

Software Replacement

Regulatory Business Case (RBC) 2024-29

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1. Summary

This preliminary business case¹ has been prepared to provide the justification for the proposed expenditure for ICT software replacement over the 2024-29 regulatory period ('the next RCP'). The driver of the replacement is technical end-of-life of the in-scope software.

This preliminary business case is aligned to Power and Water's corporate Strategic Plan (2020 – 2030) and to the ICT Strategy.²

The business case demonstrates that Power and Water has undertaken appropriate analysis of the need for the expenditure and identified credible options that will resolve the need, to ensure that Power and Water continues to manage the ICT network prudently and efficiently.

1.1 Business need

As part of the annual planning cycle, the applications are evaluated to ensure that technology debt³ does not build excessively over the course of the next RCP. Software refreshes, upgrades, and replacement is common industry practice as the applications reach end-of-life. Power and Water's current practice is to maintain at least the Tier 1 (i.e. operationally critical) applications at no more than one version behind current version or what is referred to as a 'N-1' status.⁴

Software refresh/upgrade/replacement is a recurrent activity with the timing of the investment based on vendor roadmaps (i.e. product lifecycle) and Power and Water's risk assessment.

The applications that are the subject of this business case are all 'Tier 1' applications which are given the highest level of support and Power and Water has the lowest tolerance for outages of applications in this category.

1.2 Options analysis

The options considered to address the identified need are shown in Table 1.

Table 1 Summary of credible options

Option No.	Option name	Description	Recommended
1	Maintain current software versions	Continue using software that has reached end-of-life and pay increased annual maintenance costs to vendors (if extended support is available)	No

¹ This business case will outline the software replacement program, however, the options and preferred option scope, impacts, interdependencies, sequencing, resourcing, schedule and costings for individual projects will be completed as part of Power and Water's internal final business cases.

² ICT Strategy 2022-2032

³ Technology debt is like financial debt in that the cost to eliminate the gap to contemporary products grows until the cost of removing the debt or backlog can be an impediment with the added risk of business impairment as applications become obsolete (unsupported and not-it-for purpose)

⁴ N-1 refers to the software version that is one refresh behind the latest version

2	Risk-based upgrade to supported versions of Tier 1 applications	Upgrade selected operating systems' to supported version applying where possible an 'N-1' lifecycle strategy	Yes
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The table below summarises the financial and other assessment metrics for the two options considered.

A cost-benefit analysis has not been undertaken as the driver for the expenditure is maintaining the current level of risk and (to a large extent) functionality of the software applications.

1.3 Recommendation

Option 2 (Risk-based software upgrade) is the recommended option at an estimated capital cost of [REDACTED] (real 2021/22) for the 2024-29 regulatory period. This is the least-cost technically viable solution and is a continuation of the software replacement program in the current regulatory period.

This option⁵ is

- Aligned to Power and Water’s corporate Strategic Plan (2020 – 2030) and to the ICT Strategy.⁶
- Prudent and has been carefully considered and informed by current data and information.
- Not in excess of the amount required to efficiently support our network investment and day-to-day operational activities.

Table 2 shows a summary of the expenditure requirements for the 2024-29 regulatory period.

Table 2: Forecast annual capital and operational expenditure (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Opex	-	-	-	-	-	0.00
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

The forecast expenditure for the next regulatory control period allocated to Standard Control Services as per the CAM is outlined in Table 3.

Table 3: Forecast annual capital and operational expenditure – allocated to SCS (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Opex	-	-	-	-	-	0.00
Total	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

⁵ This business case outlines the hardware replacement program, however, the scope, impacts, interdependencies, sequencing, resourcing, schedule and costings for individual projects will be completed as part of Power and Water’s internal final business cases.

⁶ Power and Water, ICT Strategy 2024-2029

The forecast expenditure for the next regulatory control period allocated to recurrent and non-recurrent categories is outlined in Table 4.

Table 4: Forecast annual capital expenditure – recurrent and non-recurrent

Item	FY25	FY26	FY27	FY28	FY29
Recurrent	100%	100%	100%	100%	100%
Non-recurrent	-	-	-	-	-

2. Identified need

This section provides the background and context to this business case, identifies the issues that are posing increasing risks to Power and Water and its customers, describes the current mitigation program and its delivery status, and provides a risk assessment of the inherent risk if no investment is undertaken.

In this document, reference made to 'upgrade' of software, should be read as applying to refreshing and replacing software also. The terms application and software are used interchangeably.

2.1 Asset condition and emerging issues

Application and software maintenance, refreshes, and upgrades are required to minimise the risk of disruption to operations and vulnerability to cyber-attacks, and to ensure the software is fit-for-purpose given evolving operational needs. Also, licences for other core systems will expire and require renewal.

Failure to replace or upgrade ICT software can lead to the following consequences:

- Higher maintenance costs.
- Software failure leading to business disruption.
- Insufficient cyber security protection, undermining Power and Water's drive to improve its cyber security maturity.
- Loss of productivity due to loss of functionality.

2.1.1 Applications approaching end-of-life

Key software and applications that support Power and Water's operations are expected to reach end-of-life during the next RCP. End-of-life is assessed by Power and Water from two perspectives;

- Technical end-of-life – when the software is either, no longer supported by the vendor, or incompatible with contemporary operating systems and infrastructure.
- Economic end-of-life - the costs of extended support contracts (if available) exceed the cost of refresh/upgrade/replacement.

The list of nine applications in Table 5 comprises the essential 'enterprise' applications that are used by Power and Water and have been assessed to reach end-of-life during the next RCP. These are considered "Tier 1" applications which are given the highest level of support and applications in this category have a low tolerance for outages. If these systems are not upgraded or supported under a vendor agreement, this will increase the vulnerability to cyber security threats. Additionally, it will also lead to limited functionality which can result in disruptions to the delivery of power to customers.

Table 5 Applications that are assessed as reaching end-of-life during the next RCP

System Name	Description	Support Status	Comments
HPE Content Manager (CM9)	Document Management System	Standard support ends in 2022	PWC will utilise extended support
SAP Business Objects (Business Intelligence)	Business Reporting	Supported	Support ends in 2027

Oracle Fusion Middleware	System Integration Enabler	Supported	Support finishes in 2027
Oracle Application Express (APEX)	Multiple Applications	Supported	Support finishes in 2027
Maximo	Asset Management System	Supported	Upgrade due November 2026
Osi Pi	Data historian and data acquisition	Supported	Support finishes in 2027
Solar Winds	Network management tool	Supported	Support finishes in 2027
Atlassian Stack (Jira & Confluence)	Corporate Services and ITSM tool	Supported	Cloud upgrade
Genesys	Call centre management system	Supported	Cloud upgrade

[1] includes the option of replacement or refresh if otherwise indicated

2.1.2 Out of scope software

Other enterprise software systems will be either required to be upgraded or are new requirements driven by one or more of Power and Water’s transformational ICT projects, listed below:

- Operating Model project
- OT Capability Uplift project
- Cyber security project.

The respective business cases for these projects identify the software (and hardware) requirements and include any related initiatives as part of the project scope and cost. They are therefore out of scope for this business case.

2.2 Current management program

As part of the annual planning cycle, the applications are evaluated to ensure that technology debt⁷ does not build excessively over the course of the next RCP. Software refreshes, upgrades, and replacement is common industry practice as the applications reach end-of-life. Power and Water’s current practice is to maintain at least the Tier 1 (i.e. operationally critical) applications at no more than one version behind current version or what is referred to as a ‘N-1’ status.⁸

Software refresh/upgrade/replacement is a recurrent activity with the timing of the investment based on vendor roadmaps (i.e. product lifecycle) and Power and Water’s risk assessment.

⁷ Technology debt is like financial debt in that the cost to eliminate the gap to contemporary products grows until the cost of removing the debt or backlog can be an impediment with the added risk of business impairment as applications become obsolete (unsupported and not-it-for purpose)

⁸ N-1 refers to the software version that is one refresh behind the latest version

Power and Water's strategy for refreshing applications is to balance risk and cost: remaining one version from the latest release from vendors. This is referred to as a 'N-1' strategy. This helps to largely avoid the issues that are often embedded in new releases, but that are largely addressed by the next refresh or upgrade of the product.

Power and Water's strategy for replacement of applications is to use commercial off-the-shelf (COTS) products requiring minimal or no customisation and it will only replace an application in response to one of the following criteria being triggered:

- The application is no longer fit-for-purpose – typically because the business requirements require additional or significantly enhanced functionality that is not achievable without excessive customisation
- The application is withdrawn by the vendor and replaced with an alternative product.

Power and Water have a recurrent software replacement program in place in the current regulatory period, which is on average estimated to incur \$1.3 million (real 2021/22) per annum for FY23 and FY24.

2.3 Risk assessment

The figure below shows the current risk rating, inherent rating in 2029 (if there is no remedial action(s)), and the residual (post-treatment) risk ratings.

- **Current Rating** is 'Medium': Although Power and Water currently refreshes, upgrades, or replaces software in accordance with our risk-based assessment of software is at end-of-life which means the application issues are unlikely, the criticality of the software means that the consequences of disruption will be at least moderate; the current ICT strategy is based on keeping our current version one release behind the latest version available from the relevant vendor.
- **Inherent rating** is 'High': without any action during the course of the next RCP to refresh, upgrade or replace 'Tier 1' software that is assessed to be at end-of-life, the consequences described in the table below are likely to eventuate by the end of the next RCP (i.e. FY29).
- **Residual rating** is 'Medium': for the same reasons discussed for the 'current rating', the proposed refresh/upgrade/replacement of Tier 1 software applications during the course of the next RCP will mean that the risk of business disruption (including from cyber-attacks) remains as 'Medium'.

Figure 1: Software replacement risk assessment through to the end of the next RCP

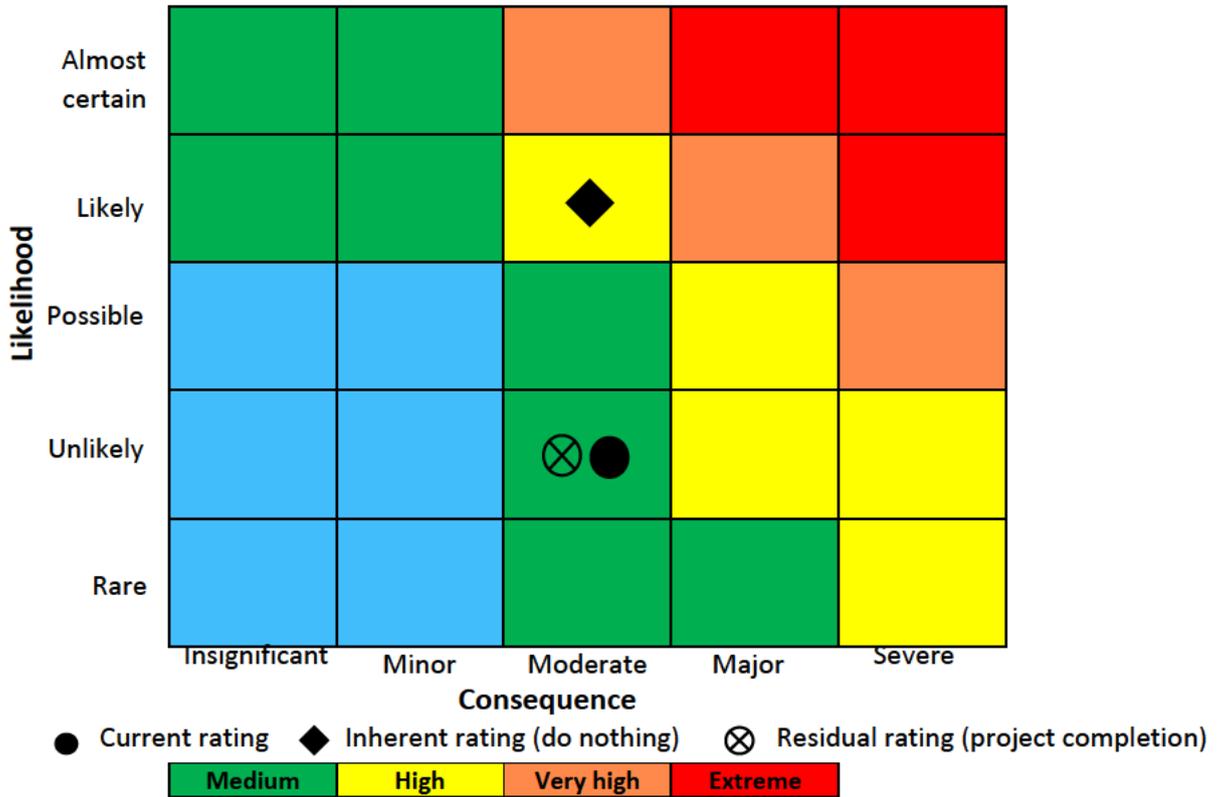


Table 6: Qualitative analysis underpinning the risk matrix

Risk Title	Impact	Inherent Rating	Mitigation
Major disruption to key systems	System will not be able to perform its intended function, which could lead to a loss of service or even a complete breakdown. In some cases, the asset failure may also cause other systems to fail.	High	Monitor software renewal schedule and maintain N-1 status of key applications Monitor the systems closely so that any potential problems can be detected and dealt with before they cause a failure
Old and outdated software is vulnerable to outside influences and cyber threats	Increased probability to cyber-attacks on major systems, leading to loss of information and downtime of operating systems.	High	Maintain N-1 application status to keep evolving cyber security for key applications
Software is not fit-for-purpose for changing business needs	Power and Water will not be able to meet its business objectives	Medium	Maintain N-1 application status to support business objectives

Higher operating costs	Higher maintenance support fees and/or remediation costs	Medium	Maintain N-1 application status to minimise operating costs
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2.4 Summary

Software refresh/upgrade/replacement is a recurrent activity with the timing of the investment based on vendor roadmaps (i.e. product lifecycle) and Power and Water’s risk assessment.

The applications that are the subject of this business case are all ‘Tier 1’ applications which are given the highest level of support and Power and Water has the lowest tolerance for outages of applications in this category.

The scope of work in this business case is complementary to but does not duplicate the need for new or replacement software driven by the three major ICT-based projects that Power and Water is progressing over the current and next RCPs:

- Operating Model project
- OT Capability Uplift project
- Cyber security project.

Each of these projects are subject to stand-alone business cases.

3. Options analysis

This section describes the two options that were identified in response to the business need described in section 2. The options are analysed based on the ability to address the identified needs at an efficient cost, cognisant of technical feasibility, deliverability, and benefits and striking an optimal balance between long term asset risk and short-term asset performance.

3.1 Comparison of credible options

Credible options are identified as options that address the identified need, are technically feasible and can be implemented within the required timeframe. The following options have been identified:

- Option 1 – Maintain current versions. This option Continue using software that has reached end-of-life and pay increased annual maintenance costs to vendors (if extended support is available)
- Option 2 – Risk-based software upgrades.⁹ This option proposes to upgrade selected operating systems’ to supported version applying where possible an ‘N-1’ lifecycle strategy.

A comparison of the two identified credible options and the issues they address in the identified need is depicted in Table 7.

These options are described and assessed in detail in the sections below.

Table 7 Summary of options analysis outcomes

Assessment metrics	Option 1	Option 2
NPV (\$m, real 2022)	n/a	■
Capex (\$m, real 2022)	< option 2	■
Opex (\$m, real 2022)	>> option 2	■
BCR	n/a	n/a
Meets customer expectations	●	●
Aligns with Asset Objectives	●	●
Technical Viability	●	●
Deliverability	●	●
Preferred	✘	✓
Ranking	2	1

 Fully addresses the issue
  Adequately addresses the issue
  Partially addresses the issue
  Does not address the issue

⁹ Rather than upgrade, application refreshes or replacement may apply depending on the vendor’s product roadmap

n/a = not applicable; note that a cost-benefit analysis has not been undertaken as the expenditure is not benefits-driven

3.1.1 Option 1 – Maintain current software versions

Option 1 assumes that Power and Water does not refresh, upgrade, or replace¹⁰ any of its Tier 1 software applications until FY30. This is not a cost-free approach. Relative to Option 2, this is a higher cost option due to higher maintenance costs, particularly following software failure leading to business disruption.

Further disadvantages of this option include:

- Outdated Tier 1 applications that are not upgraded will, following expiry of vendor support, suffer increasing reliability issues, and in turn causing operational disruption
- Outdated software generally provides less functionality and subsequently less value to the business.
- Insufficient cyber security protection, undermining Power and Water’s drive to improve its cyber security maturity.
- Cyber security vulnerabilities may be exploited.
- Costs are likely to be incurred from (i) business interruption and recovery, (ii) outdated systems requiring a more complex upgrade process (iii) cost of developing and implementing workarounds, and (iv) loss of productivity from loss or inadequate functionality.

Advantages of this option are that, in the event of no software failures or cyber breaches, the opex for additional maintenance support is likely to be less than for Option 2.

This option is not recommended.

3.1.2 Option 2 – Risk-based upgrade of software

Option 2 is consistent with good industry practice and is a continuation of Power and Water’s current applications management approach, which is to refresh, upgrade, or replace Tier 1 software when it is assessed to be at end-of-life. This option is based on a risk assessment, balancing the likelihood of software unreliability and excessive technology debt incurred from delaying software upgrades with the cost (time and money) to upgrade proactively. Upgrading critical enterprise applications at end-of-life is consistent with good industry practice to minimise the risk of software unreliability failures.

The estimated cost of this option is [REDACTED] (real 2021/22) for the 2024-29 regulatory period.

The advantages of this option include:

- Maintain required availability of applications for end users;
- Avoids risk of software failure to impact business operations and avoids any associated cost to manage this
- Maintain vendor support
- Avoid high maintenance costs for support of outdated software
- Reduce exposure to cyber security intrusions

¹⁰ Depending on the vendor’s roadmap for the product, Power and Water will either refresh (e.g. from version 2.1 to version 2.2) or upgrade (from version 2.10 to version 3.0) the application; if business functionality requirements are not met by the current application, replacement is likely justified

- Ensure compatibility with new infrastructure
- Consolidated view of total cost of ownership of applications across the organisation,
- Reduced application stack and complexities in operating (i.e. processes being able to be run in 2 app

The disadvantages of this option include:

- Upgrade capital cost
- Time and effort required to perform upgrades
- Risk of business disruption during upgrade and implementation
- Risk of user dissatisfaction or refusal to accept and use new systems.

The cost and options to each enterprise application upgrade or replacement will be reviewed by PWC management through the expenditure governance process.

Additionally, the cost of each system upgrade will be confirmed closer to the date of implementation. PWC Management will overview justification and competitive cost management at the appropriate stage of the project lifecycle.

This option is recommended.

3.2 Non-credible options

No non-credible options were identified.

4. Recommendation

Adoption of Option 2 (Risk-based upgrade of software) at an estimated capital cost of [REDACTED] (real 2021/22) is recommended for the 2024-29 regulatory period. This is the most prudent and cost-effective approach to meet the business need.

Timely upgrading of the nine designated Tier 1 software applications at or near end-of-life will provide the appropriate balance between the risk of system failure and/or unplanned production outages and the cost of the upgrades.

The proposed program is consistent with the National Electricity Rules Capital Expenditure Objectives as the scope of PWC's enterprise application refresh program includes key systems which PWC operate in the course of maintaining quality and reliability of standard control services.

4.1 Strategic Alignment

The "PWC Corporation Strategic Direction" is to meet the changing needs of the business, our customers and is aligned with the market and future economic conditions of the Northern Territory projected out to 2030.

This proposal aligns with Asset Management System Policies, Strategies and Plans that contributes to the "PWC Strategic Direction" as indicated in Table 8.

Table 8 Strategic alignment

	Strategic direction focus area	Strategic direction priority
1	One Power and Water	Improve Public Health and Safety
2	Always Safe	Cost Prudence

4.2 Dependent projects

No dependent projects have been identified.

4.3 Deliverability

Delivery risk is low. Power and Water regularly updates software applications in partnership with the vendors and integrators. Solid delivery and security management capability exists, with defined processes in place. Power and Water ICT adopts known industry frameworks, such as COBIT, ITIL v4 and PRINCE2, to support internal processes.

Power and Water has a well-designed and documented implementation model to direct and guide architectural choices and investments. A set of integrated architectural principles has been formulated to ensure that a holistic approach is taken in deciding on the most prudent, balanced and cost-effective approach to deliver the desired outcome.

4.4 Customer considerations

Evolving customer expectations regarding service levels, cost efficiency, and integration of renewables into the power system mean that enabling operational software applications are reliable and fit-for-purpose.

Our customers also expect us to adopt the economically prudent solution and provide a reliable service to customers. This project will assist achieve this objective.

4.5 Expenditure profile

Table 9 shows a summary of the expenditure requirements for the 2024-29 regulatory period.

Table 9: Forecast annual capital and operational expenditure (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	█	█	█	█	█	█
Opex	-	-	-	-	-	0.00
Total	█	█	█	█	█	█

The forecast expenditure for the next regulatory control period allocated to Standard Control Services as per the CAM is outlined in Table 10.

Table 10: Forecast annual capital and operational expenditure – allocated to SCS (\$m, real 2021/22)

Item	FY25	FY26	FY27	FY28	FY29	Total
Capex	█	█	█	█	█	█
Opex	-	-	-	-	-	0.00
Total	█	█	█	█	█	█

The forecast expenditure for the next regulatory control period allocated to recurrent and non-recurrent categories is outlined in Table 11.

Table 11: Forecast annual capital expenditure – recurrent and non-recurrent

Item	FY25	FY26	FY27	FY28	FY29
Recurrent	100%	100%	100%	100%	100%
Non-recurrent	-	-	-	-	-

The proposed investment is recurrent because each of the applications are expected to be upgraded, refreshed or replaced within a maximum five year cycle. Some applications will need to be upgraded twice within the next RCP.

4.6 High-level scope

The following activities are included within the scope of work for the upgrade of each of the eleven applications:

- Initiation and business engagement.
- Business requirements specification.
- Purchase of the application.
- Technical requirements / product architecture changes.
- Establish or reuse application environments (dev, test, production).
- Application migration.
- Testing (system, integration and user acceptance).
- End-user communication, coordination, change management.
- Updated support documentation and end-users training.
- Deployment into production.
- Hypercare and establishment or continuation of support arrangements.

These activities apply to the nine Tier 1 applications listed in Table 12.

Table 12 Applications identified for expenditure in the next RCP

System Name	Description	Support Status	No. of upgrades ¹¹	Comments
HPE Content Manager (CM9)	Document Management System	Standard support ends in 2022 PWC will utilise extended support	2	Upgrade 1 2025 Upgrade 2 2029
SAP Business Objects (Business Intelligence)	Business Reporting	Supported	1	Support ends in 2027
Oracle Fusion Middleware	System Integration Enabler	Supported	1	Support finishes in 2027
Oracle Application Express (APEX)	Multiple Applications	Supported	1	Support finishes in 2027
Maximo	Asset Management System	Supported	1	Upgrade due November 2026
Osi Pi	Data historian and data acquisition	Supported	1	Support finishes in 2027
Solar Winds	Network management tool	Supported	1	Support finishes in 2027

¹¹ includes the option of replacement or refresh if otherwise indicated

Atlassian Stack (Jira & Confluence)	Corporate Services and ITSM tool	Supported	1	Cloud upgrade
Genesys	Call centre management system	Supported	1	Cloud upgrade

Appendix A. Cost estimation

The cost estimate for Option 2 was based on an average of historical spending for enterprise systems.

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