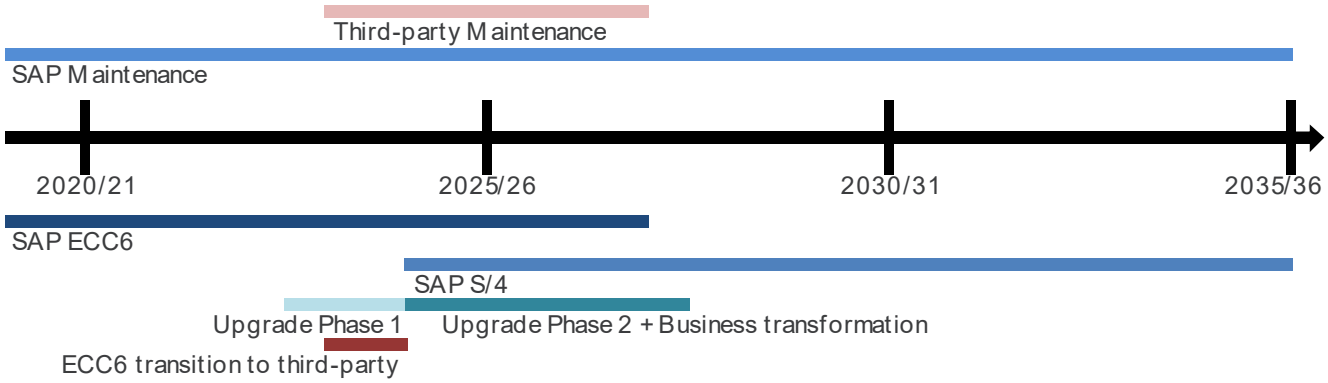
3.3 Option 2A: Phased ERP update and business transformation

This option is to undertake a full ERP upgrade with business transformation phased over two regulatory periods. This will defer a portion of the cost until the 2026-31 regulatory period.

This option allows Jemena to complete a full business transformation while reducing upfront capital expenditure during the 2021-26 regulatory period. The phasing of the upgrade and change will also provide optionality value to Jemena if alternative products that offer additional functionality or lower total cost of ownership enter the market before the second phase of the upgrade that begins in RY26.

Figure 3-5 below shows the timeline of support and significant investment milestones for Option 2A.

Figure 3-5: Timeline of support and significant investment milestones for Option 2A



3.3.1 2021-26 Regulatory Period

Jemena will shift several critical functions to the vendor-supported SAP S/4 ERP version before support is withdrawn for the current ERP by the vendor (SAP). This will include the Finance, HR and Procurement functions. Jemena will also transform its existing processes within these areas to make the best use of the new capabilities offered by S/4.

The phased upgrade approach will spread the upgrade costs and effort over a more extended period, which is expected to reduce the total upgrade cost. By migrating in phases, Jemena can continue to partially extend the ECC6 ERP, minimise disruption to the business, and learn through experiences before implementing more functions on the S/4 ERP.

As the ERP is a critical system, Jemena cannot risk operating without it being supported. SAP will withdraw vendor support for the ECC6 ERP that is used by Jemena at the end of 2025, leaving the ERP vulnerable to security threats and unable to be updated. To ensure that the functions that are retained on the ECC6 ERP keep at least to a minimal level of security during the second phase of the upgrade Jemena will engage the services of a third-party support provider.

[redacted] To ensure a smooth transition, Jemena will engage the third-party provider from 2024 while still using SAP for support until the 2025 withdrawal date. Continuing to use SAP support until the final withdrawal date ensures Jemena has available and installed all security patches and product lifecycle updates that will maximise the security level and functionality of the ERP while under third-party support.

As third-party support providers use virtual patching to ensure the security of the ERP, Jemena will have to segment its communications network and install the required security software to implement virtual patches. Jemena will complete a network segmentation during 2024. This will allow a year for Jemena to test virtual patching and other third-party support services before SAP support is withdrawn.

3.3.2 2026-31 Regulatory Period

Some ERP functions will continue to operate on the existing ECC6 ERP as they are transitioned to the S/4 ERP during the 2026-31 period. This second phase will include business transformation investments that will enhance how Jemena uses the ERP, including the addition of new modules that provide new functionalities.

[redacted]

Because only a subset of functions will remain on the ECC6 ERP, and because these will be progressively migrated to the S/4 ERP between RY27 and RY29, the risks of using third-party support will be manageable.

This option assumes that Jemena continues to use third-party support until all functions are migrated to the S/4 ERP in RY28. Some business transformation tasks will continue into RY29, but the requirement for third-party support would have ceased.

3.3.3 2031-36 Regulatory Period

Jemena will continue to incur lifecycle capital expenditure for the S/4 ERP and operating expenditure for support from SAP during the 2031-36 regulatory period.

3.3.4 Costs

Cost estimates for this option are outlined in Table 3–6.

Table 3–6: Option 2A – Cost assumptions ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Capital expenditure										
ERP Lifecycle	1.1	1.1	0.6	1.7	0.2	4.7	5.7	7.0	17.4	(1)
Network segmentation				1.8		1.8			1.8	(2)
Third-party transition costs				0.8		0.8			0.8	(3)
S/4 Migration Phase 1		4.2	8.3			12.5			12.5	(4)
Business Case Phase 2			1.1	1.1		2.2			2.2	(5)
S/4 Migration Phase 2							94.2		94.2	(6)
Total Capital expenditure	*1.1*	*5.2*	*10.0*	*5.4*	*0.2*	*21.9*	*99.9*	*7.0*	*128.8*	
Operating expenditure										
SAP Maintenance	3.1	3.1	3.1	3.1	3.1	15.5	15.5	15.5	46.5	(7)
Third-Party Maintenance				2.0	2.0	4.0	4.0		8.0	(8)
Implementation of third-party patching				0.0	0.1	0.1	0.1		0.2	(9)
Application management tool				0.0	0.0	0.0	0.1		0.1	(10)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Assumed cost to the business, penalties, internal costs, intangible costs				0.0	0.0	0.0	0.0		0.1	(11)
Virtual Patching				0.3	0.3	0.6	0.7		1.3	(12)
Network segmentation – operating expenditure					0.1	0.1	0.2		0.3	(13)
Total Operating expenditure	*3.1*	*3.1*	*3.1*	*5.5*	*5.6*	*20.4*	*20.6*	*15.5*	*56.4*	
Total Cost	**4.2**	**8.3**	**13.1**	**10.8**	**5.8**	**42.3**	**120.5**	**22.5**	**185.3**	

Capital expenditure:

1. ERP Lifecycle costs are for updating of ERP modules. Lifecycle costs are based on the current product lifecycle roadmap until 2025. After 2025 a typical annual cost is used. Due to the phased upgrade in this option, lifecycle updates will not cease during the upgrade except for RY28 when most of the phase 2 transformation occurs. During phase 1, lifecycle updates will only be applied to the ERP modules that are not being upgraded in phase 1 (i.e. modules remaining on ECC6). During phase 2, lifecycle updates will mainly be applied to the modules on the S/4 ERP (modules migrated during phase 1).
2. Network segmentation costs are incurred before the cessation of SAP maintenance for the ECC6 ERP and are in place before Jemena transitioning to third-party provider support and use of virtual patching for security. The cost is based on a similar project undertaken by Jemena during the current regulatory period.
3. Third-party transition costs include capitalised costs for managing the transition to a third party, inclusive of the development of business cases, selection of preferred provider and integration management. [redacted]
4. Greenfield S/4 Migration Phase 1 cost based on analysis done for the Jemena ERP Whitepaper (whitepaper option 3).
5. Business Case Phase 2 cost based on analysis done for the Jemena ERP Whitepaper (whitepaper option 3).[40,41]
6. Greenfield S/4 Migration Phase 2 cost based on analysis done for the Jemena ERP Whitepaper (whitepaper option 3). This amount includes the cost of the AMI IS-U upgrade from ECC6 to S/4 which is attributable to JEN only.

Operating expenditure:

[redacted]

[redacted] Third-party maintenance is based on [redacted]

40 Jemena, *ERP Corporate Whitepaper*, 4 June 2019.

41 Provided to the AER as a part of JGN's 2020-25 Access Arrangement submission.

9. Patching represents costs to Jemena for managing the patching process with the third-party provider and security software vendor.

10. The Application Management Tool provides for centralised real-time monitoring and alerting across the entire SAP on-premise footprint. This cost is for the replacement of the equivalent functionality provided to Jemena by SAP.

11. Penalties, internal costs and miscellaneous is an allowance for additional costs that may be incurred due to the use of third-party maintenance. [redacted]

12. Virtual Patching costs cover the cost of receiving specific controls from the firewall vendor to address SAP ERP vulnerabilities that may not be addressed in standard controls. This could also include additional staff and contractors with specialist skills to manage the implementation of custom virtual patches. Third-party support vendors only provide information to guide businesses on how to secure the ERP from vulnerabilities using virtual patches. The company (i.e. Jemena) remains responsible for the development, installation and maintenance of virtual patches.

13. Network segmentation operating expenditure is for the payment of licence subscription fees for the segmentation and firewall systems and software

3.3.5 Risks/Benefits

A summary of the risks and benefits of this option is outlined in Table 3–7 below.

Table 3–7: Option 2A – Risks/Benefits

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
[redacted]					-0.0	-0.0	-0.0		-0.0	(1)
[redacted]					-0.1	-0.1	-0.3		-0.5	(2)
Total Risk/Net Benefit					**-0.1**	**-0.1**	**-0.3**		**-0.5**	

Note: positive values are benefits, negative values are risks

[redacted]

3.3.6 Summary

This option will allow Jemena to receive the benefits of a full ERP business transformation while deferring most costs beyond the 2021-26 regulatory period. This approach will provide more time to determine the exact scope of the transformation and to model the expected benefits before proceeding. However, additional costs to secure the existing ECC6 ERP after 2025 will be incurred that are avoidable if the transformation were undertaken in full during the 2021-26 regulatory period.

This option has a minimum NPV of -$155.7m. The top end of the NPV range has not been calculated due to uncertainty at this point regarding the potential benefits of a greenfield ERP upgrade with business transformation. Jemena expects the NPV will be higher than the NPV of Option 1A/B, but due to the inherent uncertainty cannot provide a definite value.

This option will require $21.9m of capital expenditure during the 2021-26 regulatory period. The total capital expenditure required for this option over 15 years is $128.8m.

The calculations for NPV are outlined in Table 3–8 below.

Table 3–8: Net present value calculations for Option 2A ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Total Costs	-5.5	-4.2	-8.3	-13.1	-10.8	-42.0	-121.8	-22.5	-186.3
Total Benefits							-0.4		-0.4
Net Value	-5.5	-4.2	-8.3	-13.1	-10.8	-42.0	-122.2	-22.5	-186.7
Present Value	-5.4	-4.0	-7.7	-11.9	-9.6	-38.6	-100.8	-16.3	
NPV[42]	**-155.7**								

This option will expose Jemena [redacted] This option may also expose Jemena briefly to additional risks that are not quantified, and this should be considered before selecting this option.

[42] NPV is calculated over the 15 year period 2019/20 to 2034/35, aligning with the next three regulatory periods for JGN. All other values are presented for JEN regulatory periods.

3.4 Option 2B: Phased ERP update and business transformation then Third-Party Maintenance

This option is a variant of Option 2A.

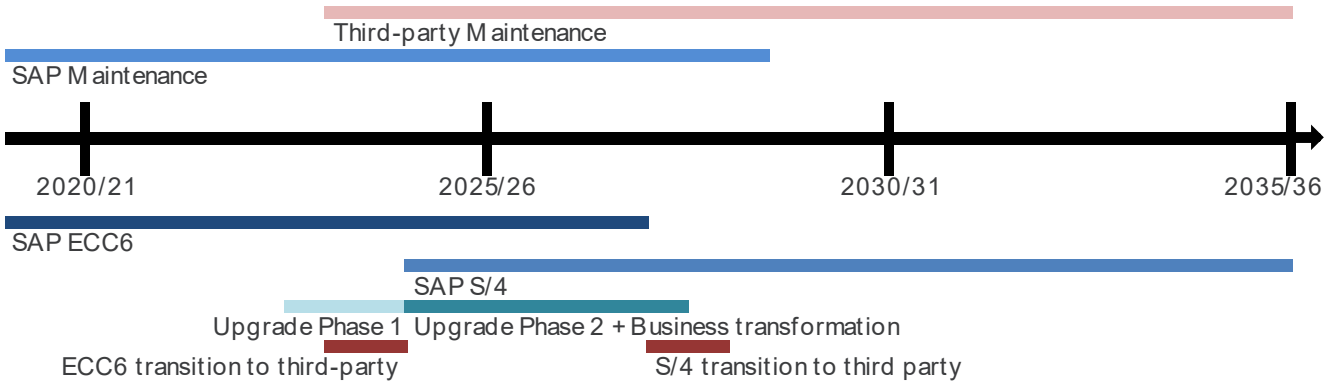
Under this option, after the second phase of the migration to S/4 and the full business transformation is complete, Jemena will retain a third-party support provider and cease SAP support. This differs from the 2A option where SAP support is kept, and third-party support ceases.

Using third-party support will provide a cost-saving and because the business transition is completed before using third-party support (for the S/4 ERP) the use of third-party support will not prevent Jemena undertaking a business transformation, although it may limit Jemena's ability to conduct further transformation projects.

The option does not address benefit limitations after RY29 as the S/4 ERP will not be easily modifiable while supported by a third-party provider. Limited changes will be possible using the third-party provider, but workarounds and use of alternative software applications may be required for some tasks.

Figure 3-6 below shows the timeline of support and significant investment milestones for Option 2B.

Figure 3-6: Timeline of support and significant investment milestones for Option 2B



3.4.1 2021-26 Regulatory Period

This option is unchanged from Option 2A during the 2021-26 regulatory period.

3.4.2 2026-31 Regulatory Period

[redacted]

Some costs will then be incurred in RY29 to enable the third-party provider to transition from supporting the ECC6 ERP to supporting the S/4 ERP.

3.4.3 2031-36 Regulatory Period

Jemena will continue to use third-party support during the 2031-36 regulatory period. The costings for this option do not include a return to vendor support before RY36. This may increase the costs of future ERP upgrades after RY36 compared to options that retain vendor support.

3.4.4 Costs

Cost estimates for this option are outlined in Table 3–9.

Table 3–9: Option 2B – Cost assumptions ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Capital expenditure										
ERP Lifecycle	1.1	1.1	0.6	1.7	0.2	4.7	5.7	7.0	17.4	(1)
Network segmentation				1.8		1.8			1.8	(2)
Third-party transition costs				0.8		0.8	1.0		1.8	(3)
S/4 Migration Phase 1		4.2	8.3			12.5			12.5	(4)
Business Case Phase 2			1.1	1.1		2.2			2.2	(5)
S/4 Migration Phase 2							94.2		94.2	(6)
Total Capital expenditure	*1.1*	*5.2*	*10.0*	*5.4*	*0.2*	*21.9*	*100.9*	*7.0*	*129.8*	
Operating expenditure										
SAP Maintenance	3.1	3.1	3.1	3.1	3.1	15.5	10.9		26.4	(7)
Third-Party Maintenance				2.0	2.0	4.0	10.0	10.0	24.1	(8)
Implementation of third-party patching				0.0	0.1	0.1	0.2	0.3	0.5	(9)
Application management tool				0.0	0.0	0.0	0.1	0.1	0.3	(10)
Assumed cost to the business, penalties, internal costs, intangible costs				0.0	0.0	0.0	0.1	0.1	0.2	(11)
Virtual Patching				0.3	0.3	0.6	1.3	1.7	3.6	(12)
Network segmentation - operating expenditure					0.1	0.1	0.5	0.5	1.1	(13)
Total Operating expenditure	*3.1*	*3.1*	*3.1*	*5.5*	*5.6*	*20.4*	*23.0*	*12.8*	*56.1*	
Total Cost	**4.2**	**8.3**	**13.1**	**10.8**	**5.8**	**42.3**	**123.9**	**19.8**	**186.0**	

Capital expenditure:

1. ERP Lifecycle costs are for the updating of ERP modules. Lifecycle costs are based on the current product lifecycle roadmap until 2025. After 2025 a typical annual cost is used. Due to the phased upgrade in this option lifecycle updates will not cease during the upgrade except for RY28 when most of the phase 2 transformation occurs. During phase 1, lifecycle updates will only be applied to the ERP modules that are not being upgraded in phase 1 (i.e. modules remaining on ECC6). During phase 2, lifecycle updates will mainly be applied to the modules on the S/4 ERP (modules migrated during phase 1).

2. Network segmentation costs are incurred before the cessation of SAP maintenance for the ECC6 ERP and are in place before Jemena transitioning to third-party provider support and use of virtual patching for security. The cost is based on a similar project undertaken by Jemena during the current regulatory period. The network segmentation is assumed to include segmentation of the S/4 ERP, so no additional costs are incurred for segmentation before the transition of the S/4 ERP to third party support in RY29.

3. Third-party transition costs include costs for managing the transition to a third party, inclusive of the development of business cases, selection of preferred provider and integration management. [redacted]

4. Greenfield S/4 Migration Phase 1 cost based on analysis done for the Jemena ERP Whitepaper (whitepaper option 3).[43,44]

5. Business Case Phase 2 cost based on analysis done for the Jemena ERP Whitepaper (whitepaper option 3).

6. Greenfield S/4 Migration Phase 2 cost based on analysis done for the Jemena ERP Whitepaper (whitepaper option 3). This amount includes the cost of the AMI IS-U upgrade from ECC6 to S/4 which is attributable to JEN only.

Operating expenditure:

7. [redacted] This ceases after the contractual minimum vendor support period following the completion of the ERP upgrade and business transformation.

8. [redacted] Incurred between RY25 and RY28 to provide support for the ECC6 ERP and from RY29 onwards to provide support for the S/4 ERP.

9. Patching represents costs to Jemena for managing the patching process with the third-party provider and security software vendor.

10. The Application Management Tool provides for centralised real-time monitoring and alerting across the entire SAP on-premise footprint. This cost is for the replacement of the equivalent functionality provided to Jemena by SAP.

[redacted] Penalties, internal costs and miscellaneous is an allowance for additional costs that may be incurred due to the use of third-party maintenance. [redacted] The cost is not incurred after the migration to S/4 is complete, and Jemena is using vendor support (due to the contractual minimum vendor support period). [redacted]

12. Virtual Patching costs cover the cost of receiving specific controls from the firewall vendor to address SAP ERP vulnerabilities that may not be addressed in standard controls. This could also include additional staff and contractors with specialist skills to manage the implementation of custom virtual patches. Third-party support vendors only provide information to guide businesses on how to secure the ERP from vulnerabilities using virtual patches. The company (i.e. Jemena) remains responsible for the development, installation and maintenance of virtual patches. This cost is not incurred during a brief period following the completion of the ERP migration and business transformation when vendor support is contractually required for the S/4 ERP.

13. Network segmentation operating expenditure is for the payment of licence subscription fees for the segmentation and firewall systems and software

43 Jemena, *ERP Corporate Whitepaper*, 4 June 2019.

44 Provided to the AER as a part of JGN's 2020-25 Access Arrangement submission.

3.4.5 Risks/Benefits

A summary of the risks and benefits of this option is outlined in Table 3–10 below.

Table 3–10: Option 2B – Risks/Benefits

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
[redacted]						-0.1	-0.3	-0.1	-0.5	(1)
[redacted]					-0.0	-0.0	-0.0	-0.6	-0.7	(2)
Total Net Risks/Benefit					**-0.0**	**-0.1**	**-0.3**	**-0.7**	**-1.2**	

Note: positive values are benefits, negative values are risks

[redacted]

3.4.6 Summary

This option will provide similar benefits as Option 2A while reducing long term operating expenditure using third-party support at the expense of an increase in risk. As this option includes a full ERP business transformation before transitioning to third-party support, the loss of potential productivity improvements will be less significant than comparable options (such as Option 1B).

This option has a minimum NPV of -$157.3m. The top end of the NPV range has not been calculated due to uncertainty at this point regarding the potential productivity benefits of a greenfield ERP upgrade with business transformation. Jemena expects the NPV will be higher than the NPV of Option 1A/B, but due to the inherent uncertainty cannot provide a definite value.

This option will require $21.9m of capital expenditure during the 2021-26 regulatory period. The total capital expenditure required for this option over 15 years is $129.8m.

The calculations for NPV are outlined in Table 3–11 below.

Table 3–11: Net present value calculations for Option 2B ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Total Costs	-4.2	-8.3	-13.1	-10.8	-5.8	-42.3	-123.9	-19.8	-186.0
Total Benefits					-0.0	-0.1	-0.3	-0.7	-1.2
Net Value	-4.2	-8.3	-13.1	-10.8	-5.8	-42.4	-124.2	-20.5	-187.1
Present Value	-4.0	-7.7	-11.9	-9.6	-5.1	-38.3	-101.9	-14.5	
NPV[45]	**-157.3**								

[45] NPV is calculated over the 15 year period 2019/20 to 2034/35, aligning with the next three regulatory periods for JGN. All other values are presented for JEN regulatory periods.

This option will expose Jemena to heightened security risks that are quantified in the NPV analysis. This option may also expose Jemena to additional risks that are not quantified, and this should be considered before selecting this option.

3.5 Option 3A: Full ERP update and business transformation

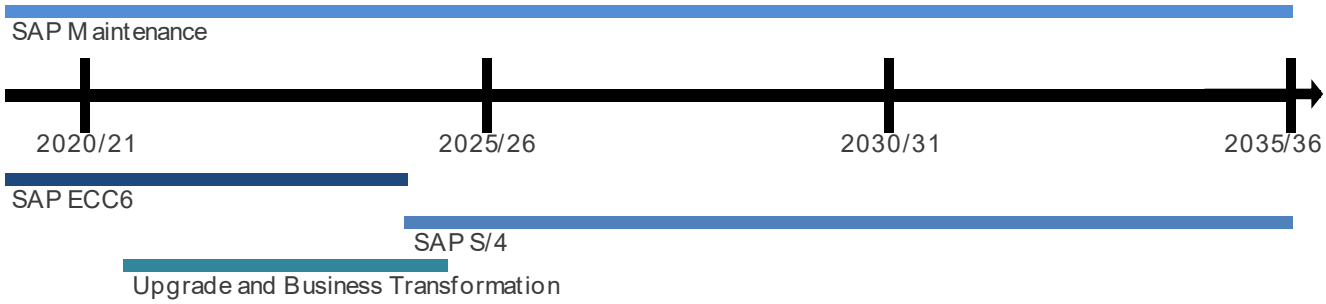
This option is to undertake a full ERP upgrade with business transformation during the 2021-26 regulatory period. This change will allow Jemena to take advantage of the benefits of the SAP S/4 ERP and the business transformation sooner than other options.

All functions will be migrated from the current SAP ECC6 ERP to S/4 before the withdrawal of vendor support by SAP in 2025. This change will [redacted] investments required to shift to a third-party support provider.

A faster business transformation will allow Jemena to achieve benefits sooner and deliver long-term benefits to customers. Although significant benefits are expected from the transformation program, a full detailed business case would be required to determine these. This level of detail is outside the scope of this initial business case. Therefore, benefits from business transformation have not been included in the forecast for this option.

Figure 3-7 below shows the timeline of support and significant investment milestones for Option 3A.

Figure 3-7: Timeline of support and significant investment milestones for Option 3A



3.5.1 2021-26 Regulatory Period

Jemena will undertake a greenfield ERP upgrade from SAP ECC6 to SAP S/4. This will include investment in new ERP modules and capabilities and a business transformation that will increase Jemena's productivity and deliver long-term benefits.

All functions will be migrated off the current ECC6 ERP before the end of RY25, and the old ERP decommissioned.

3.5.2 2026-31 and 2031-36 Regulatory Periods

Jemena will continue to pay lifecycle capital expenditure and annual maintenance operating expenditure in the following regulatory periods. Jemena does not expect another major ERP upgrade before 2036.

3.5.3 Costs

Cost estimates for this option are outlined in Table 3–12.

Table 3–12: Option 3A – Cost assumptions ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Capital expenditure										
S/4 Update and Business Transformation	1.1	15.4	62.3	48.5	0.5	127.8			127.8	(1)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
ERP Lifecycle	1.1	1.1	0.1		1.4	3.7	7.0	7.0	17.7	(2)
Total Capital expenditure	*2.2*	*16.4*	*62.3*	*48.5*	*1.9*	*131.5*	*7.0*	*7.0*	*145.5*	
Operating expenditure										
SAP Maintenance	3.1	3.1	3.1	3.1	3.1	15.5	15.5	15.5	46.5	(3)
Total Operating expenditure	*3.1*	*3.1*	*3.1*	*3.1*	*3.1*	*15.5*	*15.5*	*15.5*	*46.5*	
Total Cost	**5.3**	**19.5**	**65.4**	**51.6**	**5.0**	**147.0**	**22.5**	**22.5**	**192.0**	

Capital expenditure:

1. ECC6 to S/4 Greenfield upgrade and business transformation costs based on the Jemena ERP Whitepaper[46,47] option 2 costs. The upgrade and all associated costs are incurred before the withdrawal of vendor support for ECC6 at the end of 2025. This amount includes the cost of the AMI IS-U upgrade from ECC6 to S/4 which is attributable to JEN only

2. ERP Lifecycle costs are for the updating of ERP modules. Lifecycle costs are based on the current product lifecycle roadmap until the ERP upgrade project begins. After the upgrade is complete, a typical annual cost is used. Minimal lifecycle costs are incurred during the upgrade project

Operating expenditure:

3. [redacted] This assumes no change in the value of the maintenance base

3.5.4 Risks/Benefits

There are no quantified risks or benefits for this option.

The business transformation is expected to deliver significant productivity benefits to Jemena. However, the calculation of these benefits requires a detailed business case to be developed. At this point, Jemena does not have visibility of the level of benefits that would be achieved. Therefore, no productivity benefits have been forecast.

3.5.5 Summary

This option will allow Jemena to receive the benefits of a full ERP business transformation as soon as possible by completing the upgrade in the 2021-26 regulatory period. This will also ensure the ERP is fully upgraded before the end of vendor support for ECC6. However, a significant capital outlay will be required during the next regulatory period, and the vast scope of the project will increase deliverability risks and may impact the timelines for other IT projects.

This option has a minimum NPV of -$168.8m. The top end of the NPV range has not been calculated due to uncertainty at this point regarding the potential benefits of a greenfield ERP upgrade with business transformation. Jemena expects the NPV will be higher than the NPV of Option 1A/B, but due to the inherent uncertainty cannot provide a definite value.

46 Jemena, *ERP Corporate Whitepaper*, 4 June 2019.

47 Provided to the AER as a part of JGN's 2020-25 Access Arrangement submission.

This option will require $147.0m of capital expenditure during the 2021-26 regulatory period. The total capital expenditure required for this option over 15 years is $145.5m.

The calculations for NPV are outlined in Table 3–13 below.

Table 3–13: Net present value calculations for option 3A ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Total Costs	-5.5	-5.3	-19.5	-65.4	-51.6	-147.5	-23.1	-22.5	-193.0
Total Benefits									
Net Value	-5.5	-5.3	-19.5	-65.4	-51.6	-147.5	-23.1	-22.5	-193.0
Present Value	-5.4	-5.1	-18.1	-59.3	-45.7	-133.5	-19.0	-16.3	
NPV[48]	**-168.8**								

[48] NPV is calculated over the 15 year period 2019/20 to 2034/35, aligning with the next three regulatory periods for JGN. All other values are presented for JEN regulatory periods.

3.6 Option 3B: Full ERP update and business transformation then Third-Part Maintenance

This option is a variant of Option 3A.

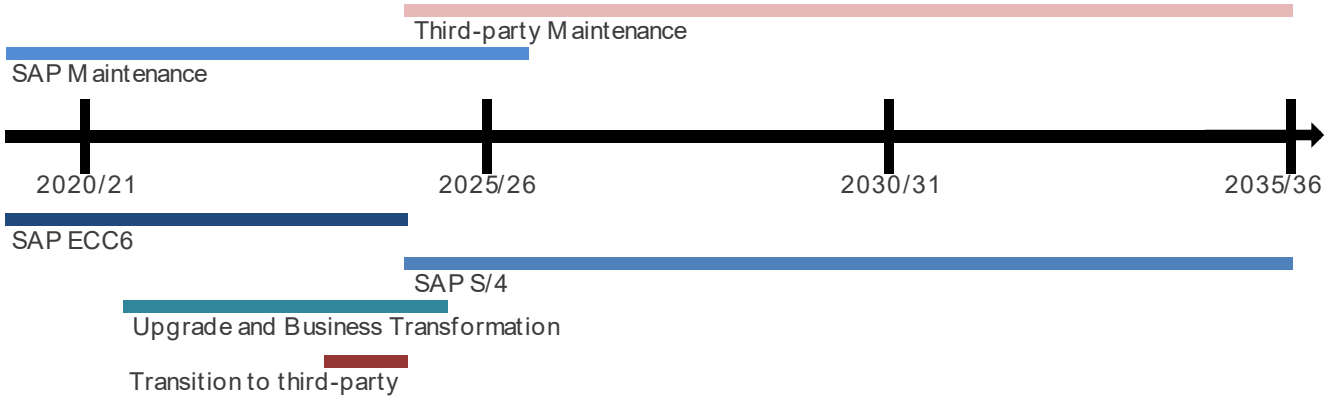
Under this option, after the migration to the SAP S/4 ERP and the full business transformation is complete, Jemena will transition to a third-party support provider and cease SAP support. This will lower Jemena's ERP maintenance costs in future regulatory periods.

During the migration and transformation period, SAP support will be required for the S/4 ERP [redacted]. Some costs will then be incurred in RY25 to enable the third-party provider to support the S/4 ERP.

The option will not address productivity limitations after RY25 as the S/4 ERP will not be easily modifiable while supported by a third-party provider. Limited changes will be possible using the third-party provider, but workarounds and use of alternative software applications may be required for some tasks.

Figure 3-8 below shows the timeline of support and significant investment milestones for Option 3B.

Figure 3-8: Timeline of support and significant investment milestones for Option 3B



3.6.1 2021-26 Regulatory Period

Jemena will undertake a greenfield ERP upgrade from SAP ECC6 to SAP S/4 following the same timeline as Option 3A. This will include investment in new ERP modules and capabilities and a business transformation that will increase Jemena's productivity and deliver long term benefits.

All functions will be migrated off the current ECC6 ERP before the end of RY25, and the old ERP decommissioned.

During RY25, Jemena will make an investment to enable the transition to third-party support for the new S/4 ERP.

3.6.2 2026-31 and 2031-36 Regulatory Periods

After the upgrade and the contractual minimum vendor maintenance period, Jemena will exit from vendor support. An overlap period where both vendor and third-party support are contracted will be used to ensure a smooth transition.

Using third-party support will provide long-term support cost savings, but some of these savings will be offset by other costs and an increase in risk. Because the business transition is completed before using third-party support, the use of third-party support will not prevent Jemena from undertaking a business transformation, although it may limit Jemena's ability to conduct further transformation projects.

Jemena will continue to pay lifecycle capital expenditure and annual third-party maintenance operating expenditure and other costs related to using third-party support in the following regulatory periods. Jemena does not expect another major ERP upgrade before 2036.

3.6.3 Costs

Cost estimates for this option are outlined in Table 3–14.

Table 3–14: Option 3B – Cost assumptions ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
Capital expenditure										
S/4 Migration and Business Transformation	1.1	15.4	62.3	48.5	0.5	127.8			127.8	(1)
ERP Lifecycle	1.1	1.1	0.1		1.4	3.7	7.0	7.0	17.7	(2)
Network segmentation				1.8		1.8			1.8	(3)
Third-party transition costs				1.0		1.0			1.0	(4)
Total Capital expenditure	*2.2*	*16.4*	*62.3*	*51.3*	*1.9*	*134.3*	*7.0*	*7.0*	*148.3*	
Operating expenditure										
SAP Maintenance	3.1	3.1	3.1	3.1	3.1	15.5	1.6		17.1	(5)
Third-Party Maintenance					2.0	2.0	10.0	10.0	22.1	(6)
Implementation of third-party patching					0.0	0.0	0.3	0.3	0.5	(7)
Application management tool					0.0	0.0	0.1	0.1	0.3	(8)
Assumed cost to the business, penalties, internal costs, intangible costs					0.0	0.0	0.1	0.1	0.3	(9)
Virtual Patching					0.3	0.3	1.7	2.0	4.0	(10)
Network segmentation - operating expenditure					0.1	0.1	0.5	0.5	1.1	(11)
Total Operating expenditure	*3.1*	*3.1*	*3.1*	*3.1*	*5.6*	*18.0*	*14.3*	*13.1*	*45.3*	
Total Cost	**5.3**	**19.5**	**65.4**	**54.4**	**7.5**	**152.2**	**21.3**	**20.1**	**193.6**	

Capital expenditure:

1. ECC6 to S/4 Greenfield upgrade and business transformation costs based on the Jemena ERP Whitepaper option 2 costs. The upgrade and all associated costs are incurred before the withdrawal of vendor support for ECC6 at the end of 2025. This amount includes the cost of the AMI IS-U upgrade from ECC6 to S/4 which is attributable to JEN only.

2. ERP Lifecycle costs are for the updating of ERP modules. Lifecycle costs are based on the current product lifecycle roadmap until the ERP upgrade project begins. After the upgrade is complete, a typical annual cost is used. Minimal lifecycle costs are incurred during the upgrade project

3. Network segmentation costs are incurred before the transition to third-party provider support and use of virtual patching for security. The cost is based on a similar project undertaken by Jemena during the current regulatory period

4. Third-party transition costs include capitalised costs for managing the transition to a third party, inclusive of the development of business cases, selection of preferred provider and integration management

Operating expenditure:

5. [redacted] This ceases after the contractual minimum vendor support period following the completion of the ERP upgrade and business transformation (December 2026). After this date, only third-party maintenance costs are incurred.

6. Third-party maintenance is based on [redacted] Overlaps with vendor support to ensure a smooth transition

7. Patching represents costs to Jemena for managing the patching process with the third-party provider and security software vendor

8. The Application Management Tool provides for centralised real-time monitoring and alerting across the entire SAP on-premise footprint. This cost is for the replacement of the equivalent functionality provided to Jemena by SAP.

9. Penalties, internal costs and miscellaneous is an allowance for additional costs that may be incurred due to the use of third-party maintenance

10. Virtual Patching costs cover the cost of receiving specific controls from the firewall vendor to address SAP ERP vulnerabilities that may not be addressed in standard controls. This could also include additional staff and contractors with specialist skills to manage the implementation of custom virtual patches. Third-party support vendors only provide information to guide businesses on how to secure the ERP from vulnerabilities using virtual patches. The company (i.e. Jemena) remains responsible for the development, installation and maintenance of virtual patches

11. Network segmentation operating expenditure is for the payment of licence subscription fees for the segmentation and firewall systems and software

3.6.4 Risks/Benefits

A summary of the risks and benefits of this option is outlined in Table 3–15 below.

Table 3–15: Option 3B – Risks/Benefits

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total	Note
[redacted]							-0.1	-0.2	-0.3	(1)
[redacted]							-0.5	-0.8	-1.3	(2)
Total Net Risks/Benefit							**-0.6**	**-0.9**	**-1.5**	

Note: positive values are benefits, negative values are risks

[redacted]

[redacted]

3.6.5 Summary

This option will allow Jemena to receive the benefits of a full ERP business transformation as soon as possible by completing the upgrade in the 2021-26 regulatory period. Jemena will then minimise ongoing operating expenditure by using third party support, at the expense of increased exposure to risk.

This option has a minimum NPV of -$172.1m. The top end of the NPV range has not been calculated due to uncertainty at this point regarding the potential productivity benefits of a greenfield ERP upgrade with business transformation. Jemena expects the NPV will be higher than the NPV of Option 1A/B, but due to the inherent uncertainty cannot provide a definite value.

This option will require $134.3m of capital expenditure during the 2021-26 regulatory period. The total capital expenditure required for this option over 15 years is $148.3m.

The calculations for NPV are outlined in Table 3–16 below.

Table 3–16: Net present value calculations for option 3B ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Total Costs	-5.3	-19.5	-65.4	-54.4	-7.5	-152.2	-21.3	-20.1	-193.6
Total Benefits							-0.6	-0.9	-1.5
Net Value	-5.3	-19.5	-65.4	-54.4	-7.5	-152.2	-21.9	-21.0	-195.1
Present Value	-5.1	-18.1	-59.3	-48.1	-6.5	-137.1	-17.6	-14.9	
NPV[49]	**-172.1**								

[49] NPV is calculated over the 15 year period 2019/20 to 2034/35, aligning with the next three regulatory periods for JGN. All other values are presented for JEN regulatory periods.

4. Comparison of Options

A summary of each of the options is outlined in the tables below.

4.1 Capital expenditure

The capital expenditure for each of the options is outlined in Table 4–1 below.

Table 4–1: Capital expenditure comparison of each option ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Option 1A	1.1	1.1	5.1	17.5	1.4	26.2	7.0	7.0	40.2
Option 1B	1.1	1.1	5.1	20.3	1.4	29.0	7.0	7.0	43.0
Option 2A	1.1	5.2	10.0	5.4	0.2	21.9	99.9	7.0	128.8
Option 2B	1.1	5.2	10.0	5.4	0.2	21.9	100.9	7.0	129.8
Option 3A	2.2	16.4	62.3	48.5	1.9	131.5	7.0	7.0	145.5
Option 3B	2.2	16.4	62.3	51.3	1.9	134.3	7.0	7.0	148.3

As can be observed in Table 4–1, a technical upgrade can reduce immediate and long-term capital costs (Option 1A/B). The other options that include a greenfield implementation (Option 2A/B and 3A/B) require significantly more capital expenditure over the fifteen years lifespan. A phased upgrade provides capital cost savings compared to an immediate greenfield upgrade.

The best way to mitigate against high capital outlays is to avoid requiring a greenfield implementation. Greenfield implementations arise because of large upgrades to catch-up later; an activity that can be avoided through regular maintenance as is the case with option 1A/B.

Extending the use of third-party support (all B options) requires higher total capital expenditure, predominantly due to the need for enhanced security requirements that is otherwise provided for within the vendor-supported maintenance agreement.

4.2 Operating expenditure

The operating expenditure for each of the options is outlined in Table 4–2 below.

Table 4–2: Operating expenditure comparison of each option ($2018, $M)

	2021/22	2022/23	2023/24	2024/25	2025/26	2021-26	2026-31	2031-36	Total
Option 1A	3.1	3.1	3.1	3.1	3.1	15.5	15.5	15.5	46.5
Option 1B	3.1	3.1	3.1	3.1	5.6	18.0	14.3	13.1	45.3
Option 2A	3.1	3.1	3.1	5.5	5.6	20.4	20.6	15.5	56.4
Option 2B	3.1	3.1	3.1	5.5	5.6	20.4	23.0	12.8	56.1
Option 3A	3.1	3.1	3.1	3.1	3.1	15.5	15.5	15.5	46.5
Option 3B	3.1	3.1	3.1	3.1	5.6	18.0	14.3	13.1	45.3

As can be observed in Table 4–2, comparing the A and B options shows the B option results in lower operating expenditure, but most of the benefit of using third party support is offset by an additional capital expenditure that will be incurred and risk.

4.3 Risks

There are qualitative factors that require consideration in the selection of the preferred option. We consider these and assess them against Jemena's risk management framework. The out-workings of this assessment are summarised in Table 4–3 below.

Table 4–3: Qualitative Risk Factors

ID	Risk	1A	1B	2A	2B	3A	3B
1	Implementation Risk						
2	System Failure						
3	Innovation Risk						
4	[redacted]						
5	Resource Availability / Deliverability						
-	**Overall risk**						

	Low
	Moderate
	Significant
	High
	Extreme

In Table 4–4, we describe each of the risk types and how the risk ratings have been applied to the options.

Table 4–4: Description of risk type

Risk type	The risk involved with implementing an entirely new system
Implementation Risk	**The risk involved with undertaking complex projects within the stated timeframe and budget** Higher risk is associated with more substantial capital investments concentrated in shorter timeframes and use of third-party support which brings a degree of uncertainty. Option 3A/B includes a substantial greenfield ERP upgrade incurred within a single regulatory period. Option 2A/B includes a greenfield upgrade but incurred over two periods. Option 1B risk is higher than the preferred option due to the use of third-party support and transition to third party investments
System Failure	**System failure due to lack of support of future system** Significant where third party support results in a higher risk of failure (Options 1B, 2B and 3B)
Innovation Risk	**Loss of flexibility to innovate & upgrade due to system limitations** Significant where third party support limits flexibility to modify the ERP (Options 1B, 2B and 3B), moderate where innovations not undertaken during the upgrade (Option 1A)

Risk type	The risk involved with implementing an entirely new system
[redacted]	[redacted]
Resource Availability / Deliverability	**Potential lack of affordable resources available for the continued support of selector vendor system in the future** High for substantial greenfield upgrade during a single period (Option 3A/B), moderate for all options where an upgrade is phased over multiple periods (Option 2A/B) or technical upgrade with additional investment to transition to third-party support (Option 1B). Low for technical upgrade due to smallest upgrade scope (Option 1A)
Loss of productivity	**Loss of productivity can occur due to issues with outdated systems** Moderate where third party support limits flexibility to modify the ERP (Options 1B, 2B and 3B)

5. Recommendation

The NPV and overall risk rating for each of the options are outlined in Table 5–1 below. The NPV is based on costs for running the ERP system, and this includes a mix of capital expenditure and operating expenditure.

Table 5–1: Net present value and risk rating comparison of each option ($2018, $M)

Option	NPV[1]	Risk rating
Option 1A	-73.7	Low
Option 1B	-76.9	Moderate
Option 2A	-155.7	Low
Option 2B	-157.3	Moderate
Option 3A	-168.8	Moderate
Option 3B	-172.1	Significant

Note (1) Based on 15 years 2020/21 to 2034/35

Given the mix of capital expenditure and operating expenditure makes comparisons difficult, an assessment of each option on an NPV basis over a more extended period—that is, a typical life-cycle of a significant IT system—is the best means to assess whether the proposal is in the long term interest of customers.[50]

As summarised in Table 5–1; Option 1A and 2A present as the lowest-risk options, Options 1A and 1B present the lowest risk rating.

Jemena recommends proceeding with Option 1A – the technical update of SAP ERP. This option meets Jemena's requirements to ensure critical systems are maintained on supported versions at the least risk and has the highest NPV (lowest net present cost NPC) of all options.

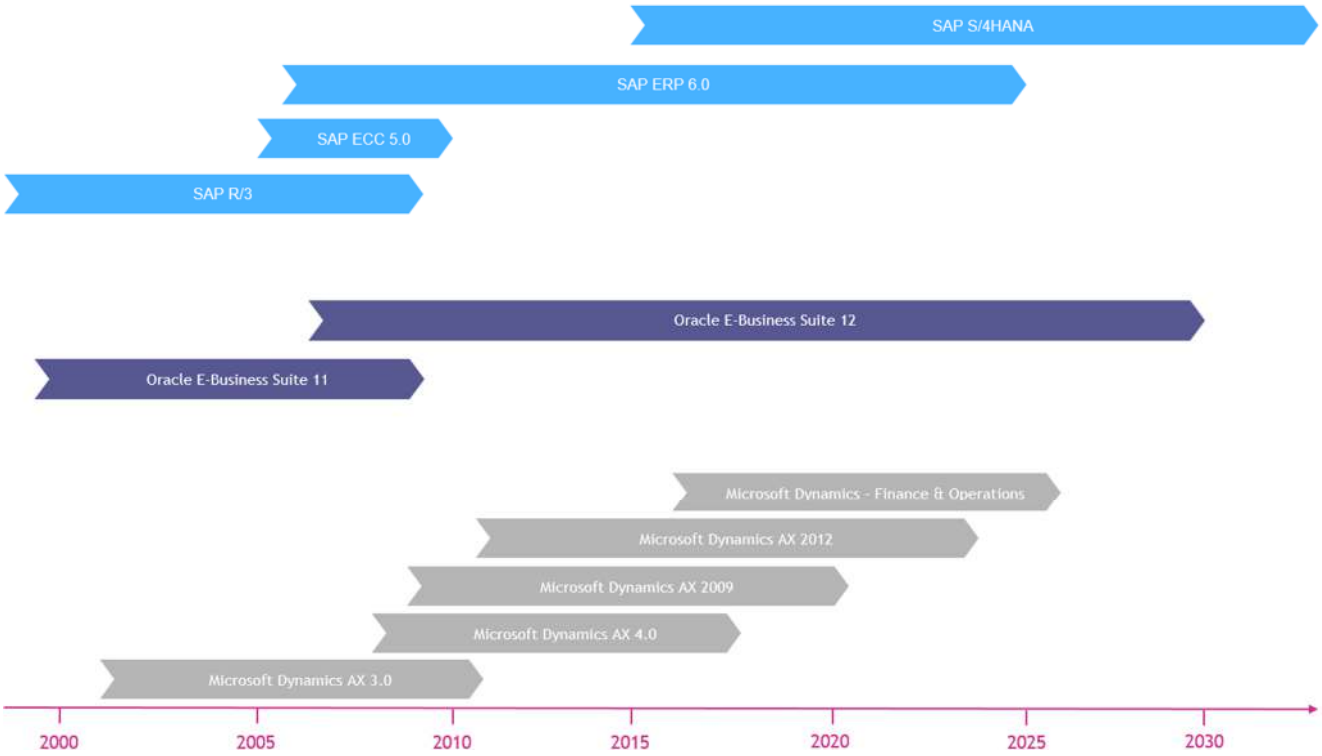
50 National Electricity Law (**NEL**), cl. 7 and National Gas Law (**NGL**), cl 23.

Appendix A
Large system life cycles

A1. Large system life cycles

SAP ERP 6.0 will have been supported by SAP for 19 years when maintenance ends in 2025. The support period for SAP ERP 6.0 is higher than that of comparable ERP solutions offered by a range of similar vendors. (See Figure A1-1below).

Figure A1-1: ERP System Lifecycles



SAP has already extended support for ERP 6.0 from December 2020 to December 2025 expressing a committed to this timeline. The likelihood of SAP extending support for ERP 6.0 is very low as it would be the second extension to the maintenance period and their strategic focus being on S/4.

Given these facts, it would be imprudent to (i) consider that a further extension is likely, and (ii) plan as though an extension would occur.

Appendix B
Risk Modelling Assumptions

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

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