



Jemena Electricity Networks (Vic) Ltd

2021-26 Electricity Distribution Price Review

Technology Plan



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Attachment A List of recurrent – base projects

Glossary

Current regulatory period	The regulatory control period covering 1 Jan 2016 to 31 Dec 2020
Jemena	The parent company of Jemena Electricity Networks (Vic) Ltd.
Next regulatory period	The regulatory control period covering 1 Jul 2021 to 30 June 2026
Office 365	Microsoft Office suite of desktop systems

Abbreviations

ACCC	Australian Competition and Consumer Commission
ACS	Alternative Control Services
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AESCSF	Australian Energy Sector Cyber Security Framework
AI	Artificial Intelligence
AMI	Advanced Metering Infrastructure
ASD	Australian Signals Directorate
ASX	Australian Stock Exchange
BI	Business Intelligence
C/4HANA	Customer Experience Platform
CAM	Cost Allocation Methodology
CATS	Customer Administration Transfer Systems
CRM	Customer Relationship Management
DER	Distributed Energy Resources
DMS	Distribution Management System
DW	Data Warehouse
ECC	ERP Central Component (the SAP version in use at Jemena)
EDPR	Electricity Distribution Price Reset
ERP	Enterprise Resource Planning
GIS	Geographic Information Systems
IaaS	Infrastructure as a Service
ICT	Information and communications technology
IoT	Internet of Things
JEN	Jemena Electricity Networks (Vic) Ltd
JGN	Jemena Gas Networks (NSW) Ltd
MDMS	Meter Data Management System
ML	Machine Learning
MSATS	Market Settlement and Transfer System
MSI	Market System Integrator Application
NECF	National Energy Customer Framework
NIST	National Institute of Standards and Technology
NMS	Network Management System
OMS	Outage Management System

PaaS	Platform as a Service
PMP	Project Management Plan
PSC	Project Steering Committee
RTS	Real-time Systems
SaaS	Software as a Service
SCADA	Supervisory Control and Data Acquisition
SCP	SAP Cloud Platform
SCS	Standard Control Services
TCO	Total Cost of Ownership

Overview

This information technology plan (**Technology Plan** or **Plan**) is one of a suite of documents submitted as part of Jemena Electricity Networks (Vic) Ltd (**JEN**) 2021-26 Electricity Distribution Price Reset (**EDPR**) proposal (**Proposal**).

This Plan describes our overarching strategy and decisions concerning non-network information and communications technology (**ICT**), and how these result in efficient ICT capital expenditure that supports the long-term interests and expectations of customers for Standard Control Services (**SCS**) under our regulated electricity distribution services. The plan enables our systems to remain sustainable and secure and maintain operationally. It also reflects opportunities to introduce new and innovative technology options to optimise how services are delivered to customers, where prudent, efficient and sought by our customers.

JEN views its investment in ICT as an investment in business processes. The objectives of our program of work are to:

- **Maintain the level of service** – customers have told us they expect this as a minimum
- **Be customer focussed** – by putting the customer at the centre of what we do
- **Serve the market** – by providing timely and accurate billing information
- **Support Distributed Energy Resources** – electricity distribution is changing and we are changing with it
- **Secure the business** – defending against the growing threats from cyberattacks to services and breaches of confidential data
- **Comply with obligations** – responding to the continually evolving regulatory environment that JEN operates within
- **Work safely** – access to accurate information is key to safer decision making and work practices
- **Contain costs** – in a business environment continually growing in complexity, systems help us minimise the impact on bills
- **Plan for the future** – the sustainability of the business depends on the long-term sustainability of its systems.

We are in a strong position to achieve these objectives. Over the previous and current regulatory periods, we have established a core platform of applications and highly virtualised infrastructure, providing a flexible and cost-effective level of technical capability. We will continue to maintain and leverage our core solutions where prudent and cost-effective to do so, well into the next regulatory period.

We listen to our customers and respond to their concerns. This Plan has been informed by:

Effective customer feedback - Over the last 18 months, our extensive stakeholder engagement sessions have provided considered and insightful feedback which has been instrumental in developing this plan. Our customers want JEN to improve:

- the information available to customers and the ease of access to smart meter data, through improving Jemena’s Portal and adding additional services such as Apps for Smartphones
- channels of customer service by increasing their services to include mobile Apps
- outage notification handling processes using SMS, with more detail specific to the outage event.

Changing customer expectations - Customers are increasingly informed and empowered in the supply chain. Growing rates and take-up of digital technology indicate customers becoming more connected and accustomed to receiving personalised experiences on-demand that align with their preferences.

Technology and data developments, opportunities - We are moving rapidly to a more digitally-enabled distribution network. Large volumes of data generated and accessible from the interconnected world of things - smart meters, smart grids and demand response solutions – shape how future distribution network assets are managed. Customers should benefit from these developments.

Our shared services delivery model is efficient. Jemena (JEN's parent company) employs a shared services delivery model across its portfolio of assets, with a high proportion of technology common to its regulated electricity and gas distribution networks. This model allows Jemena to deliver greater efficiencies for both regulated businesses, with relatively fixed costs of ICT capital expenditure shared across a larger customer base than if the expenses were incurred on a standalone basis. Where sharing of systems is not appropriate or efficient, Jemena allocates costs to the relevant subsidiary business, including JEN.

Our delivery model works. We routinely compare our delivery performance against service providers in the market using the threshold criteria of best practice, prudence, efficiency and cost-effectiveness over the long term. This approach is used to consider alternative sourcing strategies, especially for potential short-term cost-saving opportunities offered via outsourced service providers. Experience to date has shown that leveraging our depth of technical skills and internal capabilities has provided a stable and predictable forecast and knowledge base when defining our technology plans and requirements.

We are reducing costs. Affordability and cost pressures across the energy industry drive us to find new ways of using technology to innovate and deliver more efficient outcomes for customers, and to reduce ICT costs where possible. We are responding to customers' concerns about energy affordability, with our ICT capital expenditure for Standard Control Services over the next regulatory period is \$95.7M¹. This amount represents an 18% reduction in expenditure compared to the actuals/forecast for this current regulatory period, despite upward pressure on expenditure being driven by factors such as increasing cybersecurity risks and growth in customer numbers plus a significant proposed Future Network Initiative.

Our vision is robust and appropriate. We take a long-term view of ICT architecture, cognisant of our prior investment, to ensure we gain maximum value from the ICT assets for our regulated businesses.

In conclusion, our objectives for the next regulatory period are to continue building on our long term strategic capability ready to adapt as future technology evolves, to maintain the quality of our services to our customers, and to achieve the vision set out by those customers who assisted us in preparing this Technology Plan.

¹ Real mid-year 2021 dollars.

1. Introduction

1.1 Purpose and structure of this document

This Technology Plan explains and justifies our proposed non-network information and communications² (ICT) capital expenditure for the next regulatory period to ensure our distribution system, and the distribution services we provide, remain safe, reliable and secure. It describes how we respond to our customers' needs of ICT, with distribution services that remain affordable.

This document covers capital expenditure within the Australian Energy Regulator (AER) definition of non-network ICT & communications expenditure³ (referred to throughout this document as ICT capital expenditure for standard control services).

Unless otherwise stated, all financial numbers in this document are presented in real mid-year 2021 dollars.

This document describes:

- how this Plan relates to other ICT supporting documents, the role of ICT in our business, and how we respond to our customers' needs and expectations
- the ICT environment and the key industry trends that are impacting on our business
- how we manage and deliver ICT services on an ongoing basis
- our extended Technology roadmap from 2011 to 2026, together with our applications and infrastructure
- an overview of our ICT capital expenditure in the 1 Jan 2016 to 31 Dec 2020 period (**current regulatory period**), including against the respective ICT capital expenditure allowances consistent with the AER's Distribution Determination for the period
- the planned objectives and strategic themes of our ICT capital expenditure forecast
- principles, processes, methods and tools we used to forecast our ICT capital expenditure for the 1 July 2020 to 30 Jun 2026 period (**next regulatory period**)
- proposed ICT capital expenditure for the next regulatory period
- the governance framework that supports our ICT capital expenditure and how we will source and deliver our ICT capital expenditure program in the next regulatory period.

1.2 Relationship to other ICT supporting documents

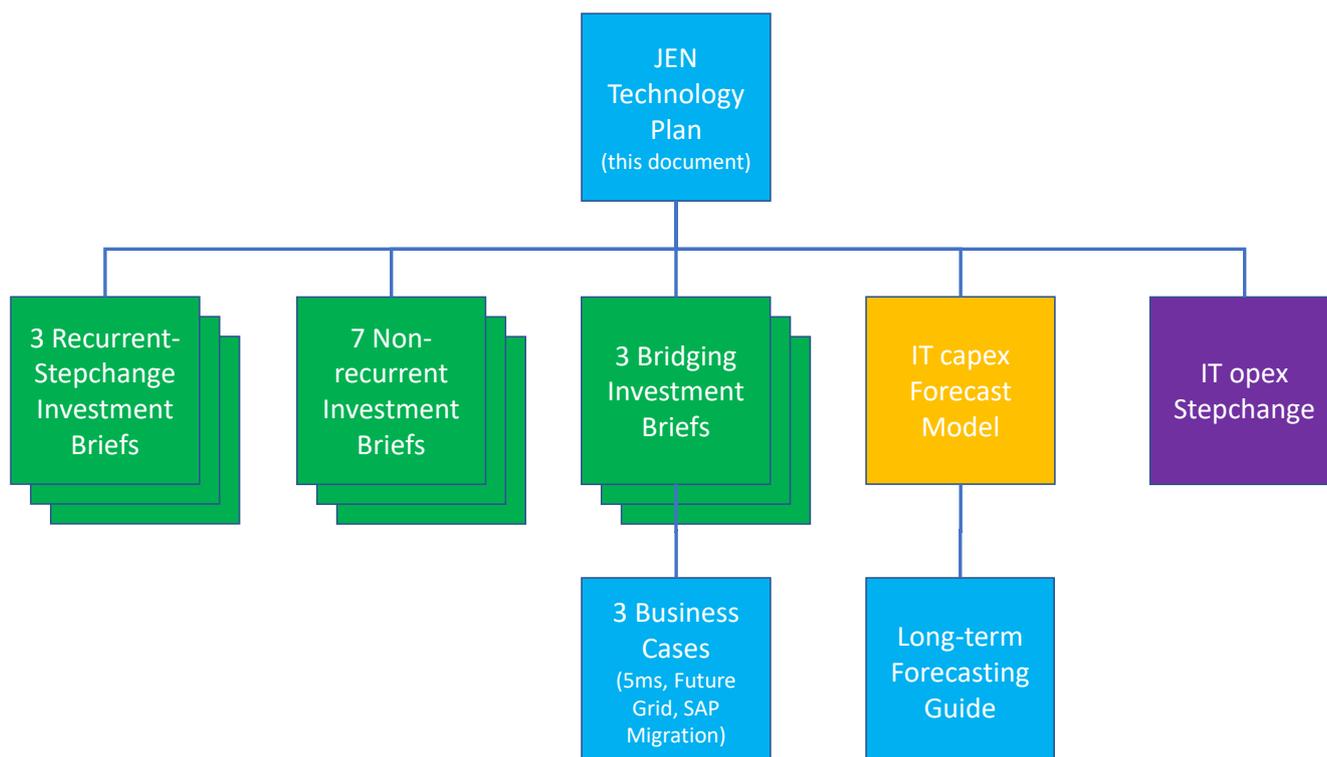
This Technology Plan forms part of JEN's regulatory Proposal, providing information about our ICT capital expenditure forecast for the next regulatory period. The plan represents the collective output of business and technology strategies, roadmaps, policies and standards that support the efficient running of the network business and technologies used to provide services.

Figure 1–1 shows relationships between this Plan and other ICT documents and spreadsheets, which form part of JEN's regulatory proposal.

² The AER's Guidance Note, *Non-network ICT capex assessment approach*, November 2019 states that information and communications technology (ICT) refers to all devices, applications and systems that combined allow for interaction with the digital world.

³ As set out in the Regulatory Information Notice issued to JEN for the next regulatory, non-network IT & communications expenditure is all non-network expenditure directly attributable to IT and communications assets including replacement, installation, operation, maintenance, licensing, and leasing costs but excluding all costs associated with SCADA and network control expenditure that exist beyond gateway devices (routers, bridges etc.) at corporate offices.

Figure 1–1: JEN regulatory proposal artefacts



1.3 Drivers to ICT planning

A significant part of our ICT capital expenditure is directed at maintaining the performance of our ICT assets, to ensure they continue to allow us to deliver the services our customers expect. We perform regular operational risk assessments and life cycle and capacity plans. These identify when a system's risk profile may change and enable optimised scope and timing of remediation solutions. Regular reviews evaluate the performance of software and hardware, comparing the current level of performance with the expected service levels. These reviews consider the frequency of incidents or interruptions, end-user or customer response times when using a service, and other critical performance criteria.

We consider the rate of expected growth in usage of a service, such as the numbers of new customer connection points and users of a system. We also review new or changed regulatory obligations. When performance evidence indicates the degradation of service, then changes are planned and implemented to remediate the problem.

Numerous internal and external inputs influence ICT planning. These inputs are captured then assessed for any capability gaps for any new or changed capability, or anticipated service level requirement.

- External influences include the views of customers and customer representatives, small business groups, large customers and retailers. Changes in our regulatory obligations include amendments made to the National Electricity Law (**NEL**), National Electricity Rules (**NER**), AER and Victorian Essential Services Commission regulatory instruments, Australian Energy Market Operator (**AEMO**) procedures and guidelines, and federal and state government laws and regulations. Cybersecurity threats are also another form of external influencer that requires JEN to respond by strengthening defences and improving the ability to detect and respond quickly in the event of an incident.
- Internal influences reflect that ICT is classified primarily as an enabler of the business. Hence, investment requirements reflect business requirements identified by teams with responsibility for planning and delivering regulated services to customers. Jemena's ICT group identifies changes in technology infrastructure and operational requirements necessary to ensure that technology ecosystems always remain fit for purpose.

Regardless of the initiation source of a proposed technology change, we use a robust and standardised governance process, that includes establishing business requirements, assessing the proposed timing and prioritisation, planning and financial approvals — crucially, ensuring all investments made support the long-term interests of our customers.

1.4 Relationships with other strategies and plans

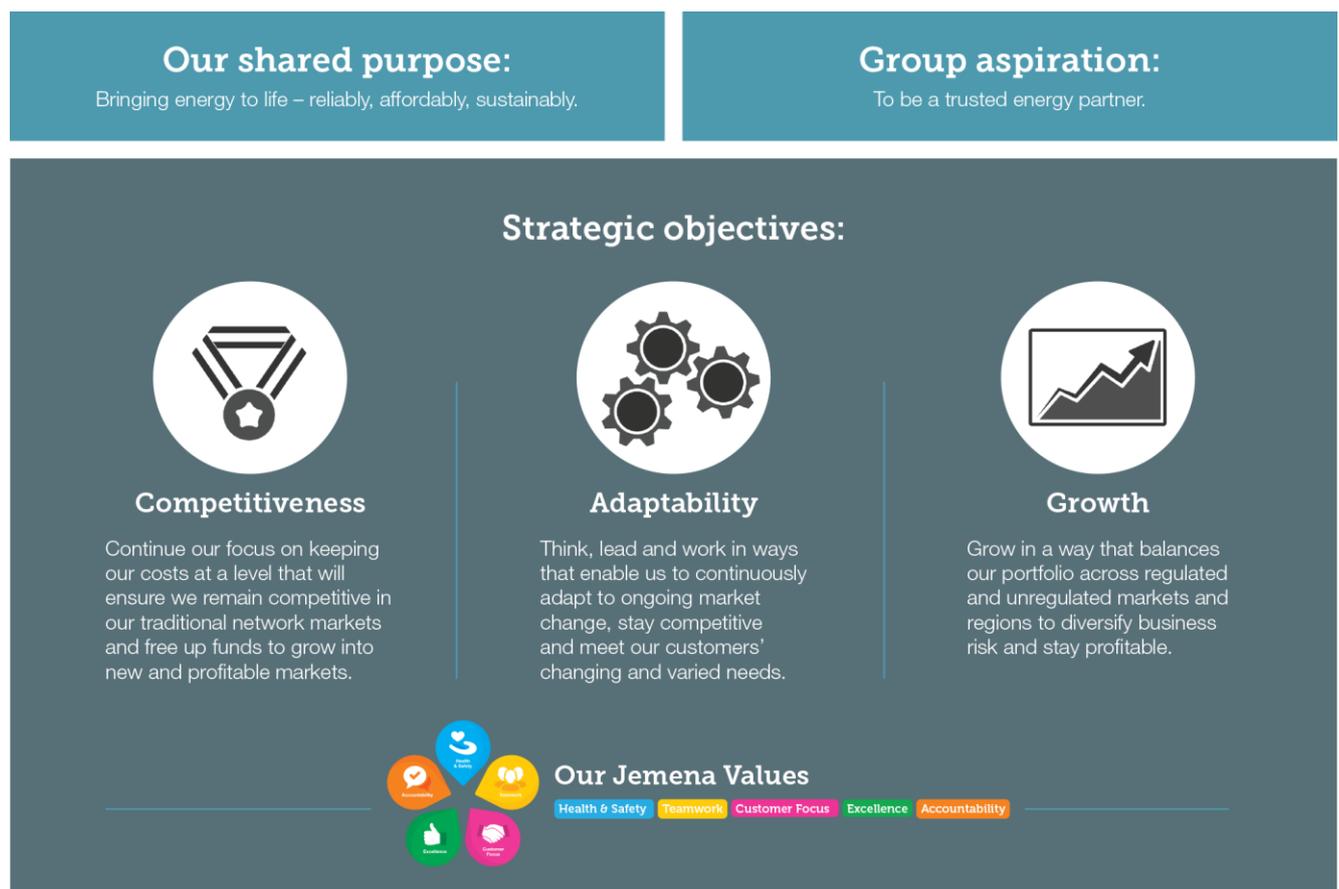
In today's digital world, customers demand more than ever before from all their service providers. They expect a more comprehensive range of services, affordable prices, greater transparency to understand better their energy usage, and engagement in a way and time that suits them. This may not necessarily extend to a full 24*7 service, but customers' expectations do go beyond normal business hours.

As ICT plays a pivotal role in ensuring we meet our customers' needs, this Technology Plan has been informed by and supports several other critical components of Jemena's corporate strategy and asset management system.

1.4.1 Jemena business plan

The Jemena Business Plan sets out the highest order objectives, goals and strategy which inform our planning. Figure 1–2 presents an overview of the Jemena Group's Business Plan.

Figure 1–2: Overview of Jemena Group Business Plan



1.4.2 The role of this Technology Plan at JEN

ICT is integral to delivering our overall business strategy. This Technology Plan ensures transparency for ICT capital expenditure investment, and for enabling technologies that support our distribution services. It allows us to:

- Align and deliver ICT capabilities that will enable business plans to be realised
- Ensure timely provision of ICT platforms that support future growth in the energy market
- Ensure our operations are sustainable and our risk levels are appropriately managed, to maintain our current levels of network service performance for customers
- Provide cost-effective and fit-for-purpose ICT solutions that address customers' concerns about energy affordability.

This Plan ensures our proposed ICT capital expenditure is prudent. It enables ongoing sustainability of our ICT systems, and continued delivery of new functionality to maintain the safety, reliability and security of our distribution system and services to customers. Each proposed project and program of work within our forecast is necessary to either sustain our current IT systems or undertake upgrades and replacements to ensure they remain fit for purpose and secure in a constantly changing technology and network environment where our customers' requirements and expectations continue to evolve.

This Plan also ensures our proposed ICT capital expenditure is efficient. It is based on leveraging investments already made in existing systems and gradually moving towards a mix of commodity-based industry-standard platforms. This strategy and approach create opportunities to leverage and develop more synergies across the businesses within our group to provide economies-of-scale benefits from using common systems and platforms, reducing complexity and lowering total cost of ownership over the long-term. Jemena has a strong track record of deploying changes to the ICT ecosystem efficiently and effectively.

1.5 Customers' needs and expectations

JEN commenced its engagement program in November 2017 with a series of focus groups for residential and business customers, as well as councils and retailers, to better understand our customers' needs and expectations, and how best to engage with them.⁴ Customers were asked two key questions—how do you want us to engage with you and, what topics are important to you?

The engagement process identified the areas of most concern to customers as being Sustainability, Affordability and Reliability.

The exercise also served an essential purpose of providing some clear direction and guidance for technology investment areas to be incorporated in developing the technology plan.

Broadly, this technology plan will allow us to maintain service levels and deliver an increased focus on better and more straightforward customer experience, demonstrated through a customer portal and additional services accessible via smartphones.

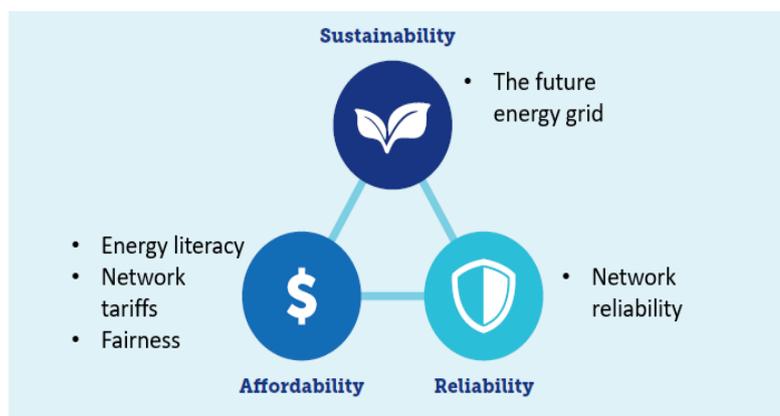


Figure 1-3 - The key topics that our customers emphasised during our engagement

⁴ Full details of the engagement program are set out in JEN Attachment 02-01 'Our Customer, Stakeholder and Community Engagement'.

Subsequent in-depth stages of our engagement program resulted in the customer recommendations outlined in Figure 1–4 below.

Figure 1–4: Customer recommendations from our people’s panel

<p>RECOMMENDATIONS TO IMPLEMENT</p> <p>Jemena should...</p>	<p>1</p>  <p>Improve the information available to customers and the ease of access to smart meter data. This should be through:</p> <ul style="list-style-type: none"> a. Improving Jemena’s portal b. Adding additional services such as apps for smart phones. 	
<p>2</p>  <p>Increase investment into energy literacy and awareness in the community by \$330,000 per annum (35c per customer per year).</p>	<p>3</p>  <p>Investigate how customers could be provided with personal usage and bill information for different pricing structures.</p>	<p>4</p>  <p>Enable increased feed-in of solar (and other renewables) into the grid, by improving the performance of the grid through new technologies.</p>
<p>5</p>  <p>Improve their channels of customer service by increasing their services to include mobile apps and using simpler processes.</p>	<p>6</p>  <p>Invest in smart technology across the grid to ensure network equipment is not upgraded too early.</p>	<p>7</p>  <p>Maintain the number of outages as they are today – on average each customer experiences four outages every four years.</p>
<p>8</p>  <p>Maintain the length of outages as they are today – on average 51 minutes per outage.</p>	<p>9</p>  <p>Send SMS messages to all customers for unplanned outages. The message should include an estimation of how long it will take to fix the outage.</p>	<p>10</p>  <p>Provide email or letter notifications about all planned outages. This should include accurate details of how long the outage will be and suggestions for how to manage the time without electricity.</p>
<p>11</p>  <p>Work with retailers to create an opt-out process for notifications, so all customers can receive notifications via their mobile unless they choose not to.</p>	<p>12</p>  <p>Note that the Panel believes that the Monthly Maximum demand pricing structure is the best for customers, so long as customers can opt out</p>	<p>13</p>  <p>Note the Panel’s recommendation that Jemena continue to explore using rebates to encourage customers to respond during times of need (for example hot days)</p>

Most of these recommendations either have implications for the ICT systems or are directly enabled by ICT.

Our customer engagement also identified some issues of specific concern to particular customer groups, notably:

- **Small and large businesses** care about price and reliability. Large businesses seek an increased focus on sustainable energy and innovative solutions. They want Distributed Energy Resources (**DER**), and DER exports enabled, with us being proactive in mitigating DER impact on reliability. They sought better information on flickers, outages, and voltage supply events.
- **Retailers** seek tariff reforms and measures to ensure the grid can accommodate new products and technologies.
- **Local councils** are interested in different commercial options for street lighting, and new light types and smart technologies. They seek our collaboration, for example, on trials for demand management, micro-grids, peer-to-peer energy trading, and other emerging technologies. They seek more information on energy usage, our infrastructure and maintenance activities, to enhance coordination.

All this feedback has been integrated into our ICT planning process to develop the forecast program of work.

2. Technology context

This section explains our current ICT environment and critical industry ICT trends that affect how we deliver services to our customers. From a technology capability viewpoint, our existing architecture is both modern and progressive, providing a fit for purpose set of core technologies that ensure continued resilience in the face of a changing external environment.

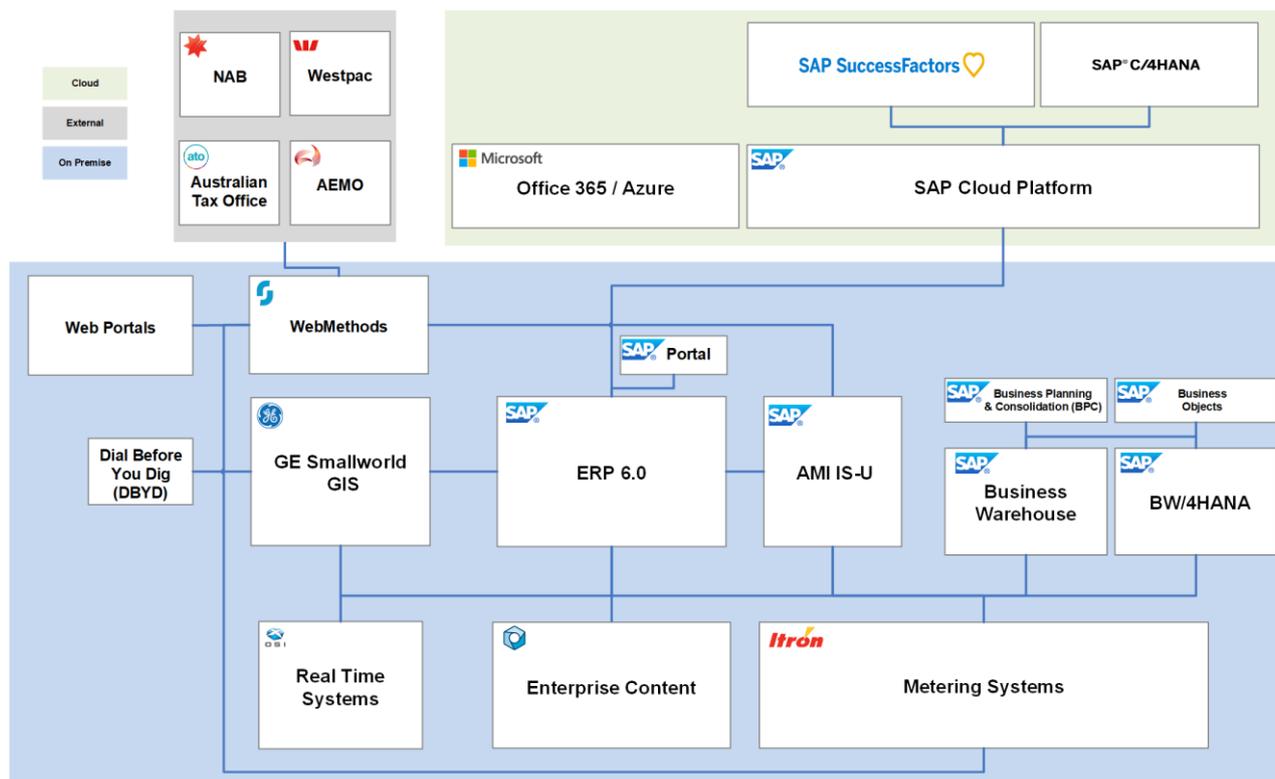
2.1 Our current ICT environment

The ICT ecosystem illustrated below provides a high-level snapshot of our approach to managing and enabling technology. These core foundational blocks represent our current state technology view including enterprise resource planning (ERP), enterprise integration, content management, management reporting, asset and geographic information systems (GIS), metering and network systems and corporate serving capabilities such as finance, human resources and procurement.

Following the assessment of the most efficient platform options, we are cautiously adopting cloud-based services. For example, the Office 365 (O365) suite provides end-user services such as email, collaboration, management reporting, active directory and device management services. Cloud platforms are also in place to support mobile services, cloud integration and portal services. Success Factors provides cloud-based services for HR management and employee training. A key component of our technology platform is our integration layer, which is provided by webMethods to unite these cloud and on-premise solutions and provide our market gateway.

Reflecting our customers' concerns about energy affordability and their desire for us to primarily maintain our current levels of network services into the future, our objective from a future state technology perspective is to achieve stability and minimise changes necessary to our systems. In developing our future state blueprint, we have used a simple principle of maximum re-use and leveraging of foundation systems while delivering improved customer experience. Section 6 of this Technology Plan elaborates on objectives and outcomes going forward.

Figure 2–1: Our current ICT environment



2.2 Industry trends

Some of the emerging trends in technology we consider when developing our ICT plan include:

- **Cybersecurity** – While Jemena must also continue to adopt new defensive tools and mechanisms as these are developed and evolve, being cyber secure goes much further than that. Cybersecurity thinking now influences all areas of ICT management and goes beyond into considerations of workplace practices. Jemena’s approach to systems and application upgrading for example, now has a much lower tolerance for systems that are out of support and which receive no further patching. A vulnerability in an aging system, even if non-vital itself, can provide a steppingstone for malicious actors to attack other systems.
- **Cloud Technologies** – Jemena sees both benefits and challenges in the move to shift processing away from traditional, on-premise computing. It is a trend that Jemena must prepare for as vendors increasingly drive adoption either by only offering cloud options or, more subtly, by directing their investment in development towards their cloud variants. Jemena takes a tactical, case-by-case evaluation of the options when it comes time to review a system rather than a strategic policy decision to migrate or not. While some applications have already moved, e.g. Office 365, and some new systems have come into use as cloud applications from the start, there are areas of Jemena’s ICT ecosystem where the appetite to move off-premise is low or the cybersecurity challenges are seen as material.
- **Internet of Things (IoT)** – The rapid evolution of smart devices, from consumer-level equipment that might be used by our workforce or located within our workplaces through to distribution network-attached devices, offers both opportunity and challenges to JEN. The Future Network Initiative, for example, will deploy many new smart devices, particularly to the LV network, to allow better management and facilitate the adoption of Distributed Energy Resources by users of the grid. In doing so, it will also introduce new communications and cybersecurity challenges which must be addressed along the way. Such devices collect new feeds of data too, which, to be useful, require new forms of analysis to be deployed to match. The growing adoption of these devices will have an impact on many elements of the ICT ecosystem.
- **Artificial Intelligence (AI) and Machine Learning (ML)** – While advances in these areas are being made at a rapid rate, Jemena expects that the concepts and techniques need to distil down into industry-specific products before they have applicability for JEN’s use. While we do not expect to develop a capability in this area ourselves, we do envisage analytic tools that incorporate the principles of AI and ML being made available within the planning horizon and being adopted to make better decisions based on JEN’s already extensive and rapidly growing data holdings.
- **Natural Language Processing (NLP)** – One outworking of AI that may also have an application, particularly in customer support, is through the rapid advances made in virtual assistants such as can be seen in commercial products like Apple’s Siri and Google Assistant. While Jemena is not expecting to develop these capabilities for itself, they could become available as a service, for this to work, there needs to be the right data interfaces for the NLP application to draw its responses from. Currently, customer-related information is held in disparate areas throughout many systems depending on the customer’s interaction with us – new connections, outages, billing, etc. For the next regulatory period, JEN is focussing on building the hub that will link this customer data together from all our interaction points where it can then be used to provide a complete customer experience whether through human or machine interaction.

3. How we manage and deliver change

We manage and deliver change as efficiently and effectively as possible. We achieve this through a robust governance framework for delivery, as described in Section 9.

3.1 ICT operating model

Together with our related regulated business Jemena Gas Networks (NSW) Ltd (**JGN**), we are supported by a shared enterprise solution and a domain-specific dedicated technology solution for the Jemena group. This shared ICT service model for providing and delivering ICT services is a vital enabler of high-quality technology solutions across Jemena. It delivers cost efficiencies from economies of scale through sharing capability between the Jemena group's assets.

Efficiencies are achieved through enterprise-level service agreements. Beyond volume discounting, these agreements deliver benefits, including enterprise support services and access to global research and development investment made by our strategic suppliers. Leveraging worldwide research and development provides us with access to innovative services and opportunities. We allocate costs between our assets in accordance with our cost allocation methods.

Regularly, we assess alternative ICT operational support and service delivery models; this ensures that ongoing expenditure for items such as annual maintenance remains at an efficient level.⁵

3.1.1 Maintenance support planning and strategy

Maintenance and support planning (incorporated in our forecast operating expenditure) is critical for effectively managing our technology assets and ensuring they best allow us to deliver the services our customers expect at the lowest cost over the long-term. Maintenance and support agreements can involve material expenditure. Therefore, Jemena considers the value and benefits associated with support agreements—and their potential alternatives—on a case by case basis.

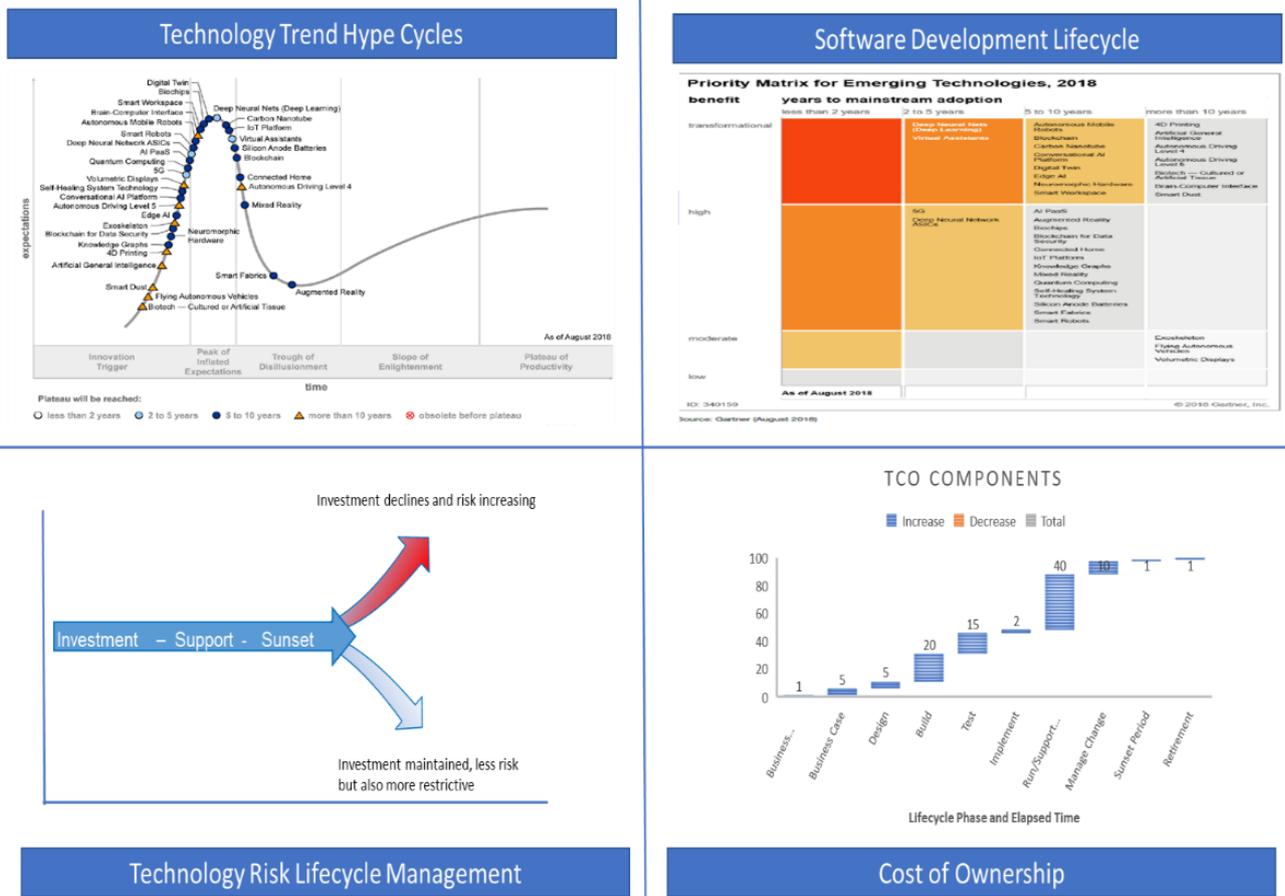
Jemena's approach to managing ICT assets is to ensure that all critical systems have vendor support available unless alternative support arrangements (such as in-house support capabilities) are in place. Most of our ICT capital expenditure relates to maintaining the ICT systems.

3.2 ICT asset management approach

We have many categories of software and systems under management to support our operations and the delivery of services to customers. The use of each technology requires a degree of management/maintenance to ensure that each asset can achieve its full serviceable lifespan, before its eventual replacement. Figure 3–1 outlines key factors we consider when determining the most efficient balance between cost, risk, resourcing and value to customers over time in our approach to managing our ICT assets.

⁵ If a regulatory allowance is not provided for one entity, then it may be necessary to seek a change in the IT allowance for another entity so that functionality can be maintained.

Figure 3–1: Key factors considered in ICT asset management



The factors depicted in Figure 3-1 come from research performed by Gartner Group⁶ and demonstrate (moving clockwise from the top left) Gartner’s view that:

- Technology trends (solutions) have a common cycle to their market development and adoption
- Individual products have a lifecycle to their development and take-up
- The most significant component of the Total Cost of Ownership (TCO) of a system is running/supporting it
- Risk changes as products go through their lifecycle and that risk continued investment and flexibility play off against each other.

3.2.1 Asset upgrades

Generally, we ensure that all market sourced IT systems maintain access to vendor support. Each vendor is different, but there is usually a pattern of short, medium and long-term lifecycle releases of upgrades:

- Short cycle times occur with patching, especially security patches, through to minor releases – e.g. moving from version 4.2 to version 4.3. For this reason, minor updates are sometimes referred to as dot-point releases. Timeframes can be as low as monthly to as long as two-yearly cycles. Adopting these patches and minor upgrades is usually advisable but there are situations where they can be skipped providing support for the previous version is still available, and the upgrade path to the following version is not going to be impeded.

⁶ [Gartner Group Website](https://www.gartner.com)

- Medium-term, major version upgrades usually happen on two to five-year cycles and incorporate more material changes to the system or introduce significant additional functionality. A typical example might be an upgrade from version 4.3 to 5.1. Adopting these upgrades usually require more considerable effort as more has changed in the system and the interactions with the rest of the ICT ecosystem require testing and, potentially, updating as well. Vendors usually allow some time for customers to update their systems, but it is also common for vendors not to provide support further back than the current and two previous major releases.
- Long-term platform migrations happen with all systems eventually but usually in longer than 10-year cycles. They occur when vendors reach the point where the entire technology stack of their solution should be refreshed to reflect advances in technology, development practices and software languages and tools. The ICT industry has seen a number of these generational lifecycles since its inception with examples such as moving from single to multi-tasking computing, the shift from mainframes to client-server applications and, more recently, the adoption of cloud solutions and the use of mobile digital devices with wireless communications.

Long-cycle upgrades and system replacements are, by definition, non-recurrent as they usually occur outside the five-year regulatory cycle. When they do occur, they subsume what would otherwise have been recurrent activity.

These three cycles of vendor upgrades combine in the lifecycle management of application systems. More significant changes supplant the smaller ones when they coincide but still form a predictable mechanism for cycling through updates to systems.

By exception, a vendor may go out of business, or a product may have no viable replacement. In these situations, we either support a product by bringing it in-house or through a third-party agreement while we search for a replacement. Where there are clear options in the market to move to a commercial, off-the-shelf product with renewed vendor support, Jemena normally adopts this approach because over time it offers a higher quality of support at a lower TCO.

The frequency of upgrades with cloud solutions such as Software as a Service (**SaaS**) or Platform as a Service (**PaaS**) based products, is somewhat different and often now measured in months rather than years. This approach is one of the challenges of cloud solutions as JEN still has a requirement to test new versions and ensure interoperability with other systems is maintained through these shorter update cycles. When vendors provide notification of an upgrade, Jemena needs to perform, primarily automated, regression testing to achieve this usually within a short timeframe. If an upgrade is declined, we must fully update based on the next product release to remain current. If multiple versions are not performed, then a full reimplementations of the product may be required.

This Technology Plan seeks to ensure commercial products are maintained under vendor support and that versions are not more than two releases behind the current version. Each upgrade is subjected to justification and priority-setting through an internal business case and risk assessment before being approved.

Software application assets are generally updated following their upgrade cycles depending on the application and product roadmaps of the vendor. ICT Infrastructure assets are typically replaced though, rather than upgraded, as the economic business case makes replacement more cost-efficient once warranty periods expire.

These lifecycle replacement periods are based on good industry practice; for example, the Australian Standard on life-cycle system management: *System and software engineering – software lifecycle processes*.⁷ These guidelines help us to ensure that we remain focused on managing our technology assets to contain risks associated with operating legacy technologies. This view also reflects an ‘active follower’ approach rather than a leader in the adoption of accelerating (less mature) technology solutions, with our plan being generally more likely to represent the optimal efficiency of asset replacement timing (see below).

⁷ Australian Standards, *AS/ISO/IEC/IEEE 12207:2019, System and software engineering – software lifecycle processes*, 11 November 2019.

3.2.2 Asset replacement

As technology changes are constant, we look to examine when to adopt a change or replacement of systems, rather than upgrading, based on historical experience and serviceability of the technology components. Doing this involves a consideration of where alternative technology is placed from a maturity perspective—is it still on the rise of the inflated expectations, or has it now matured into a valuable technology or business solution?

3.2.2.1 Asset sustainability and condition assessment

ICT hardware assets do not tend to deteriorate rapidly when they are managed within controlled environments, such as a data centre, where environmental factors can be closely managed. However, items such as mobile field devices, phones and assets exposed to the elements do have factors that can shorten their serviceable lives.

3.2.2.2 Replacement drivers and cycles

Sometimes application systems reach a point where replacement with a new approach is required rather than an upgrade of the existing system. Reasons for this include:

- A compliance obligation triggers a product change
- The requirements of the business evolve, and more contemporary or more feature-rich products are a better fit for the requirements
- Different products or approaches produce a lower long-term cost of ownership
- Transaction volumes outgrow a system's capability
- The vendor decides to rebuild the architecture of the product in a significant way which requires a reimplementation rather than an in-situ upgrade (i.e. a long-cycle platform migration)
- The vendor chooses to end support for the product and upgrades cease.

These triggers lead to the replacement of a product rather than an upgrade in place and because they are less common than the normal cycle of major and minor upgrades and patch releases that vendors usually issue, have cycle times that are generally longer than five years. The wavelength of these cycles tends to be more 10-15 years.

Examples of this include the rearchitecting of their ERP and IS-U modules that SAP is undertaking with S4/HANA. SAP is rebuilding the entire suite from the hardware up to adopt new technologies. This new platform was released 11 years after their previous platform update and customers have been provided with ten years of further support for the current system to plan for and migrate to a replacement.

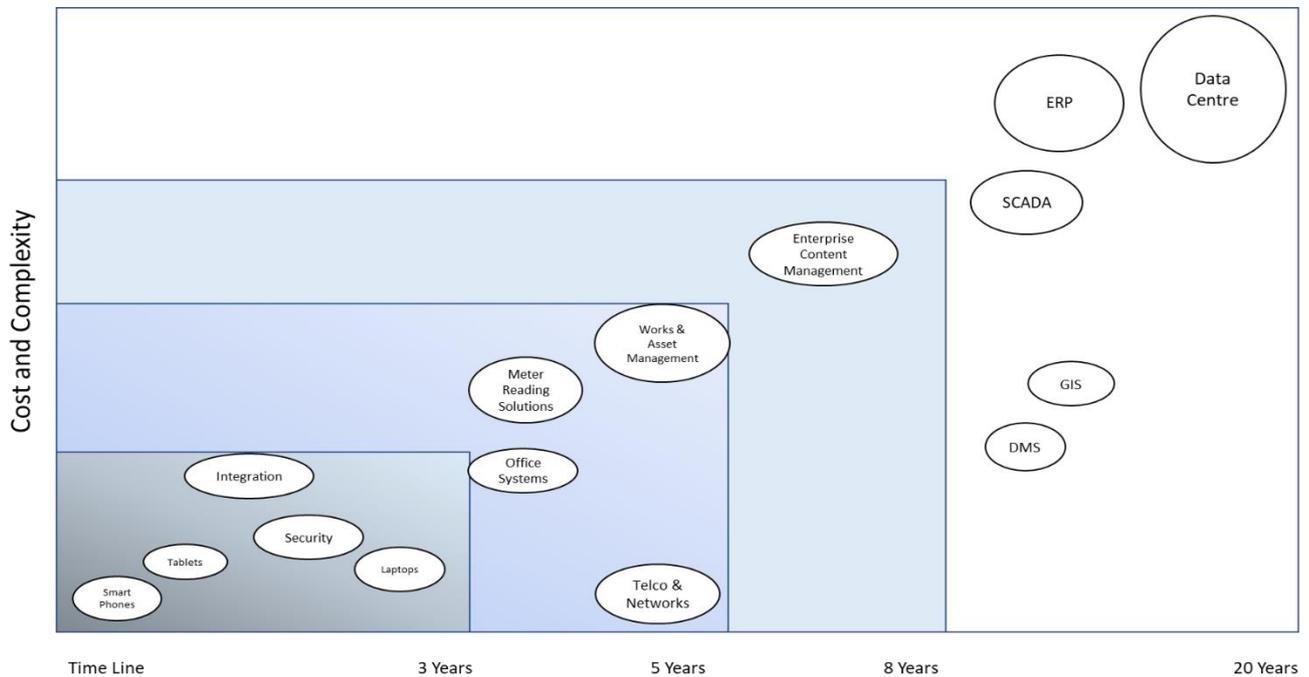
These long-cycle architecture replacements by vendors are seen with all software products in time. Vendors are themselves driven by long-cycle changes in development tools, processing equipment and data storage capability and new ways of delivering functionality become available through improved performance.

Other drivers for product replacement include a need to rearchitect to build in cyber-security resilience throughout the entire stack and the move towards cloud computing which involves a material change in system design.

When these long-cycle changes occur, Jemena must replace a system and, with the definitions the AER uses, classify that activity as Non-recurrent.

Figure 3–2 illustrates Jemena’s high-level view of the likely timing for lifecycle replacement over a range of assets in our ICT ecosystem. This horizon analysis is reflected in our policy-driven process for maintaining ICT services.

Figure 3–2: JEN’s Lifecycle Replacement Planning View



3.2.2.3 Asset retirement

When systems come to end-of-life, and there is a decision to shift to a new platform and retire the old one, it is uncommon for the business requirement to be withdrawn with it. There are few instances where there is a reduction in the functional needs. Meeting that requirement though can be done in different ways which is why it can be difficult to predict too far into the future what direction any given application may take. General trends, like the move to cloud services, for example, can still be factored in to forward planning.

3.2.3 Expanding ICT capabilities

We develop our ICT assets to meet required needs from:

- Organic growth in ICT capacity, software licenses and new users for existing systems
- Changes in platforms and support services to provide for new systems that have been deployed.

Growth gets driven by factors such as increasing customer numbers and increasing usage of ICT systems, particularly their information and data. JEN’s data growth continues to outpace technological innovation improvements in storage capability.

During the current regulatory period, JEN has implemented a new Data Warehouse (**DW**)/Business Intelligence (**BI**) reporting environment, replaced its SCADA/Real-Time Systems environment, both of which require processing and storage/backup capacity and deployed applications in the field through mobility solutions.

3.2.4 Developing new ICT capabilities

We grow our ICT capability by acquiring, developing and implementing new solutions to meet a need when we are unable to meet the requirement using an existing system or technology. The decision to implement any new capability is subject to an unusually high level of rigour due to the potential additional ongoing support and maintenance cost implications of investments in new assets.⁸

Before deciding to implement new capability, we develop and test alternative options to determine which option can deliver the best outcome. Conceptual testing of each available option identifies how further augmentation of existing technologies—and other alternative solutions—might meet the defined requirement. We also consider the resourcing implications and opportunities for support. These steps ensure that the proposed solution is the most efficient option in the context of our overall ICT environment and minimises the long-term cost of ownership.

⁸ To support any new capability or new technology, a preliminary gap analysis is conducted to determine if we have access to appropriately skilled technical resources to support the new capability. This forms part of the overall general assessment to ensure that any proposed investments in new IT capabilities provide clear benefits in customers' long-term interests.

4. Our ICT architecture

This section provides a high-level transition view of our technology roadmap between 2011 and 2026, and a small number of strategy and lifecycle tasks for 2026-30. This technology roadmap reflects the critical systems (ICT applications, infrastructure and data) we require to deliver services to our customers.

4.1 Our ICT roadmap

Our technology roadmap includes historical information and a view of our proposed fundamental technology changes over the medium term. This extended timeframe has been used to demonstrate how the technology landscape has transformed over the last decade, and what that means to our future state view (including beyond the next five-year regulatory period).

Over the last two regulatory periods, Jemena has implemented a strategy of ICT rationalisation and technology consolidation, as we seek to move to a less complicated and more generic set of technologies and platforms. These objectives have been achieved through strong governance and rigorous commercial processes.

Our technology transformation program has been conducted in parallel with significant compliance programs such as the Advanced Metering Infrastructure (**AMI**) rollout and Power of Choice market programs. Our secure technology solutions now provide strong core capability to support future compliance projects, such as 5 Minute Settlements and Customer Data Rights. Our stable and robust core platforms help us to avoid any (otherwise unnecessary) replacement of existing technology solutions for compliance projects, instead, meeting new service level obligations using planned lifecycle upgrades and augmentation of existing capability.

During the previous and current regulatory periods, we have replaced all our legacy systems, resulting in a significant reduction in operational risk, while continuing to deliver new services to customers (with AMI being central to many of these). The roadmap also reflects an increasing adoption of cloud-based services, where beneficial and cost-effective compared to alternative solutions.

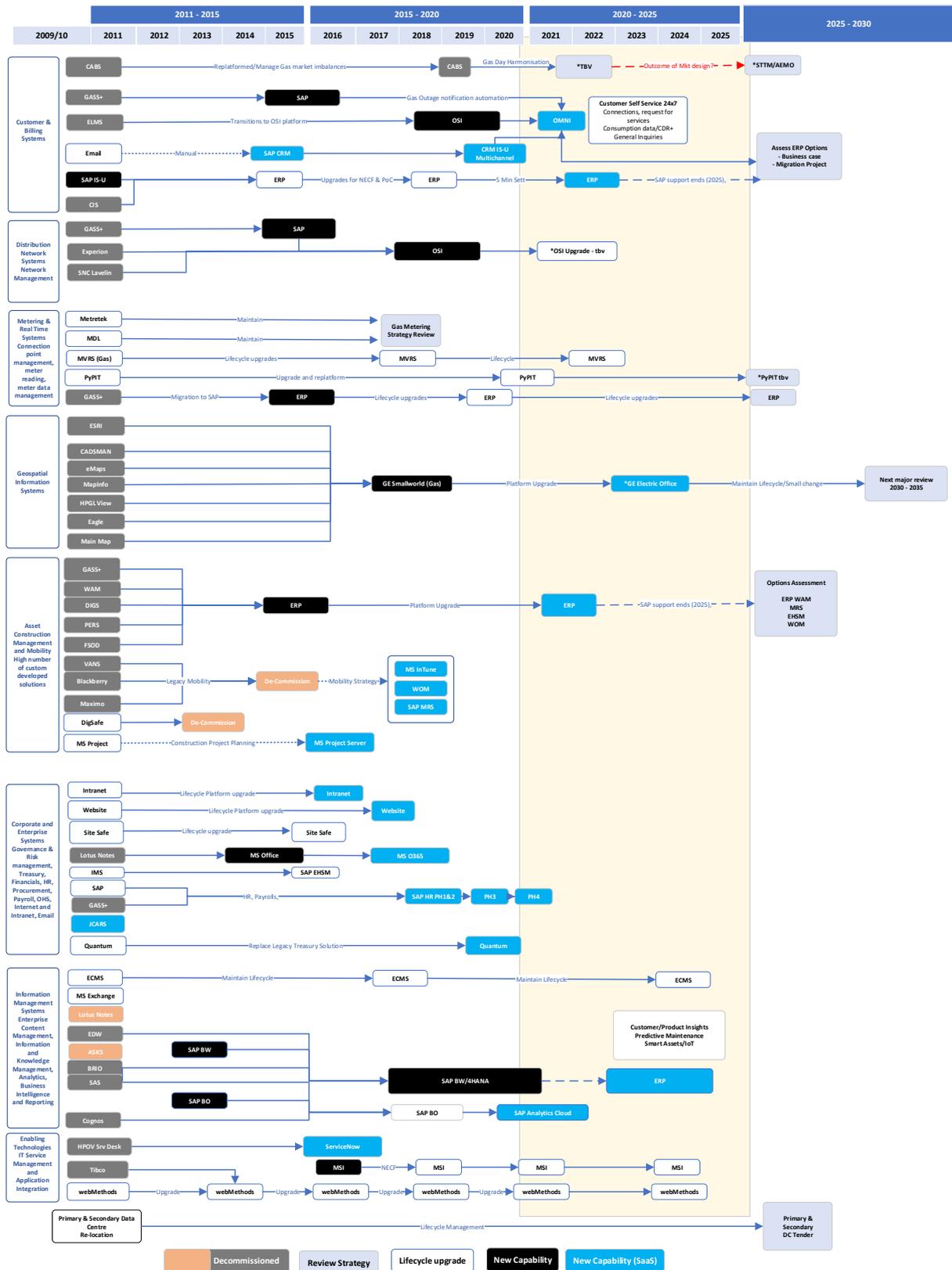
The roadmap shows the timing of new or upgraded capability being introduced due to customer demand, IT system lifecycle management, risk management planning or alignment with new regulatory obligations. Our technology roadmap is also aligned with a mature delivery capability, ensuring change management can be planned and executed based on a holistic view of the technology environment and established technology directions. This approach promotes and enables prioritisation of planned replacement projects, delivery synergies to be achieved, and change management costs to be minimised.

Figure 4-1 provides a high-level view of both historical and forecast ICT changes to our technology landscape. A consistent theme since the roadmap's commencement in 2011 is rationalising and reducing the complexity and risk of supporting the business and its customers. Black blocks represent a new capability or significant change; royal blue signifies a shift to a cloud-based service. The roadmap provides a visual snapshot of the ongoing capability lifecycle for technologies. It shows that upgrade and replacement projects are not necessarily required in every regulatory period—the lifecycles of more substantial and more sophisticated technology solutions typically are subject to transition plans occurring across multiple regulatory periods.

The level of change management involved in operating cloud-based services with security patches, software upgrades and operating system changes, makes it impractical to represent these on the roadmap. Cloud-based services can be subject to four or more upgrades per annum, and while the upgrades have a lower change impact

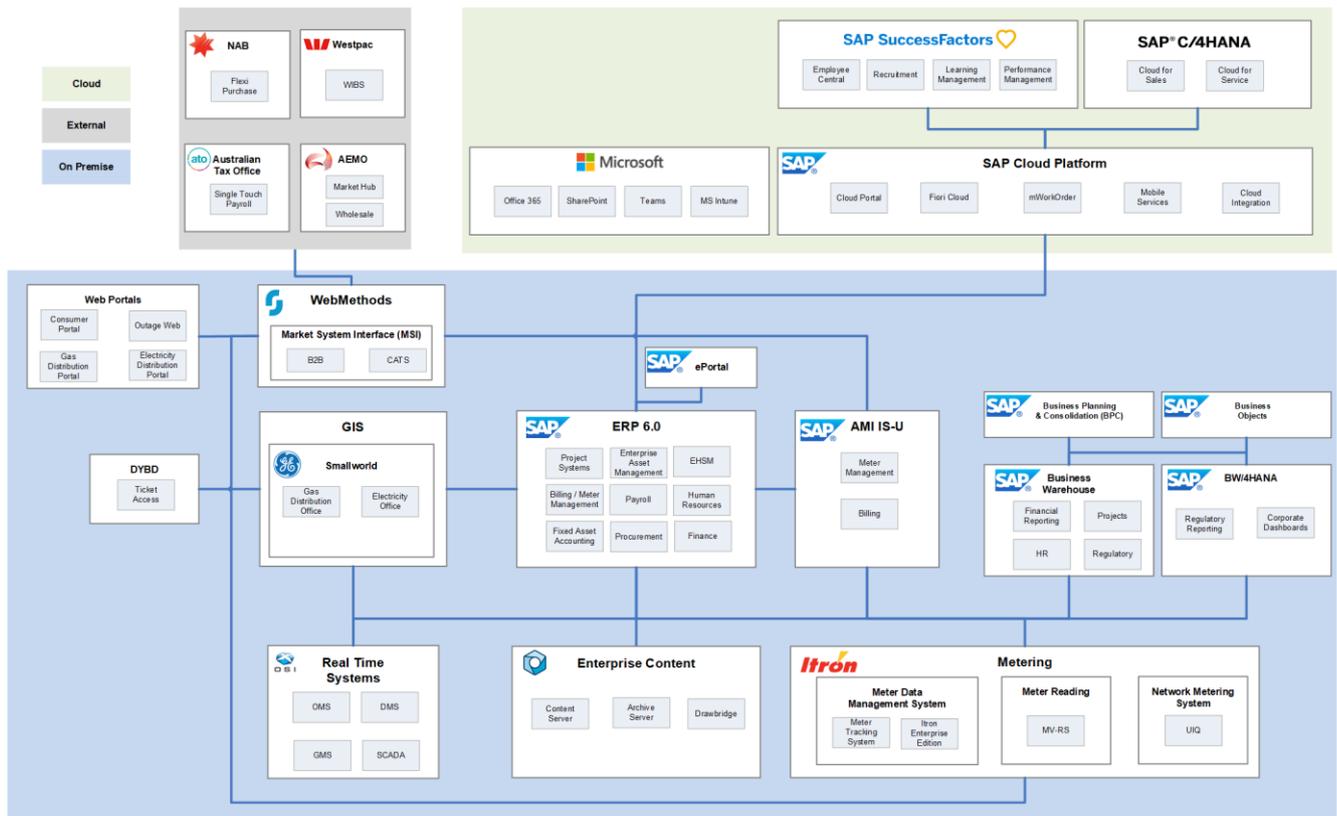
than for less frequent upgrades required to non-cloud-based services, remaining up to date with new releases is now a continuous and necessary process.

Figure 4-1: 2011 – 2026+ Jemena ICT roadmap



4.2 Current state application architecture

Figure 4–2: JEN’s Current State Application Architecture



The above diagram provides an overview of the application architecture currently in place at Jemena. This fundamental architecture has matured over several years and derives its strength and resilience from its use of core platforms in place to support the delivery of services to customers. Note, this is a whole of Jemena view and includes systems not necessarily pertinent to JEN.

Integration services are delivered by webMethods, enabling the flow of data between systems and the market. The Market System Integrator (**MSI**) application provides our business rules handling capability to deal with the many market services facilitated via the Market Settlement and Transfer System (**MSATS**) and the Customer Administration Transfer Systems (**CATS**). MSI can avoid complex rules management changes being pushed into the ERP and other locations that require market data to fulfil service requests.

The Meter Data Management System (**MDMS**), Network Management System (**NMS**), AMI meter reading, Real-Time Systems (**RTS**) and Web Portal operate to provide a range of meter reading capabilities including data capture, data transformation, data quality reference checking, provision of metering data for billing and data access to customers to view consumption information. Meter reading data is transported to AMI SAP IS-U, which is responsible for the management of metering assets and network billing calculation.

NB: the NMS, which forms the head-end of the AMI metering network, is classed as an Alternative Control Services (**ACS**) system and is referenced in document “JEN – ATT – 07 09 – Advanced Metering Infrastructure – 20200301 – Public”.

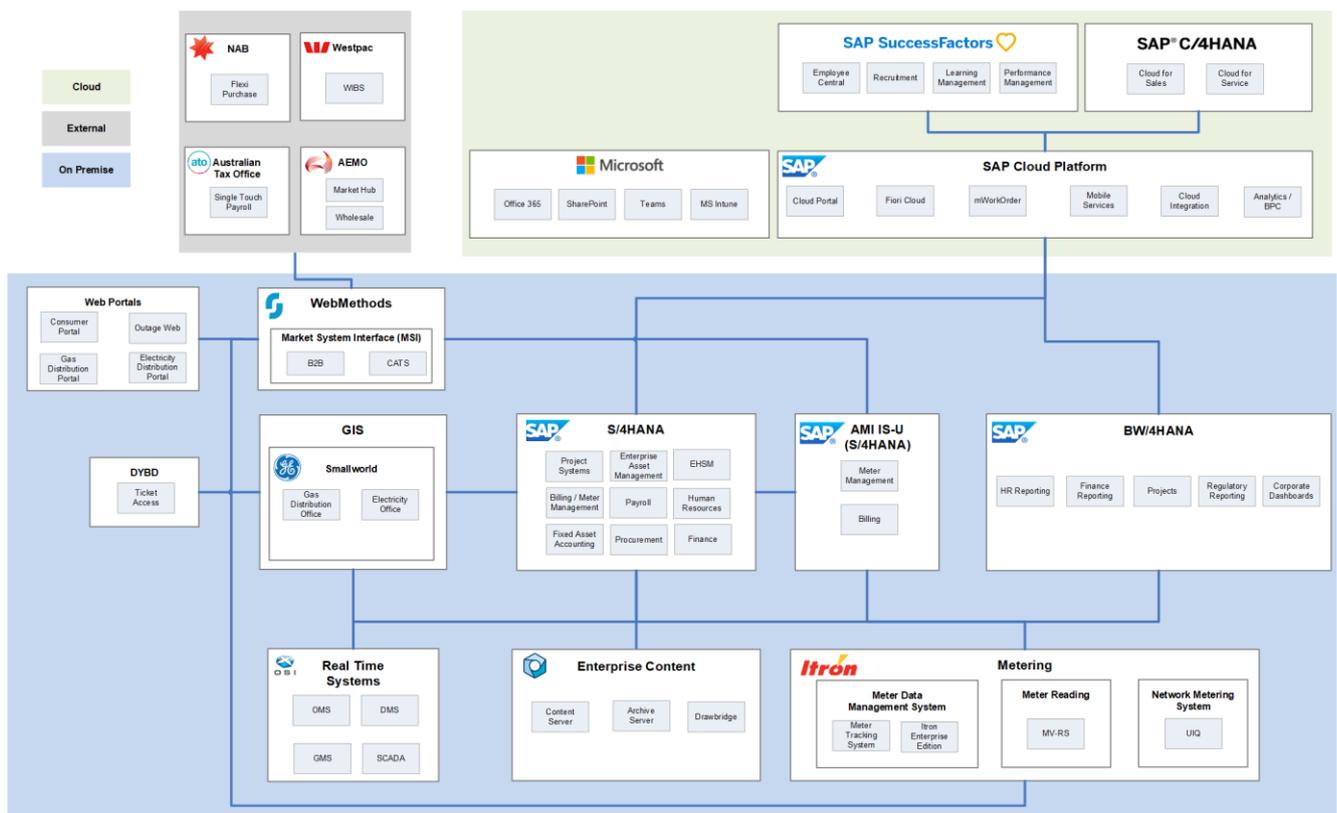
Support for Works and Asset Management, Human Resources and Finance are also managed by SAP as components of the Works and Inventory Management System.

SAP is also integrated with the Geographic Information System (**GIS**) to enable the geospatial representation of the distribution network and provide data to the Dial Before You Dig via Ticket Access.

Several components, implemented during the current regulatory period, are used to produce management reporting, service level obligation measurement, compliance and asset performance. This suite includes the SAP Business Warehouse, SAP Business Objects, together with SAP HANA providing advanced reporting and investigation capabilities. The most recent addition to the architecture stack has been the SAP cloud platform which includes cloud integration services, plus several new capabilities providing new HR services including employee central, recruitment, mobility services and cloud portal capabilities.

4.3 Target state application architecture

Figure 4–3: Target State Application Architecture



The next focus in our technology progression of application architecture will be based on completing the transition of our Enterprise Resource Planning (**ERP**) and SAP Industry Specific – Utilities (ISU) modules to **SAP S/4** to achieve a vendor-supported state into the future.

The target state application architecture has been developed to provide a view on how our technology landscape and ecosystems may evolve over the next decade, this a conceptual view only and is not intended to be a binding or locked in the decision. The fast and disruptive nature of new technology is a constant challenge when developing long-range predictions.

The conceptual architecture is intended to reinforce the principles of reducing the number of applications and continuing business process consolidation, to create a more streamlined and efficient solution through the delivery of centralised services with a design focussed on the customer experience. These themes become more evident with the future state architecture.

Customer benefits are derived from increased accessibility to data and content, together with more automation of workflow meaning that new services can be quickly personalised and tailored to meet changing customer and market requirements efficiently and cost-effectively, regardless of whether Jemena or third parties provide the end services to customers.

The longer-term outlook and assumptions concerning the ERP are based on the current market offerings, ERP options, and particularly billing options for connection point data, are constrained at the scale and level of functionality required to support business requirements. What can't be evaluated at the time of submission preparation is whether considerable scale disruption will occur in this place in the market. It is expected that further evaluation will continue in the next regulatory period to test and determine if the underlying assumptions and beliefs will persist or are subject to change in strategy.

Our ability to optimise the delivery of services to customers (and the performance of our network) in the future will be heavily reliant on our ICT architecture's ability to quickly integrate new technologies, and interact with emerging energy market structures designed around new technologies. Under our future conceptual architecture and its converged environments, the necessary operational support resources are reduced, particularly concerning managing ERP.

5. Current regulatory period ICT capital expenditure

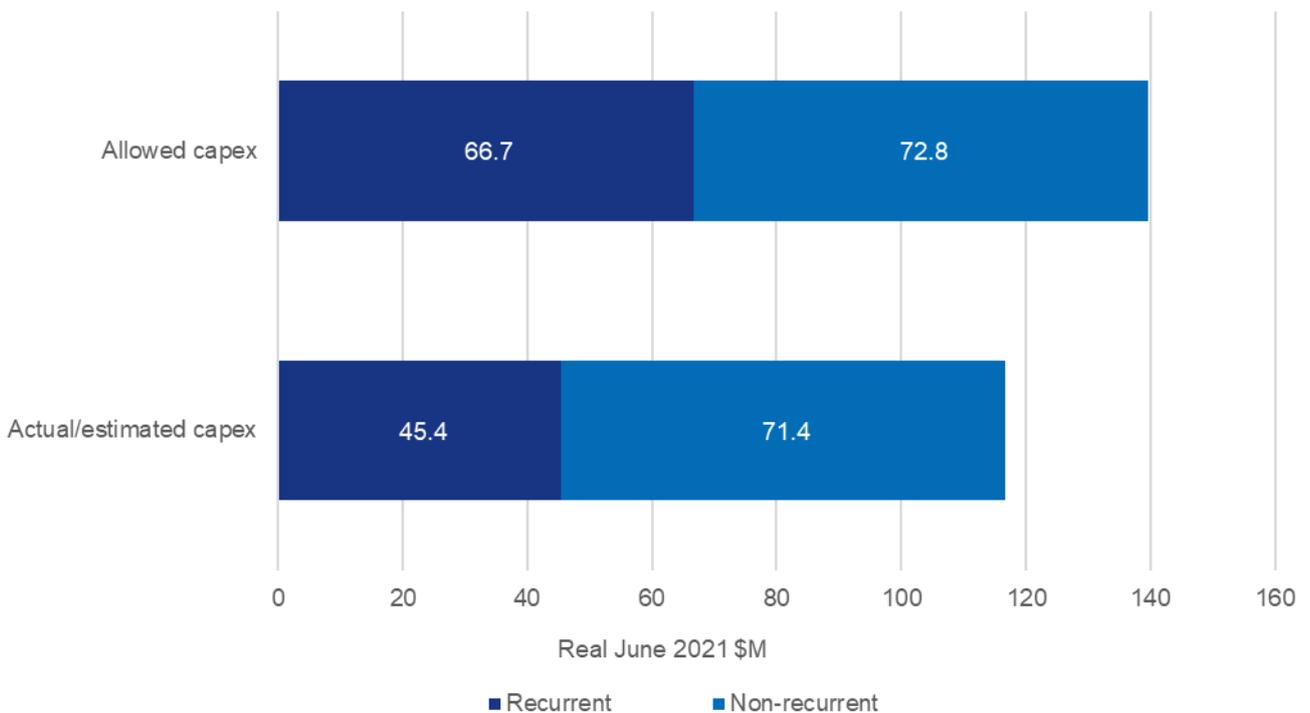
This section provides an overview of our ICT capital expenditure in the current regulatory period, including against the ICT capital expenditure allowance set out in the AER's Distribution Determination for the period.

5.1 Actual and estimated ICT Capital expenditure against AER allowance

We will primarily deliver on our ICT capital expenditure program of work commitment for the current regulatory period.

Our actual and estimated ICT capital expenditure for the current regulatory period is \$116.8 million compared with the AER's allowance in its Distribution Determination of \$139.5 million, an underspend of \$22.7 million or 16 per cent.

Figure 5-1: ICT capital expenditure during the current regulatory period (real June 2021 \$M)



5.2 Major projects and programs

We are expecting to deliver most of the ICT program for the current regulatory period largely in line with our previous forecast, although there has been some reprioritising along the way in the 2016 - 2020 ICT program plan to meet new service obligations under the Power of Choice and 5-Minute Settlement rule changes.⁹

Major programs delivered include:

- Full lifecycle maintenance of Jemena's ICT applications in line with vendor update release cycles
- Full lifecycle replacement of Jemena's infrastructure to maintain hardware platforms under warranty (Note infrastructure acquisition has often occurred within larger application upgrade projects so some hardware spend is not readily observable in RIN data)
- Meeting the regulatory changes for Power of Choice

⁹ Including the Global Settlement rule change.

- Meeting the regulatory changes to handle 5-minute settlement (forecast to begin this period)
- A higher than forecast spend on cyber-security as Jemena protects itself from ever-increasing threats
- Preparations for work on JEN's Future Network Initiative to prepare to meet the challenges of a smart grid and Distributed Energy Resources (**DER**)
- A new SCADA/RTS environment encompassing Distribution Management (**DMS**) and Outage Management (**OMS**) Systems
- A new DW and BI platform that now forms the basis for all financial, management and regulatory reporting and which was instrumental in delivering JEN's new RIN reporting capability
- A foundational mobility platform delivering access to a range of relevant data to field workers as they perform their duties working on the network and allowing the live capture of data directly from site
- Deployment of new systems, communications mechanisms and mobile devices to allow field crews to access JEN's core application systems when on-site and to both view and update information live.

Major areas not delivered fully on include:

- Merging of the AMI IS-U modules into the main SAP environment; benefits for doing so have so far not outweighed the likely costs, and while this may still be an activity that is undertaken, it is more likely it would become part of a larger transformation/migration than as an independent activity
- A richer customer experience; JEN's customer data is scattered across many systems, resulting from the different types of engagements that customers initiate, and while steps have been towards integrating this information through the introduction of a Customer Relationship Management system, more needs to be done in this area if JEN is going to meet customer expectations
- A Project Portfolio Management system has not been implemented, although some trial work was conducted under operating expenditure with a cloud service; a full system module to provide this capability has been deferred to the upcoming regulatory period.

Overall, JEN has been able to accommodate changes to the plan, such as 5-minute settlement, and conduct most of the program of work while still achieving cost efficiencies in delivery.

6. Next regulatory period ICT objectives and outcomes, strategic themes and roadmap

This section explains the objectives, outcomes and strategic themes of our forecast ICT capital expenditure.

6.1 Objectives and outcomes

This ICT Plan must deliver a balanced approach to addressing the rapidly evolving needs of the energy market and of our customers. Feedback from a wide range of customers through our engagement program has allowed us to develop the following objectives which guide our ICT capital expenditure forecast:

- **Maintain the safety of services** – maintenance of all necessary ICT systems is planned to ensure the maximum lifecycle can be achieved and that the integrity and performance of our ICT systems is maintained over their lifecycles
- **Maintain the quality, reliability and security of services** – this is necessary to ensure our business processes are designed and built in a manner that promotes the overall reliability of the services we provide to customers
- **Comply with regulatory obligations** – we must conform to new or changed obligations and must have plans in place to remain compliant at all times
- **Prepare for new demands on the network** – electricity distribution networks everywhere are having to cater for a future smart grid and the introduction of more Distributed Energy Resources (DER)
- **Plan for the future** – we must ensure our ICT solutions can support organic growth. Our planned expenditure is based on the adoption of open standards and cloud-based services where these are evaluated and assessed to represent the most efficient solution.

These objectives also align with those set out in clause 6.5.7 of the National Electricity Rules (NER).

In line with these objectives, our ICT capital expenditure forecast has been developed to achieve the following outcomes:

- Reliable infrastructure, systems and environments that are up-to-date, secure, efficient and fit for purpose, supporting us to maintain our current levels of service reliability for customers
- Provision for organic growth and continuous change as the regulatory and business environment change
- Better centricity of information to support data quality and information security.

6.2 Strategies

We have considered how best to achieve these objectives having regard to the technology context discussed in section 2, how we manage and deliver ICT addressed in section 3, our ICT architecture considered in section 4 and our ICT capital expenditure in the current regulatory period discussed in section 5. The strategies we have developed to achieve our objectives in the next regulatory period are set out below.

- **Respond to new or changed regulatory obligations** – Australia's energy market and the industry continues to change, evolve and diversify with new obligations continually being introduced to:
 - Respond to the evolving demands and expectations of customers
 - Ensure the market operates as intended as energy technologies rapidly evolve

- Put into effect the policies of Federal and State Governments
- Implement structural changes to the market such as the 5-minute settlement rule change
- Address increased cyber-security risks.

We must continue to respond as these obligations develop, as achieving regulatory compliance in many cases requires new or changed system capabilities. Most significantly for the next regulatory period, this includes complying with rule changes to move the settlement of the wholesale National Electricity Market to 5-minute intervals. This change also includes measures associated with higher cybersecurity maturity compliance requirements.

- **Timely introduction of technology changes** – we carefully consider how and when we introduce new technologies and solutions, with our approach being only to adopt technologies that:
 - Are demonstrating high adoption rates in Australia
 - Have proven to be robust, reliable and efficient.

In the absence of any new or compelling customer enhancement (in line with customers' expectations for improved digital services), we will also look to develop and leverage our existing systems in preference to the early adoption of new technologies to maximise the value of previous investments.

- **Provide new and extended system capability** – Our customer base and distribution network are forecast to continue to grow steadily throughout the next regulatory period. We need to ensure ICT systems continue to support our continued customer growth by planning and preparing for:
 - Growth in transaction volumes and increased data capacity
 - Procurement of Software licenses phased to support additional users (e.g. customer portal access, additional licences for billing customers)
 - Increased number of new connection points
 - Advancement of new disruptive technology solutions that offer new opportunities for customers (e.g. future grid device integration)
 - Increasing incidence of cyber-security events and attacks.
- **Continue to become more customer-centric** – Jemena now has far greater clarity about what our customers want from their experience with us – we now need to develop and enhance systems to meet their expectations efficiently and effectively.

Our customers' expectations also continue to evolve, and we need to ensure we can meet them in terms of regulated service standards and respond to the changing needs.

Technology provides the enabler to meet customers' expectations, through application integration and the delivery of a near-real-time digital experience via a centralised customer experience hub.

- **Employ prudent risk management to minimise total costs over the long-term** – We must provide sustainable technology solutions that are:
 - Prudent and efficient investments that ensure long-term benefits to customers
 - Supported by vendors or either replaced or supported in-house at a reasonable cost, where vendor support is not available.

- **Continue to rationalise and consolidate systems** – We continually monitor opportunities streamline information management, such as by introducing further workflow automation. This holistic approach seeks to leverage rather than replace current solutions and be more cost-effective in how we support the delivery of services to customers. At some point, it becomes no longer prudent and efficient to continue to do this, and a broader scale approach to the consolidation and rationalisation of systems is required to reduce complexity and maintenance costs.

Jemena continually reviews the technology stack architecture. For example, when we consider the adoption of large-scale products vs. best-of-breed technology approaches, we research market developments and measure our performance against our peers.

6.3 Cyber Security strategy

We must continue to maintain and augment our defensive capabilities and keep fit in the battle against cybersecurity threats. We plan to continue with the adoption of the Australian Signals Directorate (**ASD**) Essential 8 recommendations in addition to elements of the cybersecurity standards developed by the US National Institute of Standards and Technology (**NIST**) Cyber Security Framework.

6.3.1 Industry Cyber Security Maturity Assessment

In response to the increased risk related to cybersecurity, the Australian Energy Sector Cyber Security framework (**AESCSF**) was established. The AESCSF adopts Cybersecurity Maturity Model ES-C2M2 and the **NIST** cybersecurity frameworks. An objective of the AESCSF coming into effect in 2018 was to assess the cyber maturity of all energy market participants to understand where there are vulnerabilities.

Cybersecurity is a common challenge for the industry, and all participants are on a journey. The assessment also identified areas of strength and areas of opportunity for Jemena's cybersecurity across the assessed domains. These opportunities have been considered in the development of cybersecurity investment planning in the next regulatory period.

Importantly, the rapid advancement of cyber threats means that cybersecurity responses must also move quickly to remain ahead of the many threats and actors that represent risks on a global scale. Tools which leverage artificial intelligence and machine learning are maturing and mechanisms to continually detect and respond to security threats are improving. These deep learning, AI solutions which look at raw security event data to identify and prevent threats from initiating are considered leading-edge security and threat protection.

We will continue to progressively implement elements of the ASD and NIST where these standards can be applied to deliver a stronger and more robust cyber strategy and where the investment results in an efficient cost outcome for our business and our customers, and we will continue to monitor and evaluate new ways of managing security.

The NIST framework is currently a global standard for cybersecurity and protection of critical infrastructure. It has five core objectives, which are:

- **Identify:** Assessing the threats and risks to systems and understand the vulnerabilities.
- **Protect:** Defending systems from attack with best practice approaches.
- **Detect:** Having tools and protocols in place to spot when a breach has happened.
- **Respond:** Reacting quickly, using automated safeguards, to contain the breach and have protocols in place to mobilise resources.
- **Recover:** Having plans in place to handle the aftermath, communicate the outcomes and review the learnings.

Our independent technology advice and research provider group Gartner uses this same model to classify products and services under an “Identify, Protect, Detect and Respond” framework when assessing the market for their cybersecurity product comparisons. We have evaluated our current cybersecurity risks based on the ASD and NIST frameworks because they are recognised as providing measurable baselines to identify existing areas of network vulnerability.

Our proposed investments in cybersecurity have been based on expert guidance from Gartner, and several other security-focused organisations such as Checkpoint, Microsoft, McAfee, Huntsman and Symantec, to determine what combination of products and services provide the best and most efficient protection.

We have assessed our proposed cybersecurity investments against the vulnerabilities in our network today. The JEN Cybersecurity Enhancement Investment Brief details how we will invest in cybersecurity to harden our environment and efficiently manage risks.

In its Non-network ICT capex assessment approach¹⁰ the AER notes that “*Expenditure to achieve a higher cyber security maturity compliance requirement.*” qualifies under Non-recurrent – compliance.

6.4 ICT capital expenditure-operating expenditure trade-offs for cloud services

Cloud services have introduced advantages and new levels of flexibility for organisations, including:

- Capacity and scalability on demand, providing the flexibility to scale up and scale back as required. This means capacity and scale can be matched to actual business requirements at any time, minimising underutilised capacity sitting idle
- Reduction in hardware capital investment
- Access to technology innovation with lower effort and capital investment, leveraging research and development, e.g. the use of artificial intelligence and machine learning to manage computing environments in the cloud and data centre solutions.

But it does not come without risk. The transition to cloud services requires an extension of security functionality to ensure information remains protected regardless of hosting location. We must also consider the exit strategy and access to data at the point of ending the service.

Jemena has transitioned to some cloud services in the current regulatory period - examples include ServiceNow, Office365, SuccessFactors and SAP C/4HANA. Each of these has required ICT capital expenditure to facilitate the transition from their on-premise equivalent but costs then switch to a large operating expenditure-based subscription model which leads to a reduced recurrent ICT capital expenditure in the next regulatory period. There is likely always to be some level of ICT capital expenditure activity though as we enable new capabilities and perform integration testing of updates.

To date, vendor discounts and pricing structures have made moving from on-premise solutions to the cloud operating expenditure cost-neutral, but still, entailing ICT capital expenditure to transition. Jemena examines each case on its merits when determining where to adopt cloud solutions.

¹⁰ [AER's Non-network ICT capex assessment approach, Pg 9](#)

7. ICT capital expenditure forecasting

This section sets out our ICT capital expenditure program planning processes, methods and the tools that we have used to develop our forecast ICT capital expenditure for the next regulatory period.

7.1 Planning process – a program of work development steps

This Technology Plan is informed by business and technology teams, providing both short and long-term objectives and articulating the vision gathered from our customers. Aligning our planning and delivery processes with customer expectations helps to ensure that the cost of services and value creation for customers becomes more transparent and better understood. Practical examples include ease of access to customer data, additional access channels and self-service capabilities and tracking the progress of service requests.

In brief, our planning process is centred around:

- Collaboration and engagement with customers and business stakeholders to understand and capture technology requirements.
- Understanding what gaps we need to address within our current ICT capabilities and asset performance to ensure that future capability will be in place when it is required.
- Ensuring all proposed investments under our plan represent prudent and cost-efficient outcomes that are realistic, deliverable, balanced and timely.
- Synchronising technology planning with other business planning streams to ensure alignment with common goals and objectives.

This approach has resulted in our Technology Plan, Investment Briefs, capability roadmaps and ICT capital expenditure budgets.

7.2 Forecasting method

We have prepared our ICT capital expenditure forecast in line with good industry practice, including for technology lifecycle management. When combined with our forecast operating expenditure, our ICT capital expenditure forecast ensures that our assets can be sustained in good working order and remain capable of providing optimal performance over their full lifecycle. These processes for producing estimates are governed and managed in accordance with our ICT Strategy, ICT policies, cybersecurity standards and application and infrastructure roadmaps.

We have developed our ICT capital expenditure forecast on a bottom-up basis, with our program consisting of individual ICT projects. The majority of the projects within our ICT capital expenditure forecast for the next regulatory period have been costed using our standardised ICT Project Estimation Tool because a bottom up build of project costs has not been available for many. This approach ensures a consistent methodology is applied to individual initiative cost estimation. The use of the estimation tool for forecasting was accepted in the AER's recent draft decision for JGN.¹¹

Some exceptions to the use of the Estimation Tool have been made for projects of large size (which extend beyond the tool's range) or where a detailed analysis of the project elements has already been conducted. Examples include the 5-Minute Settlement business case, SAP S/4 Migration and the Future Grid Program.

¹¹ [AER, Draft decision – Jemena Gas Networks \(NSW\) Ltd Access Arrangement 2020-25, Attachment 5: Capital expenditure, November 2019, Pg 5-39.](#)

As explained further in section 8.4, a fundamental basis for our project estimates was known historical costs due to the potential for the inaccuracy (and in particular, of overstating forecast expenditure) inherent in detailed bottom-up approaches. In particular—with estimates being undertaken up to seven years in the future and the significant developments in technology that are likely to occur over this time frame—the error rate is expected to grow in the latter years of the regulatory period.

As part of our process in developing our ICT capital expenditure forecast, we:

- Considered top-down trend analysis of our ICT capital expenditure forecast compared to previous regulatory periods.
- Undertook back-cast testing of the parameters used in our cost estimation tool against the known costs of similar historical projects.
- Considered interdependencies between individual projects and assessed the deliverability of our overall forecast.

A more detailed description of our ICT capital expenditure forecasting model and forecasting approach is contained in our ICT Long-Term Capital expenditure Forecasting Usage and Governance Guide.

8. Forecast ICT capital expenditure

This section outlines our proposed ICT capital expenditure for the next regulatory period.

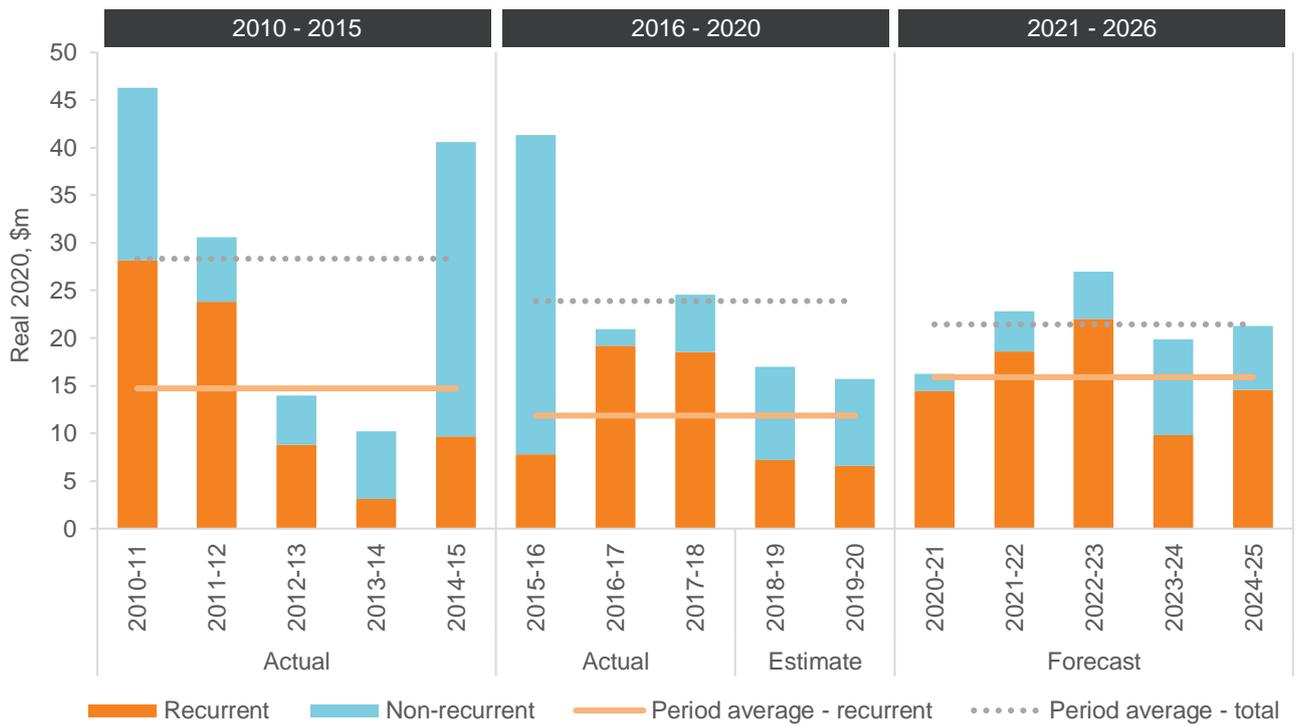
We have classified our forecast ICT capital expenditure into recurrent and non-recurrent projects in line with the AER's definitions. These categories are explained in Table 8–1 below.

Table 8–1: ICT value driver categories

Project Types	Description
Recurrent - base	Lifecycle activities to maintain application systems, platforms and communications systems.
Recurrent - step	Additions to the recurrent base resulting from the deployment of new systems or the non-recurrent replacement of old ones in the current regulatory period.
Non-recurrent – compliance	Projects to respond to changing regulatory requirements or market rules.
Non-recurrent – maintain	Lifecycle activities are driven by replacement of systems rather than in-situ upgrades. These do not always fall within the five-year regulatory cycle, nor are they, necessarily, repeated in the same way. They do, however, subsume other activity that would have otherwise been classified as recurrent.
Non-recurrent – New capability	The introduction of new functionality, modules or whole systems to meet a business requirement.

Figure 8–1 illustrates the trends in our recurrent and non-recurrent ICT capital expenditure over the previous, current and next regulatory periods. The previous regulatory period recurrent expenditure was lower than the current regulatory period due to some non-recurrent replacement projects which subsumed recurrent activities. For the next regulatory period, we expect our base recurrent expenditure will be comparable to the current regulatory period.

Figure 8–1: Recurrent and non-recurrent ICT capital expenditure



The project initiatives, grouped by cost category, are outlined in Table 8–2.

Table 8–2: Summary of IT Capital expenditure by cost category

Standard Control Services (2021-26 forecast)		Amount	Investment brief
Recurrent			
Base		42,316,927	
Step changes			
	<i>Operational Technology Step change</i>	4,209,149	Yes
	<i>DW and BI Step change</i>	1,571,897	Yes
	<i>Mobility Step change</i>	2,811,599	Yes
Total		8,592,646	
Total recurrent		50,909,573	
Per annum equivalent			
	<i>Recurrent benchmark (2016-18 average)</i>	8,621,254	
	<i>Base amount-annual average</i>	8,463,385	
Difference		157,869	
Non-recurrent			
Compliance			
	<i>5-Minute Settlement</i>	10,244,292	Yes

Standard Control Services (2021-26 forecast)		Amount	Investment brief
	<i>Cybersecurity Enhancements</i>	2,175,611	Yes
	<i>Wholesale Demand Response</i>	548,458	Yes
	<i>Customer Data Right</i>	939,742	Yes
	Total	13,908,103	
	Maintain		
	<i>SAP Migration</i>	5,553,940	Yes
	<i>Cybersecurity Enhancements</i>	1,327,814	See above
	<i>Asset Mgt and GIS</i>	2,090,194	Yes
	<i>System Management</i>	542,214	Yes
	<i>Operational Technology Enhancements</i>	198,089	Yes
	Total	9,712,252	
	New capability		
	<i>Customer Experience</i>	2,810,923	Yes
	<i>Asset Mgt and GIS</i>	2,633,853	See above
	<i>Future Grid Program</i>	15,653,536	Yes
	<i>Operational Technology Enhancements</i>	96,205	See above
	Total	21,194,517	
Total non-recurrent		44,814,872	
Total IT		95,724,445	

8.1 Recurrent – base

Appendix A contains a list of Recurrent - base projects. The forecast expenditure on Recurrent – base projects is in line with our current regulatory period Recurrent expenditure and the list is informed by experience from the current period.

Much of the recurrent expenditure is shared across the Jemena enterprise, although there are some JEN specific applications requiring lifecycle maintenance such as AMI metering systems, market interfaces, etc.

8.2 Recurrent – step

Jemena has deployed new systems this period which were allowed for in the current period's pricing determination and conducted as Non-recurrent project work. These systems now need to be maintained and, in future, these costs will be Recurrent in nature.

Accompanying this Technology Plan are 3 Investment Briefs detailing these three areas:

Section	Title	Shared ¹² or JEN specific	Explanation
Platforms & Processing	Operational Technology – SCADA/RTS	Shared	Platforms support for the new Operational Technology environment providing DMS and OMS systems.
Platforms & Processing	Data Warehouse & Business Intelligence	Shared	Platforms support for the new DW and BI environment used to produce financial, management and regulatory reports.
End-user facilities	Mobility	JEN	Ongoing maintenance of the mobility solution to allow field crews to access and update information live on-site as they perform work on the distribution network.

8.3 Non-recurrent

The following table provides a summary of the Non-recurrent ICT capital expenditure for technology projects in the next regulatory period. Each of these areas is covered in an accompanying Investment Brief.

Table 8–3: Summary of Non-recurrent ICT capital expenditure projects in the next regulatory period

Section	Title	Shared ¹³ or JEN specific	Maintain, Compliance or New capability	Explanation
Asset Management	Asset Mgt & GIS Enhancements	Mix	4 Maintain projects + 5 New capability	A range of projects to retain current capability and add to the current asset management and geographical information systems ecosystem.
Compliance	5 Minute Settlement	JEN	Compliance	Modification to systems to meet new National Electricity Rule obligations to deliver 5-minute interval meter data to market. The change is expected to result in a reduction in the wholesale electricity costs for customers.
	Customer Data Right	JEN	Compliance	The Government has announced its intention to include energy data under the Customer Data Right (CDR) system. This requirement will give customers a right to direct their data to be shared with others they trust so that they can benefit from its value. The COAG Energy Council supports its implementation in the energy sector.
	Wholesale Demand Response	JEN	Compliance	An expected requirement to support a new category of registered participant, a demand response service provider (DRSP) that would be able to bid demand response directly into the wholesale market as a substitute for electricity generation. A DRSP could also engage directly with a customer without the involvement of that customer's retailer.

¹² Shared with other businesses in the Jemena Group.

¹³ Shared with other businesses in the Jemena Group.

Section	Title	Shared ¹³ or JEN specific	Maintain, Compliance or New capability	Explanation
Cyber Security	Enhancements (for compliance)	Shared	4 Maintain projects + 14 Compliance	Strengthening of our cyber-security capabilities to improve preventative, detective and reactive protocols to harden defences in the event of a cyber-attack. Cybersecurity is increasingly becoming a compliance requirement with several obligations now in place or being formulated for market participants to follow.
Customer	Customer Experience	Mix	New capability	Responding to feedback from our customers, optimising existing technologies to create a seamless, personalised, customer-focused digital experience to enable customers to self-serve, manage their energy needs and interact with us anytime, anywhere.
Enterprise Resource Planning	SAP Migration	Shared	Maintain	SAP ECC lifecycle migration to new S4/HANA platform to maintain within vendor support. Project classified as non-recurrent as these large platform migrations do not occur in every regulatory cycle.
Future Network Initiative	Future Network Initiative	JEN	New capability	Support the establishment of IoT network sensors, integration and data capture. Manage reporting to extract, load and transform data produced by network sensor devices to inform asset strategy and maintenance planning.
Operational Technology	Operational Technology – SCADA/RTS	JEN	1 Maintain project + 1 New capability	Minor follow-on work to complete the SCADA/RTS systems implementation for DMS and OMS.
Platforms & Processing	System Management	Shared	Maintain	Non-recurrent – maintain activities to address systems management tools which are undergoing significant changes in the way they function, which falls outside the definition of recurrent activity.

8.4 Project justification – introduction to investment brief

Investment briefs accompany this Technology Plan include those in the Recurrent – step change and Non-recurrent ICT capital expenditure categories. They are intended to provide insight into how we will meet our future state challenges through the specific projects within our forecast ICT capital expenditure program. The section below provides details on the structure and objectives of the investment briefs.

Each Investment Brief details the objective and problem statements that will be addressed as well as the high-level scope, what options have been considered to deliver the most prudent and efficient technology solution. The options analysis provides a preliminary assessment of the options to implement an effective solution to achieve the objective of the brief. As part of our ICT Governance process when we are considering making any investment, we undertake further options analysis using most recently available information, including a detailed costing activity and benefits assessment relating to the implementation of each option.

These Investment Briefs provide information about our ICT capital expenditure forecast. While informative, it is important to note that JEN does not create detailed business cases for technology projects until the time the project reaches its final initiation step. This process is described in section 9:

- All projects contained in our ICT capital expenditure forecast have been scoped well in advance of the actual start date of any project given the need to develop a forecast for the next regulatory period. Technology changes are frequent, and technology roadmaps are always subject to change and provide guidance rather than facts. The delay between preparation of our regulatory proposal and the initiation of a project within the next regulatory period, therefore, means that changes in technology and business requirements are likely to necessitate that the business case is redeveloped.
- The time horizons required by the preparation of a next regulatory proposal forecast (up to seven years) can be significantly longer than the 'normal' investment horizon for these types of technology assets in a business that is not subject to economic regulation using five-year periods. Technology vendors can, therefore, be reluctant to participate in or may seek means of cost recovery for provision of responses in tender processes so far in advance of projects being initiated, or otherwise may provide non-binding or build significant risk premiums in their responses. This approach can make vendor responses of limited use when forecasting the efficient cost of undertaking a project in the future. In contrast, our project estimation methodology (explained in section 7.2) reflects the efficient costs we have incurred in performing similar projects historically.

Table 8–4 set out the details the template we have used for our Investment Briefs. Note: not all sections are relevant to each brief.

Table 8–4: Investment Brief Template

Section	Information provided
Objective	What is the overall objective of the initiative and investment?
Background/Problem	What is the problem/s the proposed projects address?
Customer Importance	What importance do customers place on this?
Strategic Approach	How does this support our future vision and objectives?
Options/Investments	What opportunities have been considered?
Benefits	What are the benefits derived from the proposed activity?
Risks	What are the risks associated with doing, or not doing, the activity?
What We Are Recommending	What is our recommendation, and what makes it the choice which best contributes to the long-term interests of customers?
Projects	Which projects are related to this objective?
Relationship to ICT Capital Forecast	Where to find the projects in the project listing?

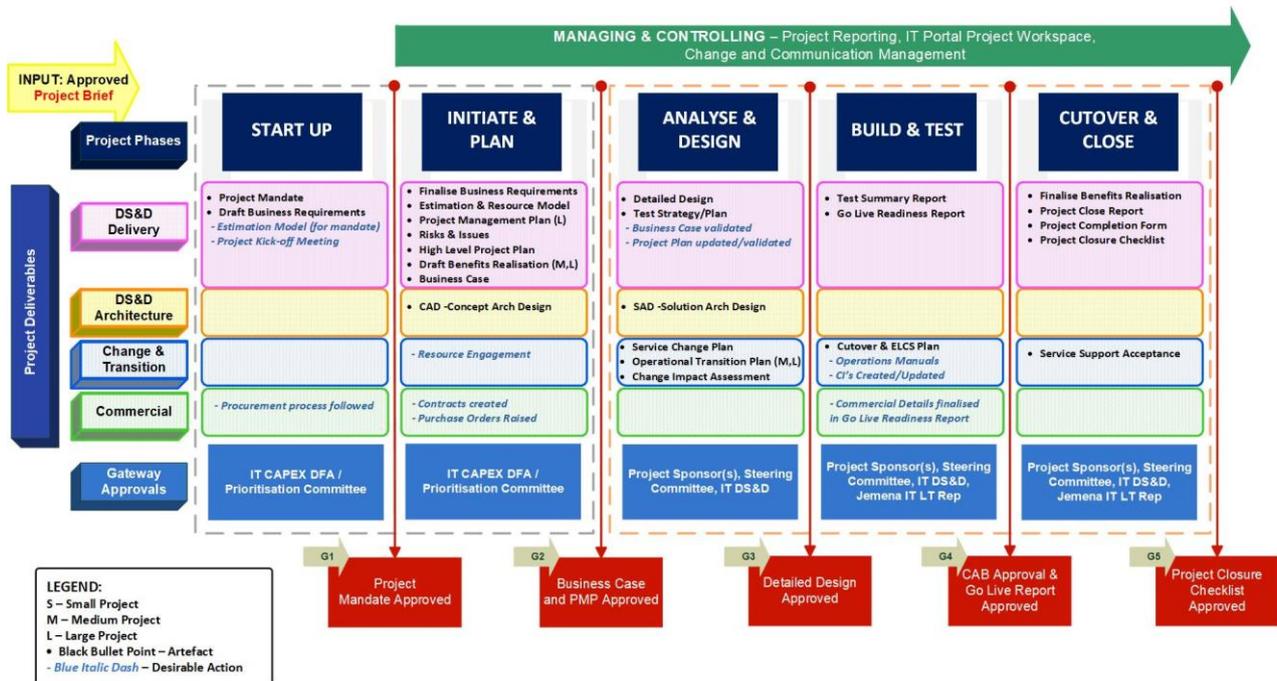
9. Governance, sourcing and delivery

This section explains the governance framework that supports our ICT capital expenditure and how we will source and deliver our ICT capital expenditure program in the next regulatory period.

9.1 ICT Governance Framework

Our ICT governance framework supplements our core business governance and program delivery model and defines, for ICT projects (reflecting some differences like these investments compared to the other capital investments typically made by an energy network business), who has input and who is accountable for decision-making processes. Our ICT governance framework is an integral part of Jemena's investment and corporate governance approaches and helps drive alignment between ICT decisions and broader organisational goals and strategies. Our ICT governance framework enables us to consider and implement ICT decisions in a timely yet robust manner, helping to reduce the cost and risk profile of projects efficiently.

IT PMO Project Management Lifecycle & Governance Framework



Regular monitoring and reporting under the governance framework ensures that the Board, senior executives and management have a standard and structured view of the ICT programs of work, work-in-progress and the overall status on which to make decisions based on the most relevant and up to date information, including:

- Project status by stage and gate
- Performance compared to budget and schedule
- Benefits specification and realisation
- Funding requirements by stage, years and months
- Financial forecasts
- Risks and Issues

- Delivery performance to requirements and outcomes
- New projects to be initiated
- Changing business and external environments and potential impacts on projects.

9.2 Program delivery

Jemena has a proven track record in successfully and efficiently delivering its ICT program of works, largely as planned, across multiple assets and regulatory periods. We have taken several considerations into account when developing our program of ICT capital expenditure for the next regulatory period, and we are well-placed to efficiently deliver all required technology investments to support the delivery of the services our customers expect, due to:

- Our robust ICT governance model and project delivery framework (explained further in sections 9.3 and 9.4)
- Comparable or reduced project complexity and business change impacts in the next regulatory period compared to previous periods of successful delivery, as we further leverage and build on our core systems
- Our long-term planning, which considers interrelationships between projects and programs of work in the regulatory periods before and after the forecast period, such as through our multi-period ERP Strategic Roadmap
- Our long-standing practice of calling upon specialist external contract labour for ICT project work, providing access to a large pool of resources which is 'elastic' and thereby minimising the potential for resource contention to slow down project progress
- The diversity of project types for the coming period. By their very nature, ICT projects involve key specialties, both within the ICT group and from the business. Diversity within the project mix enables the smoothing of workloads for key ICT personnel and subject matter experts from the business (who participate in projects) across the enterprise and over the planning horizon.

9.3 ICT Governance Model

The ICT Governance model provides a framework of accountabilities, processes, and auditable and measurable controls to ensure all investment decisions are prudent, efficient and in the long-term interests of customers. For example, this model provides for integration between technology project delivery teams and principal business owners to ensure that the total cost of ownership is fully assessed in our investment decision making processes.

Our objectives for the ICT governance model are to:

- Provide greater clarity around ICT decision rights
- Provide ICT leadership to strategic decisions and investments
- Provide a framework to prioritise and manage ICT investments
- Ensure ICT architecture enabled business requirements are authorised with supporting evidence
- Ensure ICT operations support are fit for purpose and can support critical business services in times of disaster and catastrophic events.

9.4 ICT Project Delivery Governance

We individually assess each proposed project before making a final investment decision, which in some cases can result in us implementing different solutions (or different timings) to those set out in our price review forecast given the long lead time involved in preparing this. Within the regulatory period, we follow a standardised ICT Project Management Lifecycle and Governance process.

Project business cases must demonstrate the value of the technology investment, together with the benefits and the methodology used to quantify those benefits. This approach ensures projects remain prudent, efficient and in-line with customers' long-term interests.

9.4.1 Commencement of initiate and plan stage

The approval of an Investment Brief by the Jemena Leadership Team (or ICT Portfolio Forum for projects less than \$2 million) indicates the commencement of the Initiate and Plan stage of a project. The Investment Brief provides funding for the preparation of the business case, Project Management Plan (**PMP**) and conceptual architecture. Where necessary, the Investment Brief may also provide funding to undertake relevant procurement activities such as Request for Information or Request for Tender in line with Jemena's Procurement Policy.

9.4.2 End of initiate and plan stage

At the end of the Initiate and Plan stage of the project, the critical deliverables created are the business case, PMP, benefits realisation plan and conceptual architecture. Where relevant, procurement activities performed in the Initiate and Plan stage result in vendor contracts ready for execution by Jemena upon approval of the business case.

The purpose of the business case is to present a compelling scenario to obtain relevant approvals and funding for the delivery of the remaining activities of the project, concentrating on the customer, business and financial justification for the recommended actions. The business case is presented to the Jemena Leadership Team (or business-specific committee for projects less than \$2 million) and approved by members of the Jemena leadership team or business steering committee within their respective Delegated Financial Authority.

Upon approval of the business case and depending on the size of a project, a Project Steering Committee may be established. The PMP, which stipulates the stage boundaries for the project and what will be delivered and checked at the end of each stage, is presented to the Project Steering Committee for approval. The approval of the business case and PMP is the stage-gate to move from Initiate and Plan into Analysis and Design.

9.4.3 End of analysis and design stage

At the end of the Analysis and Design stage of the project, the critical deliverable created is the Solution Blueprint (Solution Design Summary). The Solution Blueprint is a summary of the following deliverables:

- Business Requirements
- Process Design
- Detailed Design
- Test Strategy
- Solution Performance Design
- Security Compliance Design.

Towards the end of the Analysis and Design Stage of the project, the Project Manager reviews the following to provide information for the next stage (Build and Test) of the project:

- Identify any variation between planned and actual progress
- Identify any variation in the expected future resource availability
- Assess any current risks for the stage
- Review external developments that may impact on the project.

The Project Manager also assesses whether the PMP and Business Case needs to be revised. This is achieved by evaluating the costs, benefits, risks and schedule that may have been affected by internal or external influences. Possible reasons to update a PMP include changes in:

- Implementation dates
- Cost of delivery or support
- External, corporate or Program environments
- Resources, including internal and external suppliers.

Identified changes required in the PMP are documented in a Change Request, and the PMP requires approval once updated. Where changes in the PMP impact the Business Case (e.g. costs of delivery or support, or delayed benefit realisation), a revision to the Business Case is required.

9.4.4 End of build and test stage

At the end of the Build and Test stage of the project, the critical deliverables created are the Cutover Plan and the Go-Live Readiness Report. The Go-Live Readiness Report includes references to the following deliverables:

- Test Summary Report
- Cutover Plan
- ICT Operations Transition Plan
- Business Transition Plan
- Go Live Readiness Report.

The Project Manager reviews the plan for the next stage to ensure that the components of the PMP are still valid. This includes:

- Ensuring the primary products for the Cutover and Close stage of the project is still valid
- Checking external dependencies to ensure that there is no change to the timeframe or scope of the project
- Adding further detail to the project schedule for the Build and Test stage and ensure that inter-project dependencies are identified.

9.4.5 End of cutover and close stage

As the project comes to a close, the Project Manager will notify the ICT PMO that the project is ready for decommission and to close out. The key deliverable from the end of Cutover and Close stage is the Project Close

Report. The Project Manager will complete the Project Close Report, and this is presented to the Project Steering Committee (**PSC**) for approval. Approval of the Project Close Report signifies the project moving through the final stage gate.

In the next regulatory period, our planning will also be informed by post-implementation reports (**PIRs**), as outlined in the AER's November 2019 Guidance Note on non-network ICT capital expenditure assessments.¹⁴ The PIR's will be similar to our current Project Close Reports modified to include the matters listed by the AER, i.e., expressly:

- A comparison of the actual cost to the proposed cost in the business case
- A comparison of the actual timeframe to complete the project with the forecast timeframe
- A comparison of the actually achieved benefit to the forecast benefit (as best estimated) in the business case
- An explanation of any material variations in costs, delivery timeframe, and benefits realised.

9.4.6 Procurement, legal and regulatory process

As part of the ICT Program Management Office methodology outlined above, all ICT projects also involve significant collaboration and peer review with internal teams to ensure solutions are fit for purpose. A typical engagement includes the Customer and Markets team, which will be followed by procurement, regulatory and compliance and legal teams to ensure specialist guidance and support is obtained to ensure compliance with internal and external obligations.

¹⁴ AER, *Non-network ICT capex assessment approach*, November 2019

Attachment A

List of recurrent – base projects

A1. List of recurrent – base projects

The projects listed in Table A1–1 below are recurrent activities which address the lifecycle maintenance of Jemena’s application systems, processing platforms and communications networks based on vendor updates and patching cycles.

JEN’s allocation of costs totals \$42.3M (\$2021) or an average of \$8,463k per annum over the next regulatory period against an average of \$8,620k per annum in the first three years of the current regulatory period.

Table A1–1: List of recurrent – base projects – costs allocation to JEN (\$2021)

Project Title	Project ID	RY22	RY23	RY24	RY25	RY26
Visitor Registration Lifecycle Upgrade	ITSD67	28,478	0	0	0	0
SAP ERP Annual HR/Legal Support Packs Lifecycle	ITSD48	28,478	0	0	0	0
HP Intelligent Management Console Lifecycle Upgrade	ITSD32	0	28,579	0	0	0
Microsoft Skype for Business Lifecycle Upgrade	ITSD42	0	28,579	0	0	0
Web Content Management Lifecycle (Kentico) - PK2	ITSD34	0	0	28,686	0	0
Checkpoint Smartconsole Lifecycle Upgrade	ITSD20	0	0	28,686	0	0
Netflow Lifecycle Upgrade	ITSD44	0	0	28,686	0	0
Microsoft Office Products Lifecycle Upgrade & Testing	ITSD39	0	0	37,866	0	0
OrgPlus Lifecycle Upgrade	ITSD46	28,478	0	0	28,794	0
NetBackup Software Lifecycle Upgrade	ITSD43	28,478	0	0	28,794	0
Azure (cloud) Active Directory Lifecycle Upgrade	ITSD14	0	0	57,372	0	0
Checkpoint Mobile Lifecycle Upgrade	ITSD19	0	0	57,372	0	0
AutoCAD & Drawbridge Inray Lifecycle Upgrade	ITSD29	0	0	57,372	0	0
Oracle Enterprise Manager Lifecycle Upgrade	ITSD45	0	0	57,372	0	0
SAP GRC Support Packs Lifecycle	ITSD56	0	28,579	0	28,794	0
Solarwinds Lifecycle Upgrade	ITSD64	0	28,579	0	28,794	0
InfoBlox (IP Management) System Lifecycle Replacement	ITSD72	28,478	0	0	0	28,903
Mobile Device Management System (Cloud Service)	ITSD70	62,651	0	0	0	0
File Integrity Monitoring & Response (OT & IT) Lifecycle	ITSD28	0	0	0	63,347	0
SAP Portal Support Packs Lifecycle	ITSD60	0	0	0	63,347	0
vRealize Suite Lifecycle Upgrade	ITSD68	34,173	0	0	34,553	0
Budgeting & Planning Migration (to SAP Analytic Cloud)	ITSD15	0	75,450	0	0	0

Project Title	Project ID	RY22	RY23	RY24	RY25	RY26
Land Management System Lifecycle Upgrade	ITEF23	0	0	0	82,034	0
SAP ERP Minor Support Packs Lifecycle	ITSD53	28,478	0	0	28,794	28,903
Integrated Project Portfolio Management - Lifecycle	ITSE06	0	0	0	86,669	0
CYMDIST Minor Lifecycle Upgrade	ITEF07	0	0	107,880	0	0
DrawBridge Minor Lifecycle Upgrade	ITSD31	113,911	0	0	0	0
McAfee EPO Lifecycle Upgrade	ITSD36	0	114,318	0	0	0
Agile Development Support Suite Lifecycle Upgrade	ITSD12	0	114,318	0	0	0
Microsoft AD Federation Services Lifecycle Upgrade	ITSD38	56,955	0	0	57,588	0
Meeting Room Scheduling & Management (Condeco) Lifecycle Upgrade	ITSD22	0	0	0	0	114,926
Follow-Me Print Lifecycle Upgrade (Equitrac)	ITSD26	0	57,159	0	0	57,806
Digital Signage (Common Area Screens) Lifecycle Replacement	ITSD74	0	104,148	14,258	0	0
Network Load Balancing Lifecycle Upgrade (includes licences)	ITSA22	0	118,949	0	0	0
DBYD System Lifecycle Consolidated Platform	ITSE04	119,719	0	0	0	0
Testing Automation Lifecycle Upgrade (HP Quality Centre)	ITSD33	0	0	126,219	0	0
Flexera Management System Lifecycle Replacement	ITSD69	62,651	0	0	0	63,586
IMC HP Data Centre Core Management System Lifecycle Replacement	ITSD71	62,651	0	0	0	63,586
Data Centre Firewall Replacements	ITSA20	0	0	86,145	41,171	0
SIEM (Huntsman) Lifecycle Upgrade	ITSD63	137,832	0	0	0	0
Penetration Testing (associated with project change)	ITSE36	28,478	28,579	28,686	28,794	28,903
SAP ERP Desktop Client Upgrades Lifecycle	ITSD49	28,478	28,579	28,686	28,794	28,903
Treasury System Lifecycle Integration Testing	ITSD66	28,478	28,579	28,686	28,794	28,903
SAP Portal Major Release Lifecycle	ITSD59	0	150,899	0	0	0
SuccessFactors Lifecycle Integration Testing	ITSD65	42,716	28,579	28,686	28,794	28,903
AMI MSI Java Lifecycle Upgrade	ITEF01	0	81,423	0	0	82,344
RESIS Lifecycle Upgrade	ITEF17	0	81,423	0	0	82,344
Backup Hardware Growth/Capacity	ITSA11	56,736	0	57,030	57,182	0
ServiceNow Annual Update Testing/New Functionality	ITSD61	34,458	34,581	34,710	34,841	34,972

Project Title	Project ID	RY22	RY23	RY24	RY25	RY26
Emergency Outage Report CX Hub Integration & Lifecycle - PK1	ITEF04	0	179,130	0	0	0
GIS DBYD Consolidated System Lifecycle	ITSD01	0	0	0	189,095	0
External Website Lifecycle Refresh - PK2	ITSD27	62,651	0	63,110	0	63,586
Data Centre DWDM Replacement	ITSA03	0	0	196,842	0	0
Electricity Outlook Portal CX Hub Integration & Lifecycle - PK1	ITEF03	0	98,522	0	0	99,636
SAP ERP Gateway Patches Lifecycle	ITSD51	28,478	57,159	28,686	57,588	28,903
Oracle Database Upgrades	ITSA06	0	74,306	74,584	0	75,147
Clearpass Network (WiFi) Access Controller Lifecycle Upgrade	ITSD21	0	228,635	0	0	0
SharePoint 2013 Upgrade	ITSD62	0	0	252,438	0	0
Wireless Access Point Replacements	ITSA04	0	237,437	37,070	0	0
SAP ERP Gateway Support Packs Lifecycle	ITSD52	0	137,181	0	138,211	0
Batch Scheduling Lifecycle Upgrade (Control-M)	ITSD23	137,832	0	0	139,363	0
DrawBridge Major Lifecycle Upgrade (or new product)	ITSD30	0	0	0	278,726	0
Provision for Additional Licences (Growth & Vendor Audit "True-Ups")	ITSE11	56,280	56,481	56,692	56,905	57,120
Desktop/Laptop OS Upgrades (Release Testing)	ITSA14	56,955	57,159	57,372	57,588	57,806
Active Directory Lifecycle Upgrade	ITSD11	288,763	0	0	0	0
Identity Management Lifecycle Upgrade (Dell One)	ITSD24	300,724	0	0	0	0
SAP ERP Support Packs Lifecycle	ITSD54	300,724	0	0	0	0
Kofax Replacement	ITSD35	300,724	0	0	0	0
GIS Smallworld Minor Lifecycle Upgrade	ITEF12	324,532	0	0	0	0
Outage Portal CX Hub Integration & Lifecycle - PK1	ITEF13	162,266	0	0	164,069	0
GIS Mobile Enterprise Server Minor Lifecycle Upgrade	ITEF11	0	0	326,908	0	0
GIS Field Capability	ITEG15	0	0	326,908	0	0
GIS Data Sharing Capability (Customer Portal) Lifecycle Upgrade	ITEF08	0	0	0	0	329,377
Security Reporting & Auditing	ITSE39	68,916	69,162	69,420	69,682	69,945
Server Hardware Growth/Capacity	ITSA19	70,780	70,959	71,147	71,336	71,527
Electricity Distribution Portal CX Hub Integration & Lifecycle - PK1	ITEF02	196,342	0	0	198,523	0
GIS Engineering Analysis Lifecycle Upgrade	ITEF09	81,133	81,423	81,727	82,034	82,344
Corporate Works KPI Reporting & Dashboards Enhancements	ITEG26	81,133	81,423	81,727	82,034	82,344

Project Title	Project ID	RY22	RY23	RY24	RY25	RY26
Branch Network Replacement	ITSA01	98,276	146,336	86,899	39,196	50,453
ARIS Lifecycle Upgrade	ITSD13	0	150,899	151,463	0	152,607
Mobile Phone Replacement Program (rolling)	ITSA23	91,346	91,577	91,819	92,064	92,310
Hypervisor Upgrades	ITSA16	250,603	0	0	253,388	0
Meeting Room Equipment Lifecycle Upgrade	ITSD37	432,563	73,944	0	0	0
Conference Room Equipment Lifecycle Replacement	ITSD73	0	433,657	74,139	0	0
Storage Hardware Growth/Capacity	ITSA12	176,338	0	177,252	177,724	0
Software Defined Wide Area Networking Lifecycle Upgrade	ITSA21	0	267,503	268,502	0	0
GIS Data Asset Reporting & Dashboard - Service Improvement Requests	ITEG10	107,095	107,478	107,880	108,285	108,694
Brocade Storage Switch Replacement	ITSA10	68,083	0	0	0	586,253
GIS Web Viewer Lifecycle Upgrade	ITEF15	0	325,691	0	0	329,377
GIS Data Sharing Capability Build (Customer Portal)	ITEG13	0	325,691	0	0	329,377
SQL Database Upgrades	ITSA07	148,084	148,613	149,168	149,729	150,295
Data Centre Network Replacement	ITSA02	199,162	495,443	73,398	0	0
GIS Connect to SBI (SAP Integration) Lifecycle Upgrade	ITEF05	0	788,172	0	0	0
GIS Mobile Enterprise Server Major Lifecycle Upgrade	ITEF10	856,763	0	0	0	0
SAP ISU (AMI) Enhancement Packs Lifecycle	ITEF18	0	0	863,036	0	0
Document Mgt System Lifecycle Upgrade (ECMS)	ITSD25	328,062	0	330,464	0	332,960
Storage Replacement	ITSA09	0	1,010,524	74,139	0	0
Webmethods Lifecycle Upgrade	ITEF22	0	0	549,205	551,271	0
CYMDIST Major Lifecycle Upgrade	ITEF06	548,458	0	0	0	556,647
GIS Service Improvement Requests (Across all GIS, Drawing & DBYD tools)	ITEG21	253,135	254,039	254,988	255,947	256,914
Server Host Hardware Replacements	ITSA18	734,673	630,093	0	0	0
Backup Infrastructure Replacement	ITSA08	0	1,474,061	0	0	0
LINUX/Windows OS Upgrades	ITSA17	296,168	297,226	298,336	299,458	300,589
GIS Smallworld Major Lifecycle Upgrade (incl. interface & platform updates)	ITEG18	0	0	1,529,928	0	0
SAP ISU (AMI) Minor Support Packs Lifecycle	ITEF19	356,985	358,260	359,598	360,951	362,314
Desktop/Laptop Replacements	ITSA13	559,871	533,703	274,510	536,540	565,782
Itron IEE Lifecycle Upgrade	ITEF16	0	1,641,483	1,647,614	0	0

Project Title	Project ID	RY22	RY23	RY24	RY25	RY26
SCADA/RTS Solarwinds Lifecycle Upgrade	ITSC05	0	35,547	0	35,813	0
Totals		9,064,649	12,180,219	9,981,369	5,225,401	5,865,290