OTE Infrastructure Replacement Ergon Energy

Justification Statement

31st October 2024

ERGON ENERGY NETWORK
Part of Energy Queensland

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DOCUMENT VERSION

Version Number	Change Detail	Date	Updated by
1.0	Approved Version	15/11/2024	General Manager Grid Technology

1 SUMMARY

Title	OTE Infrastructure Improvements
DNSP	Ergon
Expenditure category	☒ Replacement ☐ Augmentation ☐ Connections ☐ Non-network
Identified need *(select all applicable)*	☐ Legislation ☒ Regulatory compliance ☒ Reliability ☐ CECV ☐ Safety ☐ Environment ☐ Financial ☐ Other Ergon Energy distributes energy to 93% of Queensland and operates two Control Room facilities in Townsville and Rockhampton. In contrast, Energex has one Control Room facility but manages several sites in the Southeast corner. The presence of multiple Control facilities is part of Energy Queensland's broader strategy to diversify and mitigate risks, which also involves distributing Data Centre capabilities across the state. The Operational Technology Environment (OTE) provides a secure computing platform designed for real-time, high-priority operations that control the distribution network. These assets are crucial for ensuring a reliable energy supply to customers, and Ergon Energy recognizes the importance of effectively managing them. Many of these assets are expected to reach the end of their original design lifespan during the 2025-30 regulatory period. These servers, workstations, and related systems are vital for the functioning of critical control systems in the OTE. Failing to manage the lifecycle of these assets properly could jeopardize essential business services. The systems supported by OTE are responsible for: • Ensuring the stability and security of the control platform against cybersecurity threats and asset failures. • Maintaining the stability and security of the communications platform against cybersecurity threats and asset failures. • Fulfilling responsibilities related to power restoration for the community and collaborating with critical services. • Supporting the Queensland Energy and Jobs Plan (QEJP), which aims to increase renewable energy sources and providers. This will increase the workload for the control team and necessitate scalable control room platforms. • Meeting obligations to external partners, especially Emergency Services (QES and QPS) and Transmission providers (Powerlink).

<table>
<tr><td>Expenditure</td><td>
<table>
<tr><th>Year</th><th>Previous period</th><th>2025-26</th><th>2026-27</th><th>2027-28</th><th>2028-29</th><th>2029-30</th><th>2025-30</th></tr>
<tr><td>$m, direct 2025-27</td><td>4.0M</td><td>3.6M</td><td>0.5M</td><td></td><td></td><td></td><td>4.1M</td></tr>
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</td></tr>
<tr><td>Benefits</td><td>

$488k of avoided costs associated with additional support and maintenance costs and reduced Value of Customer Reliability (VCR) savings
Avoidance of significant business disruptions in the delivery of planned and unplanned work on the network due to the failure or performance issues caused by aging control and communications platforms and supporting technology stack
Avoided cyber security risks associated with exposure of vulnerabilities associated with aging software and hardware
Avoidance of data loss associated with failing infrastructure

</td></tr>
<tr><td>Consumer engagement</td><td>At this point in time, no customer engagement has been performed on this specific network ICT business case.</td></tr>
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Table 1 The Executive Summary

2 PURPOSE AND SCOPE

The purpose and scope of this business case is to assess the feasible investment option for managing the prudent and efficient asset lifecycle of Ergon Energy's Operational Technology Environment workstation and server fleet so that it remains secure, reliable, and efficient.

The investment that underpins this business case is driven by the following objectives:

- Maintain prudent and efficient asset management of Ergon Energy's Operational Technology Environment compute infrastructure
- Provide efficient, reliable, and scalable infrastructure services to Ergon Energy's control rooms
- Support and integrate new and emerging operational technologies
- Modernise the infrastructure to mitigate increasing cyber security risk
- Ensure critical systems are supported by an up-to-date infrastructure systems

3 BACKGROUND

3.1 Asset Population / Site Summary / Capability

The Ergon Energy operational technology environment (OTE) provides a secure computing environment, architected to support real-time and high criticality computing solutions for the operation and control of the distribution network. As such these assets are central to ensuring the supply of energy to customers. Ergon Energy is aware of the need to effectively manage their existing assets. Many of the existing assets are now approaching, have reached, or have passed their original design life.

The average life for these systems is between 3 to 5 years however in some cases the software assets can remain in use for much longer periods if the business requirement still exists and continues to meet Ergon's needs effectively. The list of assets and systems that are included in this justification:

- 102 servers purchased in 2019 and 2020 providing compute to host the Distribution Management System (DMS) and other control applications, as well as hosting the support and associated management systems.
- 74 workstations purchased in 2019 and 2020. These are the DMS workstations used by the control room staff in Townsville in Rockhampton.
- Operating Systems – Ergon has various versions of Windows deployed from Server 2012 to Server 2022 and Windows 10 for workstations. It also has various versions of RedHat Linux from RHEL 7 to RHEL 9. There is an ongoing program to ensure these are replaced prior to end of life to ensure they remain supported.
    - Microsoft Windows Server Lifecycle dates

Release	End of Mainstream Support	End of Extended Support
Windows Server 2012	9th October, 2018	10th October, 2023

Windows Server 2016	11th January, 2022	12th January, 2027
Windows Server 2019	9th January, 2024	9th January, 2029
Windows Server 2022	13th October, 2026	14th October, 2031

- Microsoft Windows Lifecycle dates

Release	End of Mainstream Support	End of Extended Support
Windows 11 24H2	12 Oct 2027	12 Oct 2027
Windows 11 23H2	10 Nov 2026	10 Nov 2026
Windows 10 22H2	14 Oct 2025	14 Oct 2025

- RedHat Linux Lifecycle dates

Release	End of Full Support	Maintenance Support Ends	Extended Life Phase Ends
RHEL 9	31 May 2027	31 May 2032	31 May 2035
RHEL 8	31 May 2024	31 May 2029	31 May 2032
RHEL 7	6 August 2019	30 June 2024	30 June 2028

- In addition, we have the following systems that we must prudently manage their lifecycle:

System	System Criticality
VMware virtualisation	High
RedHat OpenShift	High
Certificate Management	High
Active Directory	High
SCCM	Medium
IGA (Identity, Governance and Administration)	Low
Dell OME (OpenManager Enterprise)	Low
Trellix EPO	High
CI/CD	Medium
OTWiki	High
SNOW	Low
Ansible	Medium

4 IDENTIFIED NEED

4.1 Summary

Ergon is aware of the need to efficiently manage these software systems and this project proposes a multi-faceted approach as follows to ensure a prudent approach to maintaining system stability, increase reliability and performance, ultimately managing costs by replacing services and infrastructure before in-service failure or removal of support impacts the manageability of the infrastructure.

The software and infrastructure lifecycle and replacement strategy are evaluated on a case-by-case basis, considering the specific circumstances and objectives of each system. The strategy for lifecycle management is categorised as follows:

- **Maintain currency.** Regular and routing patching to occur where required to resolve software bugs, security vulnerabilities, maintain system stability. This project proposes to patch each of the major systems at an average interval of once per annum in accordance with vendor recommendations and industry guidelines. Operating systems will be patched on a minimum of a 3 monthly basis to mitigate vulnerabilities.
- **Maintain vendor support.** Maintaining vendor support is vital for these software systems because it offers technical expertise, bug fixes, compatibility updates, security patches, performance improvements, troubleshooting assistance, online manuals, and training resources. The availability of vendor support ensures that software systems remain reliable, secure, and up to date, enhancing their value and contributing to the smooth functioning of Ergon's daily operations. Generally, once every 3-5 years it is required to perform a major revision upgrade of each system to maintain vendor support for the software itself, or to ensure compatibility with newly deployed telecommunications equipment, firmware and feature sets managed through this software.
- **Maintain obsolete software system.** The software system in this category has either been retired from the manufacturer, Ergon no longer require the capability, or the capability can be consolidated into other existing systems to reduce the amount of overhead required to manage and maintain. This project proposes to remove obsolete and unsupported versions of base infrastructure, such as Windows, Linux and VMware.
- **Maintain reliability.** Replacement of the Server and Workstation fleet to ensure that asset management of the critical platforms aligns with Energy Queensland's Digital Asset Management Guidelines, by not extending operation of the assets beyond their useful life. This will allow for the high availability and performance of the platform to remain constant to avoid costly business disruptions due to asset failures or performance issues.

4.2 Counterfactual

The counterfactual considers the continued use of the current infrastructure platform and supporting technology stack beyond its useful asset life from FY26 onwards. This means that only extended maintenance and support (where available) and remedial/restoration of services with be funded through operating costs, with no capital investment in minor and major upgrade and/or replacement of the infrastructure.

The absence of capital investment in the 2025-30 regulatory control period would mean that over time the current solution would no longer be fit-for-purpose and may become incompatible with

upgraded systems, e.g. new versions of the DMS, and new and emerging systems and technologies used by Ergon Energy and third parties.

Whilst this option has extremely low upfront expenditure and minimal business change, these are outweighed by the growing risks that impact the efficient delivery of services within the control room and the network, as well as increased long-term costs that would have a direct impact on Ergon Energy and its customers. Long term issues resultant from this option include:

- Potential disruptions to critical business operations in the control room and in the field from degrading performance and/or failure of the underlying infrastructure and its supporting technology stack
- Increased cyber security risks associated with vulnerabilities on aging/legacy solution that becomes more difficult to efficiently secure over time
- Additional costs associated with disruptions and restoration of the underlying infrastructure and associated critical control systems
- Reduced customer confidence through potential delays in planned outages and restoration of power following unplanned outages.

The recommended option involves the replacement of the servers in the 25/26 and 26/27 financial years.

4.3 Costs

4.3.1 Base Case Costs

Base Case Costs include the costs associated with keeping the legacy environment maintained in an operational state. These cover the costs associated with maintaining both hardware and software ongoing should the status quo be maintained.

Table 2 Base Case Costs

	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025-30
Capex	-	-	-	-	-	-
Opex	$0.19M	$0.34M	$0.36M	$0.37M	$0.38M	$1.64M
Totex	**$0.19M**	**$0.34M**	**$0.36M**	**$0.37M**	**$0.38M**	**$1.64M**
Benefits	-	-	-	-	-	-

4.4 Risks

The base case assumes there is no new investment over and above ongoing business as usual (BAU) expenditure. This option therefore exposes Ergon Energy to several risks, as summarised in the following table.

Table 3 Ergon Energy's Delivery Risks for the Counterfactual (Base Case) Option

#	Risk	Description of Risk
1	Increased risk of system failure or degradation of system performance	Aging infrastructure and the associated systems are past the end of their useful asset life and fails or reduces significantly in performance directly impacting business operations
2	Increased cyber security risks	Aging infrastructure and the associated systems are no longer being supported and able to be patched or secured. This may expose Ergon Energy to new and emerging cyber security vulnerabilities that could be exploited by actors with malicious intent. Probability of Failure (PoF): Aged technology is certain (100% likely) to contain vulnerabilities, as identified by vendors constantly releasing security related patches. Likelihood of Consequence (LoC) – Reliability: Cyber attempts on Utilities are to be expected and monitored. Provision of additional FTE along with a per server cost to ensure monitored for these risks. Est. $0.44M over the AER25-30 period
3	Infrastructure not fit for purpose	Increased risk of the underlying infrastructure to allow integration with new control room technologies or meet evolving demands and control room needs over time
4	Increased restoration costs	An increase in frequency of technology related failures will also mean an increase in the restoration costs to restore the control room platforms back to normal operations. Probability of Failure (PoF): To cover the random impact of component failure, vendors offer extended hardware support. This is the cost of incorporating that provision rather than modelling component failure and incorporating costs of internal parts inventory, etc. Likelihood of Consequence (LoC) - Reliability: 100% - as extended support would be taken out with the incumbent vendor. Note: this is only likely to be extended for the duration that the vendor can support parts inventory, likely to only be an addition 5 years past the initial vendor maintenance period. Est. cost of providing extended hardware support is $1.08M over the AER25-30 period.
5	Increased risk of data loss	There will be an increased risk of data loss as legacy technology may not be able to be fully restored and/or data becomes breached and leaked. Probability of Failure (PoF): Application software does not always stay current with vendor Operating System (OS) release. We have many applications that exceed OS release cycles. To mitigate this scenario, OS vendors provide an extended support offering. Likelihood of Consequence (LoC) - Reliability: 100% as there are numerous critical software applications that require this additional coverage before being updated or replaced. Est. cost of providing extended OS is $0.12M over the AER25-30 period.
6	Inability to source skills required for legacy technologies	There will be an increase in the costs and complexity of sourcing the right skills required to maintain and support legacy technology
7	More OT support team time spent on major incidents	Effort will be required to focus on non-value adding activities such as restoration as more incidents occur, meaning less effort concentrated on adding value for both Ergon Energy and the customer

8	Major impact on executing planned and unplanned control system work	An outage to the underlying OT infrastructure can lead to a failure of the control system causing cancellation/rescheduling of planned and unplanned work to the network. Probability of Failure (PoF): We have taken a minimalistic approached to estimating the impact to Customer Reliability, by limiting the exposure to 1 instance of a small 2000KWh impact. Likelihood of Consequence (LoC) - Reliability: 100% likely that an outage would occur should no active remediation be conducted. Estimated to have an impact of approximately $104k per annum of VCR costs and the rescheduling of planned work.
9	Inability to efficiently respond to changing business needs	Inability to efficiently respond to changing business needs (Queensland Energy and Jobs Plan, new technology, etc)

5 ECONOMIC ANALYSIS

5.1 Cost Summary 2025-30

Table 4 Cost Summary 2025-30

	2025-26	2026-27	2027-28	2028-29	2029-30	Total 2025-30
Capex	$3.63 M	$0.5 M	$0.0 M	$0.0 M	$0.0 M	$4.13M
Opex	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M	$0.0 M
Totex	**$3.6 M**	**$0.5 M**	**$0.0 M**	**$0.0 M**	**$0.0 M**	**$4.13M**
Benefits	$0.19 M	$0.34 M	$0.36 M	$0.37 M	$0.38 M	$1.64 M

5.2 NPV Analysis

Table 5 Base Case NPV Analysis

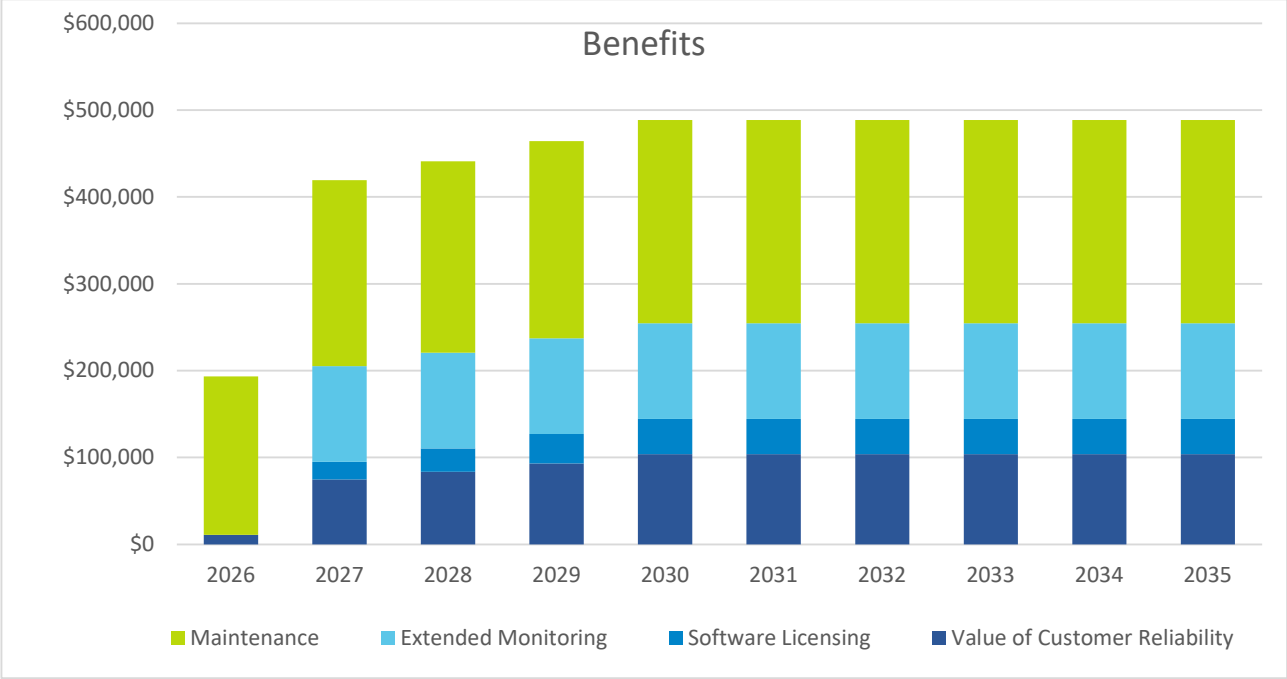
Net NPV	Capex NPV	Opex NPV	Benefits NPV
	$4.1M	$0M	($0.12M)

Table 6 NPV Sensitivity Analysis

Discount rate		Failure rate		Benefits	
2.5%	**4.5%**	**125%**	**75%**	**125%**	**75%**
$0.06M	($0.27M)	$0.07M	($0.30M)	$1.00M	($1.02M)

5.3 Benefit

The yearly benefits cashflow



5.4 Delivery Capability

Energy Qld has established has a robust framework in place to successfully deliver OT projects, leveraging a blend of internal expertise and external partnerships. By utilizing experienced contractors, we can quickly adapt to project demands and access specialized skills as needed. This flexibility not only allows us to scale our efforts based on the scope of each project but also ensures that we remain responsive to evolving client requirements. Over the past few years, we have significantly ramped up our delivery capabilities, successfully scaling from several projects per year to over ten.

To enhance our project execution, we have built strong collaborations with leading external firms that provide us with expertise and industry best practices. These partnerships enable us to stay at the forefront of technological advancements, ensuring that we deliver appropriate solutions. Central to our project management approach is a dedicated program manager who oversees all aspects of delivery, ensuring that projects align with strategic objectives and are executed efficiently. This leadership ensures seamless communication and coordination among all project teams and stakeholders.

In addition, our project teams include a business analyst and a change manager, both of whom play vital roles in our project delivery process. The business analyst engages closely with stakeholders to gather requirements and define project scopes, ensuring that the final deliverables meet client expectations. Meanwhile, the change manager focuses on facilitating smooth transitions, supporting teams and end-users throughout the implementation process. This comprehensive approach, combined with our recent growth in project delivery capacity,

underscores our capability to consistently deliver high-quality OT solutions that drive value for our clients.

6 PROJECT RISKS

No special project risks have been identified.

7 RECOMMENDATION

To proceed with Server and Workstation fleet replacement will improve reliability, enhance security, increase flexibility, improve efficiently, and enhance customer service, all of which will contribute to a more robust and safer network.

Table 7 Analysis Scorecard

Criteria	Counterfactual (Base Case)	OTE Server and Workstation replacement
Net Present Value	N/A	($0.12M)
Investment cost (TCO)*	$1.64M	$4.13M
Investment Risk	High	Low
Benefits	Low	High
Delivery time	Not applicable	2025-30 Period fleet replacement
Detailed analysis – Benefits	Lowest upfront cost	Replacement of the OT Infrastructure will improve platform reliability, mitigate security risks associated with legacy technology, and increase adaptability to new, or upgraded, applications and systems. It also avoids costs of $104k p.a. through VCR and additional support costs.
Detailed analysis – Risks	Whilst this option has low upfront expenditure this is outweighed by the growing risks and long-term costs that would have a direct impact on Ergon Energy's operation of its network and its ability to restore power for its customers.	Identified risks are mitigated as part of this option.
Detailed analysis - Advantages	No upfront capital investment or change management required.	Prudent and efficient asset lifecycle management of this platform in supporting critical business processes and systems. Replacement Infrastructure under vendor warranty.