Business Case
Ergon Obsolete Data Telecommunications

ERGON. ENERGY NETWORK

Executive Summary

Ergon Energy's telecommunications network (CoreNet) provides vital support to operational requirements. This includes critical voice and data services to enable monitoring and control across the distribution network, and to coordinate safe and efficient work. A number of assets in this network are reaching end of life, and action is necessary to ensure these services continue.

This document seeks to provide a high-level description and justification of an allocation of funds in the 2020-25 regulatory control period to replace ageing assets in this network, and should be considered in conjunction with broader strategic documents such as the Telecommunication Asset Management Plan and Intelligent Grid Technology Plan.

Two options were considered but rejected for this business case. A counterfactual option, under which assets are replaced reactively upon failure, was considered but rejected due to the risks associated with permitting assets to fail in service. Replacement of the entire CoreNet system was also considered, but rejected based on significantly higher initial cost and implementation time estimates than the other options considered.

Two network options have been evaluated in this business case:

Option 1 – A minimal risk replacement program, which replaces all assets at the end of support.

Option 2 - A risk-based replacement rolling program, which operates the assets after the end of support but maintains reasonably low risk of in-service failure.

Ergon Energy aims to minimise expenditure in order to keep pressure off customer prices, however understands that this must be balanced against critical network performance objectives. These include network risk mitigation (e.g. safety, bushfire), regulatory obligations (e.g. safety), customer reliability and security and preparing the network for the ongoing adoption of new technology by customers (e.g. solar PV). In this case safety is a strong driver, as the CoreNet system is critical for coordinating safe and efficient work.

To this end, Option 2 is the preferred option, as it has the least negative Net Present Value result of the two options (-$21.6M compared to -$22.3M for Option 1).

The proposed work under Option 2 will provide the following benefits:

- Reduce the risk of the loss of critical voice and data communications across the network
- Maintain the safety of staff and assets at current levels
- Ensure the reliability of the network through control data communications

Replace aged assets with modern technology with additional functionality.

The direct cost of the project for each submission made to the AER is summarised in the table below. Note that all figures are expressed in 2018/19 dollars and apply only to costs incurred within the 2020-25 regulatory period for the preferred option.

Regulatory Proposal	Draft Determination Allowance	Revised Regulatory Proposal
$18.6M	$0	$18.6M

Contents

1 Introduction

Ergon Energy's telecommunications network (CoreNet) is vital to support operational requirements. Existing services across the distribution network support critical voice and data services to enable monitoring and control, and to coordinate safe and efficient work activities. CoreNet operates over a combination of sites and infrastructure that are either directly owned by Ergon Energy or leased from third parties. Previous iterations of this document were titled "Strategic Scope: Intelligent Grid Data Comms". The document title was updated to more accurately reflect the proposed works, but in Telecommunications Asset Management Plan, the previous nomenclature was used and as such references in that document to "Intelligent Grid Data Comms" are referring to assets addressed by this case.

1.1 Purpose of document

This document recommends the optimal capital investment necessary for the Ergon Obsolete Data Communications program.

This is a preliminary business case document and has been developed for the purposes of seeking funding for the required investment in coordination with the Ergon Energy Revised Regulatory Proposal to the Australian Energy Regulator (AER) for the 2020-25 regulatory control period. Prior to investment, further detail will be assessed in accordance with the established Energy Queensland investment governance processes. The costs presented are in $2018/19 direct dollars.

1.2 Scope of document

This document lays out the requirement for replacement of assets within the data communications network (CoreNet) over the coming AER period. It does not seek to replace the entire system, but rather proposes an economical approach to replacing items as they become obsolete.

1.3 Identified Need

Ergon Energy aims to minimise expenditure in order to keep pressure off customer prices, however understands that this must be balanced against critical network performance objectives. These include network risk mitigation (e.g. safety, bushfire), regulatory obligations (e.g. safety), customer reliability and security and preparing the network for the ongoing adoption of new technology by customers (e.g. solar PV). In this case safety is a strong driver, as the CoreNet system is critical for coordinating safe and efficient work.

The program is required to ensure Ergon Energy can meet critical operational requirements that support our obligations in relation to safety and reliability, by ensuring ongoing and reliable carriage of protection and control communications services. These assets provide Telecommunications for mission critical protection and Supervisory Control and Data Acquisition (SCADA) applications, and there is no alternate method available for provisioning this network. This proposal aligns with the CAPEX objectives and criteria from the National Electricity Rules as detailed in Appendix C.

1.4 Energy Queensland Strategic Alignment

Table 1 details how these communications assets contribute to Energy Queensland's corporate and asset management objectives. The linkages between these Asset Management Objectives and Energy Queensland's (EQL) Corporate Objectives are shown in Appendix D.

Table 1: Asset Function and Strategic Alignment

Objectives	Relationship of Initiative to Objectives
Ensure network safety for staff contractors and the community	These assets are essential to allow the Control Centre to communicate with field crews via substation phones, fax and radios fitted in vehicles (e.g. P25 and legacy VHF (Very High Frequency) network). Such communication is important to supporting the safety of workers as well as ensuring the network functions safely for the community. These assets also improve site access security at control centres, substations, depots, and hubs.
Meet customer and stakeholder expectations	Improved customer outcomes through the provision of data communications which deliver reliability and power quality improvement as well as enabling Demand Management and Load Control applications and systems.
Manage risk, performance standards and asset investments to deliver balanced commercial outcomes	Provision of high availability data and voice telecommunication services to support operational systems and equipment that function across a range of locations and a distributed workforce.
Develop Asset Management capability & align practices to the global standard (ISO55000)	Facilitates the remote collection of asset condition data to enable improved asset management.
Modernise the network and facilitate access to innovative energy technologies	Remote engineering access to intelligent substation systems and equipment including protection relays, SCADA and automation systems.

1.5 Applicable service levels

This asset class will be managed, consistent with corporate asset management policy, to achieve all legislated obligations and any specifically defined corporate key performance indicators and all associated key result areas as reported in the Statement of Corporate Intent (SCI).

Under the Queensland Electricity Industry Code (EIC) Ergon Energy and Energex have existing service obligations including:

- Minimum service standards (MSS) covering average performance levels delivered to customers.
- Guaranteed service levels (GSL) covering the performance standards applicable to individual customers.

1.6 Compliance obligations

Table 2 shows the relevant compliance obligations for this proposal.

Table 2: Compliance obligations related to this proposal

Legislation, Regulation, Code or Licence Condition	Obligations	Relevance to this investment
QLD Electrical Safety Act 2002 **QLD Electrical safety Regulation 2013**	We have a duty of care, ensuring so far as is reasonably practicable, the health and safety of our staff and other parties as follows: • Pursuant to the Electrical Safety Act 2002, as a person in control of a business or undertaking (PCBU), EQL has an obligation to ensure that its works are electrically safe and are operated in a way	This proposal would address risks posed to Energy Queensland staff and the public by a potential failure of these assets. Obsolete assets of these types introduce additional safety risks as

Legislation, Regulation, Code or Licence Condition	Obligations	Relevance to this investment
	that is electrically safe.[1] This duty also extends to ensuring the electrical safety of all persons and property likely to be affected by the electrical work.[2]	described in section 2.4 of this proposal.
Distribution Authority for Ergon Energy or Energex issued under section 195 of *Electricity Act 1994* (Queensland)	Under its Distribution Authority: • The distribution entity must plan and develop its supply network in accordance with good electricity industry practice, having regard to the value that end users of electricity place on the quality and reliability of electricity services. • The distribution entity will ensure, to the extent reasonably practicable, that it achieves its safety net targets as specified. • The distribution entity must use all reasonable endeavours to ensure that it does not exceed in a financial year the Minimum Service Standards (MSS)	This proposal mitigates the risk of loss of control over sections of the network due to communications failures, helping Energy Queensland to meet the requirements to effectively manage the network.
National Electricity Rules, Chapter 5	Schedule S5.1 of the National Electricity Rules, Chapter 5 provides a range of obligations on Network Services Providers relating to Network Performance Requirements. These include: • Section S5.1.9 Protection systems and fault clearance times • Section S5.1a.8 Fault Clearance Times • Section S5.1.2 Credible Contingency Events	This proposal addresses the requirement to duplicate communications paths for protection services

1.7 Limitation of existing assets

The majority of CoreNet was established between 2009 and 2013 under a project called UbiNet. CoreNet operates over a combination of sites and infrastructure that is either directly owned by Ergon Energy or leased from third parties. CoreNet telecommunications sites are separated into a four-layered architectural framework:

- **Core Layer** - Highest transport and major wide area network (WAN) capacity between major cities and aggregates distribution layer sites.
- **Distribution / Aggregation Layer -** This layer aggregates sites from the access layer onto common WAN capacity. Provides medium WAN capacity between smaller towns.
- **Access Layer** - Aggregates services and connections to common capacity provided by the distribution layer. Typically provides capacity within a township
- **Edge Subscriber / Terminals / Customer Layer -** The subscriber layer connects internal/external customers equipment/users to the access layer.

This program covers numerous active asset classes that comprise CoreNet, including Internet Protocol (IP) network equipment, microwave radio links, Operational Support Systems (OSS) servers, commercial 3G cellular network and private 3G cellular network. Ergon Energy is aware of the need to effectively manage these assets, as some are now approaching, have reached or have passed their original design life. The three primary drivers for renewal are shown in Table 3.

[1] Section 29, *Electrical Safety Act 2002*
[2] Section 30 *Electrical Safety Act 2002*

Table 3: Primary drivers for the replacement of different asset types

Driver	Driver Description	Relevant Assets
Equipment Condition	Aged telecommunications equipment is experiencing high failure rates, extended outages, high ongoing maintenance costs and/or high replacement costs in a complete failure scenario. In addition, the equipment is out of production and is no longer supported by the manufacturer. It is not reinforced by high levels of safety stock (refurbished equipment), technical support or service knowledge.	• OSS Servers
Product Support Removal	Product support by vendors is critical for many types of assets to obtain device information, as well as troubleshooting and device software updates if the device malfunctions. Configuration updates for software that runs active equipment hardware are needed to improve operation, fix bugs, and maintain the device's functionality as the telecommunications network evolves. The equipment vendor is the only possible source for these updates.	• IP Network Equipment • Microwave Radio Links • Private 3G cellular Network
Commercial Product Removal	The future disconnection of external vendors' 3G network services is a risk to the Ergon Energy telecommunication network. Due to the high volume of reliant equipment, measures need to be undertaken to ensure the risk is reduced.	• Commercial 3G Cellular Network

2 Counterfactual Analysis

2.1 Purpose of asset

Ergon Energy's telecommunications network (CoreNet) is vital to support operational requirements. Operational services across the distribution network support critical voice and data services to enable monitoring, control and to coordinate safe and efficient work activities. The majority of CoreNet was established between 2009 and 2013 under a project called UbiNet. CoreNet operates over a combination of sites and infrastructure that is either directly owned by Ergon Energy or leased from third parties.

2.2 Business-as-usual service costs

The business as usual (BAU) service costs for these assets are the maintenance costs associated with ongoing operations. In addition to these costs, significant emergency response and replacement costs would be incurred for the counterfactual BAU case in the event that failures occur. These have not been explicitly costed in this case due to the significant safety, reliability and compliance risks associated with asset failures.

2.3 Key assumptions

IP Network Equipment and OSS Servers

- IP Network Equipment: Ergon Energy has 1,282 IP operational network assets across numerous makes and models. In total 476 assets are experiencing product support removal.
- OSS: Ergon Energy has 76 OSS servers completing various functions. Two systems are obsolete due to expiry of vendor support.

Microwave Radio Links

Ergon Energy has a total of 455 microwave radio links.

- Four NEC Pasolink radios are no longer supported by supplier
- Two LEDR900S radios are no longer supported since March 2018.
- Five Flexi hopper radio units are no longer supported by the supplier. Spares are still available within Ergon and the systems are still performing to requirements.
- Three Ceragon 640 Microwave radios are no longer supported since December 2014. Spares are still available within Ergon and the systems are still performing to requirements.

Commercial 3G Cellular Network

Telstra has advised that decommissioning of the 3G network will be complete by 2024. Ergon Energy's has a total of 2,002 devices that utilise this cellular network. A total of 1,889 devices are only compatible on the 3G network. Once the 3G network is decommissioned all 1,889 units will be obsolete.

Private 3G Cellular Network

Ergon Energy installed a private 3G cellular network in 2014-15. This system is to be decommissioned due to high support and Australian Communications and Media Authority (ACMA) frequency costs.

Other Assumptions

- The condition of the equipment does not experience an accelerated failure rate.
- Asset condition assessed from site maintenance is based on the same criteria and acceptable standard across all field groups.
- End of product support notification is received in due time.

2.4 Risk assessment

This risk assessment is in accordance with the EQL Network Risk Framework and the Risk Tolerability table from the framework is shown in Appendix E.

Table 4: Risk assessment of counterfactual case

Risk Scenario	Risk Type	Consequence (C)	Likelihood (L)	Risk Score	Risk Year
Reduced capacity to remotely control half of the Energex / Ergon network, due to loss of visibility of SCADA derived data resulting from obsolescence of CoreNet assets.	Business	5 *(Unable to remotely control half of Energex / Ergon network)*	3 *(Unlikely)*	**15** *(Moderate Risk)*	2020
Breach of National Electricity Rules and an improvement notice issued by the regulator, due to failure to duplicate communication paths for protection services.	Legislated	4 *(Improvement notice Issued by the regulator)*	3 *(Unlikely)*	**12** *(Moderate Risk)*	2020
A single fatality occurs when an unstable or failed communications path leads to a delayed relay operation and the fault is unable to be cleared within specified timeframes.	Safety	5 *(Single fatality / Incurable fatal Illness)*	3 *(Unlikely)*	**15** *(Moderate Risk)*	2020
Inability to access corporate IT systems and to remotely control or manage the network across multiple sites, due to failure of corporate voice, data, and internet communication resulting from obsolesce of CoreNet.	Business	4 *(Inability to remotely control ≥2 bulk supply substations supply area)*	3 *(Unlikely)*	**12** *(Moderate Risk)*	2020
Control room communication with field crews not possible. Inability to communicate with field crews via substation phones, fax and radios fitted in vehicles (e.g. P25 and legacy VHF network). Control Centre unable to transmit switching sheets via fax impacting restoration and planned works equating to >$100,000.	Business	2 *(business cost of >$100k or equivalent)*	4 *(Likely)*	**8** *(Low Risk)*	2020

Further Details of the risk ratings and descriptions can be found in Energy Queensland's Network Risk Framework.

2.5 Retirement decision

Retiring the parts of the CoreNet as they become obsolete would reduce the ability of Ergon Energy to monitor and control the network and would leave workers without critical voice communications in the field. This is an unacceptable risk both to the safety of the workers and to the ability to provide an adequate service. This replacement work needs to be considered in the wider context of the Future Grid Roadmap and Intelligent Grid Technology Plan, as well as the other planned project that address these goals. As such, no retirement option is available.

3 Options Analysis

3.1 Options considered but rejected

Two options were considered but rejected:

Counterfactual

The counterfactual was considered as unacceptable, as replacement of these assets on a fail-fix basis would result in the risks detailed in Section 2.4 and higher costs overall.

Replacement of the entire CoreNet system

The option which was considered but is not plausible is the context of this proposal is the complete replacement of the CoreNet system. The cost and time associated with this option would be unacceptable given that most of the assets are operating well and are still supported by the manufacturers. This option was rejected on the basis that it would not represent a balanced decision in term of weighing risk and asset performance against commercial goals.

While there are plans to grow the network as required to meet the emerging needs of the business, in the 2020-25 regulatory control period, EQL will consider how best to merge the CoreNet network (Ergon Energy's Telecommunications network) with the Matrix network (Energex's Telecommunications network). In the interim, these assets will still be required, and no future rationalisation of assets is predicted following this merge given their nature in providing mission critical telecoms. No wholesale replacement of the existing CoreNet or Matrix networks is anticipated as the outcome, rather there is a plan to converge these networks where it makes economic sense. Any replacement activities suggested in the options given below will be aligned to any decisions made on future directions for convergence of these networks.

3.2 Identified options

3.2.1 Network options

Option 1 – Replacement Rolling Program with minimal risk

Under this option, assets are replaced as soon as they reach end of product support. This minimises the risk associated with the asset.

Internet Protocol (IP) Network Equipment and Operational Support System (OSS) Servers

- IP Network Equipment: Replace all IP network assets before the Product Support Removal date irrespective of the criticality of the communications sites. Total assets to be replaced would be in the order of 1026.
- OSS: Bring forward the replacement of OSS servers to the beginning of AER period to ensure that the projects are completed before removal of vendor support.

Microwave Radio Links

Replace all Microwave Radio assets when support from the supplier ends.

- Four NEC Pasolink radios.
- Two LEDR900S.
- Five Flexi hopper radios.
- Three Ceragon 640 Microwave.

Commercial 3G Cellular Network

- Replace all 1,889 3G devices well in advance of Telstra ceasing operation of its 3G network.

Private 3G Cellular Network

It is not technically or commercially feasible to bring forward this program due to the volume of units required to be transferred

Option 2 – Risk Replacement Based Rolling Program

Under this option, assets are not replaced immediately after the end of product support as per Option 1. Instead the assets are permitted to remain in service after the end of support if they are still in good condition and replaced in more critical locations as a priority.

IP Network Equipment and OSS Servers

- IP Network Equipment: Risk based replacement program where IP network assets on replaced where located in Core sites and “higher-order” distribution sites. Total assets to be replaced would be in the order of 476.
- OSS: Replace 2 OSS servers just in time before removal of vendor support.

Microwave Radio Links

Risk based replacement program to replace Microwave Radio.

- Four NEC Pasolink radios fully replaced in 2019/20. Recommended solution as radios out of production and support, low internal sparing and low population of asset class in Ergon Energy network.
- Two LEDR900S radios replaced across in 2020/21 and 2021/22. Radios are out of production and support, low internal sparing and with a low population of assets in the Ergon Energy network.
- Five Flexi hopper radios replace from 2022/23. Radios are out of production and out of support (Qtr. 1 2019) with a low population of assets in the Ergon Energy network. However, spares are still available within Ergon and the systems are still performing to requirements and expected will not be required for replacement until mid-way through the 2020-25 regulatory control period.
- Delay replacement of the Ceragon 640 Microwaves to beyond 2025. The radios are out of production and out of support with a low population of assets in the Ergon Energy network. However, spares are still available within Ergon and the systems are still performing to requirements. It is considered likely that these radios will not require replacement until after 2024/25.

Commercial 3G Cellular Network

- Replace all 1,889 3G using in a rolling efficient program for completion just in time before Telstra ceasing operation of its 3G network.

Private 3G Cellular Network

- Migrate all 190 services and decommission bases in 2019/20 to avoid high support and ACMA frequency costs.

3.3 Economic analysis of identified options

3.3.1 Cost assessment of each option

The Net Present Value (NPV) of each option has been determined by considering costs over the program lifetime from FY2019/20 to FY2024/25, using the EQL standard NPV analysis tool. The tool

incorporates any residual value for assets at the end of the program lifetime into the NPV analysis. Only CAPEX has been considered for each option, as little difference in OPEX is predicted regardless of which option is selected. The costs for each option are given in Table 5.

Table 5: Costs per year for each of the considered options

Option	FY 2019/20	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	FY 2024/25
Option 1 – replacement at end of support	$4,208,262	$18,596,301	-	-	-	-
Option 2 – risk-based replacement	$4,208,262	$3,310,184	$6,340,977	$3,924,209	$2,513,900	$2,507,031

The counterfactual cannot be priced since the time to failure of each asset is unknown. The risk associated with this option is deemed too high for consideration.

Results

Using the assumptions outlined previously, the Present Value (PV) and NPV results of each option, discounted at the Regulated Real Pre-Tax Weighted Average Cost of Capital (WACC) rate of 2.62% (as specified in the EQL Standard NPV Tool), are outlined in Table 6. This shows that Option 2 is the lowest cost option and is thus the preferred path forward.

Table 6: Net present value of options

Option	CAPEX NPV
Option 1 – replacement at end of support	-$22,330,000
Option 2 – risk-based replacement	-$21,556,000

3.4 Scenario Analysis

3.4.1 Sensitivities

The proposed works are sensitive to the implications of any upcoming changes to requirements. Generally, the replacement of assets of this type is driven by the need to replace them at the end of their supported life – rather than by asset failure rates. If a unit is left in service beyond its end of supported life, issues can occur when new implementations reveal firmware problems. In this case, as the is device out of support the equipment must be replaced as though it had failed in service.

If an in-service failure were to occur, this would require the work schedule to be brought-forward as replacement of the failed asset is unlikely to be possible in the short term due to the scarcity of spares and support. This could result in inability to contact emergency help, or the inability to control areas of the network, resulting in safety risks and/or extended outages for customers.

3.4.2 Value of regret analysis

In terms of selecting a decision pathway of ‘least regret’, Option 2 presents an economically efficient and balanced approach to investment by targeting replacement works based on asset criticality and assessed condition and reducing risk to the greatest extent without bringing forward unnecessary expenditure.

The proposed replacement is considered to be least regret as it replaces assets as close to the point of failure as possible while balancing this against the potential risks of in-service failure. This option does not close-out any future options for consolidation of the communications networks between Ergon and Energex, hence it is a low regrets path to optimal asset management.

3.5 Qualitative comparison of identified options

3.5.1 Advantages and disadvantages of each option

Table 7 below details the advantages and disadvantages of each option considered.

Table 7: Assessment of options

Options	Advantages	Disadvantages
Option 1 – Replacement at end of support	**Risk** • No assets are operating without support, meaning that the impact of an in-service failure is reduced • Improved site access security at control centres, substations, depots etc. • Management of cyber risks **Future Proofing** • Replacement of aged obsolete assets • Provision of high availability data and voice telecommunication services to support operational systems • Provision of high availability, low latency telecommunication links between substations to facilitate key data services	**Cost** • Replaces some fully-functional assets which could continue to operate well for several years • Brings costs for replacement forward into single time-period
Option 2 – Risk based replacement	**Cost** • Replaces assets as close to point of failure as possible, extending operational life beyond end of support while keeping risk of in-service failure As Low As Reasonably Practicable (ALARP) **Risk** • Improved site access security at control centres, substations, depots etc. • Management of cyber risks **Future proofing** • Replacement of aged obsolete assets • Provision of high availability data and voice telecommunication services to support operational systems • Provision of high availability, low latency telecommunication links between substations to facilitate key data services	**Risk** • Increased impact of in-service failure if it occurs after end of support

Options	Advantages	Disadvantages
Option 3 – Counterfactual	**Cost** • Replaces aged assets after in-service failure	**Risk** • Increased impact of in-service failure which occurs after end of support • In-service failure guaranteed for each asset as is a requirement for replacement

3.5.2 Alignment with network development plan

Option 2 aligns with the Asset Management Objectives in the Distribution Annual Planning Report. In particular it manages risks, performance standards and asset investment to deliver balanced commercial outcomes while modernising the network to facilitate access to innovative technologies.

3.5.3 Alignment with future technology strategy

This program of work is aligned with the Future Grid Roadmap and Intelligent Grid Technology Plan, as it supports the modernisation of telecommunications functionality in the Ergon Energy grid. Customers have indicated they want prudent investments in technology to modernise the network, to enable them to interact with the network, manage their electricity costs and take advantage of new products and technology developments. A modern communication network is a critical part of the intelligent grid of the future that will enable this for customers. As such, ensuring assets are replaced with a cost-efficient and modern equivalent, when they become obsolete, aligns well with the Future Grid Roadmap.

3.5.4 Risk Assessment Following Implementation of Proposed Option

Table 8: Risk assessment showing risks mitigated following Implementation

Risk Scenario	Risk Type	Consequence (C)	Likelihood (L)	Risk Score	Risk Year
Reduced capacity to remotely control half of the Energex / Ergon network, due to loss of visibility of SCADA derived data resulting from obsolescence of CoreNet assets.	Business	*(Original)* *5* (Mitigated) 5 *(Inability to remotely control half of Energex / Ergon network)*	*3* 2 *(Very unlikely)*	***15*** **10** ***(Low Risk)***	2020
Breach of National Electricity Rules and an improvement notice issued by the regulator, due to failure to duplicate communication paths for protection services.	Legislated	*(Original)* *4* (Mitigated) 4 *(Improvement notice Issued)*	*3* 2 *(Very Unlikely)*	***12*** **8** ***(Low Risk)***	2020

Risk Scenario	Risk Type	Consequence (C)	Likelihood (L)	Risk Score	Risk Year
A single fatality, due to unstable or failed communications path resulting in delayed relay operation and the fault unable to be cleared within specified timeframes.	Safety	*(Original)* *5* (Mitigated) 5 *(Single fatality / incurable fatal illness)*	*3* 2 *(Very Unlikely)*	***15*** 10 ***(Low Risk)***	2020
Inability to access corporate IT systems and to remotely control or manage the network across multiple sites, due to failure of corporate voice, data and internet communication resulting from obsolesce of CoreNet.	Business	*(Original)* *4* (Mitigated) 4 *(Inability to remotely control ≥2 bulk supply substations supply area)*	*3* 2 *(Very Unlikely)*	***12*** **6** ***(Low Risk)***	2020
Control room communication with field crews not possible. Inability to communicate with field crews via substation phones, fax and radios fitted in vehicles (e.g. P25 and legacy VHF network). Control Centre unable to transmit switching sheets via fax impacting restoration and planned works.	Business Impact	*(Original)* *2* (Mitigated) 2 *(business cost of >$100k or equivalent)*	*4* 2 *(Very Unlikely)*	***8*** **4** ***(Very Low Risk)***	2020

4 Recommendation

4.1 Preferred option

The preferred option is Option 2 – Risk Replacement Based Rolling Program.

4.2 Scope of preferred option

- Risk based replacement program where IP network assets are replaced where located in Core sites and “higher-order” distribution sites. Total assets to be replaced in the order of 476.
- Replace 2 OSS servers just in time before removal of vendor support.
- Risk based replacement program to replace Microwave Radios. Total assets to be replaced in the order of 14.
- Replace all 1,889 3G-only compatible assets in a rolling efficient program for completion just in time before Telstra ceasing operation of its 3G network.
- Migrate all 190 private 3G assets, including decommissioning bases, before 2019/20 to avoid high support and ACMA frequency costs.

Appendix A. References

Note: Documents which were included in Energy Queensland's original regulatory submission to the AER in January 2019 have their submission reference number shown in square brackets, e.g. Energy Queensland, *Corporate Strategy [1.001], (31 January 2019).*

Energy Queensland, *Asset Management Overview, Risk and Optimisation Strategy [7.025]*, (31 January 2019).

Energy Queensland, *Asset Management Plan, Telecommunications [7.043]*, (31 January 2019).

Energy Queensland, *Corporate Strategy [1.001],* (31 January 2019).

Energy Queensland, *Future Grid Roadmap [7.054],* (31 January 2019).

Energy Queensland, *Intelligent Grid Technology Plan [7.056],* (31 January 2019).

Energy Queensland, *Network Risk Framework*, (October 2018).

Ergon Energy, *Distribution Annual Planning Report (2018-19 to 2022-23) [7.049]*, (21 December 2018).

Appendix B. Acronyms and Abbreviations

The following abbreviations and acronyms appear in this business case.

Abbreviation or acronym	Definition
$M	Millions of dollars
$ nominal	These are nominal dollars of the day
$ real 2019-20	These are dollar terms as at 30 June 2020
2020-25 regulatory control period	The regulatory control period commencing 1 July 2020 and ending 30 Jun 2025
ACMA	Australian Communications and Media Authority
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ALARP	As Low As Reasonably Practicable
AMP	Asset Management Plan
BAU	Business As Usual
CAPEX	Capital Expenditure
Current regulatory control period or current period	Regulatory control period 1 July 2015 to 30 June 2020
EIC	Electricity Industry Code
EQL	Energy Queensland
FY	Financial Year
GSL	Guaranteed Service Levels
IP	Internet Protocol
IT	Information Technology
MSS	Minimum Service Standards
NER	National Electricity Rules
Next regulatory control period or forecast period	The regulatory control period commencing 1 July 2020 and ending 30 Jun 2025
NPV	Net Present Value
OPEX	Operational Expenditure
OSS	Operational Support System
PCBU	Person in Control of a Business or Undertaking
Previous regulatory control period or previous period	Regulatory control period 1 July 2010 to 30 June 2015
PV	Present Value
SAMP	Strategic Asset Management Plan
SCADA	Supervisory Control and Data Acquisition
SCI	Statement of Corporate Intent
VHF	Very High Frequency
WACC	Weighted Average Cost of Capital

Abbreviation or acronym	Definition
WAN	Wide Area Network

Appendix C. Alignment with the National Electricity Rules (NER)

The table below details the alignment of this proposal with the NER capital expenditure requirements as set out in Clause 6.5.7 of the NER.

Table 9: Alignment with NER

Capital Expenditure Requirements	Rationale
6.5.7 (a) (2) The forecast capital expenditure is required in order to **comply with all applicable regulatory obligations or requirements** associated with the provision of standard control services	In accordance with QLD Electrical Safety Act 2002 and QLD Electrical safety Regulation 2013, this expenditure will improve the safety of field workers and the public by enabling communications in the event of faults.
6.5.7 (a) (3) The forecast capital expenditure is required in order to: (iii) maintain the **quality, reliability and security of supply** of supply of standard control services (iv) maintain the **reliability and security of the distribution system** through the supply of standard control services	This program of work ensures the integrity of vital communications functions, which are critical in the provision of network reliability in support of MSS and safety net security and reliability targets.
6.5.7 (a) (4) The forecast capital expenditure is required in order to maintain the **safety of the distribution system** through the supply of standard control services.	This program of work ensures the integrity of vital communications functions that support numerous systems. They are critical in ensuring safety, and the availability of communications during all routine and emergency events.
6.5.7 (c) (1) (i) The forecast capital expenditure reasonably reflects the **efficient costs** of achieving the capital expenditure objectives	The options considered in this proposal take into account the need for efficiency in delivery. The preferred option has utilised a delivery approach that provides for a staging of work timing to enable a lower cost delivery compared to other options. It generally avoids emergency replacements that incur higher costs. Specialised contractors are utilised as appropriate to ensure that costs are efficiently managed through market testing. Cost performance of the program will be monitored to ensure that cost efficiency is maintained. The Unit Cost Methodology and Estimation Approach sets out how the estimation system is used to develop project and program estimates based on specific material, labour and contract resources required to deliver a scope of work. The consistent use of the estimation system is essential in producing an efficient CAPEX forecast by enabling: • Option analysis to determine preferred solutions to network constraints • Strategic forecasting of material, labour and contract resources to ensure deliverability • Effective management of project costs throughout the program and project lifecycle, and • Effective performance monitoring to ensure the program of work is being delivered effectively. The unit costs that underpin our forecast have also been independently reviewed to ensure that they are efficient (Attachments 7.004 and 7.005 of our initial regulatory proposal).

6.5.7 (c) (1) (ii) The forecast capital expenditure reasonably reflects a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objective	The prudency of this proposal is demonstrated through the options analysis conducted and the quantification of risk and benefits of each option. The prudency of our CAPEX forecast is demonstrated through the application of our common frameworks put in place to effectively manage investment, risk, optimisation and governance of the Network Program of Work. An overview of these frameworks is set out in our Asset Management Overview, Risk and Optimisation Strategy (Attachment 7.026 of our initial regulatory proposal).

Appendix D. Mapping of Asset Management Objectives to Corporate Plan

This proposal has been developed in accordance with our Strategic Asset Management Plan. Our Strategic Asset Management Plan (SAMP) sets out how we apply the principles of Asset Management stated in our Asset Management Policy to achieve our Strategic Objectives.

Table 1: "Asset Function and Strategic Alignment" in Section 1.4 details how this proposal contributes to the Asset Management Objectives.

The Table below provides the linkage of the Asset Management Objectives to the Strategic Objectives as set out in our Corporate Plan (Supporting document 1.001 to our Regulatory Proposal as submitted in January 2019).

Table 10: Alignment of Corporate and Asset Management objectives

Asset Management Objectives	Mapping to Corporate Plan Strategic Objectives
Ensure network safety for staff contractors and the community	**EFFICIENCY** ***Operate safely as an efficient and effective organisation*** Continue to build a strong safety culture across the business and empower and develop our people while delivering safe, reliable and efficient operations.
Meet customer and stakeholder expectations	**COMMUNITY AND CUSTOMERS** ***Be Community and customer focused*** Maintain and deepen our communities' trust by delivering on our promises, keeping the lights on and delivering an exceptional customer experience every time
Manage risk, performance standards and asset investments to deliver balanced commercial outcomes	**GROWTH** ***Strengthen and grow from our core*** Leverage our portfolio business, strive for continuous improvement and work together to shape energy use and improve the utilisation of our assets.
Develop Asset Management capability & align practices to the global standard (ISO55000)	**EFFICIENCY** ***Operate safely as an efficient and effective organisation*** Continue to build a strong safety culture across the business and empower and develop our people while delivering safe, reliable and efficient operations.
Modernise the network and facilitate access to innovative energy technologies	**INNOVATION** ***Create value through innovation*** Be bold and creative, willing to try new ways of working and deliver new energy services that fulfil the unique needs of our communities and customers.

Appendix E. Risk Tolerability Table

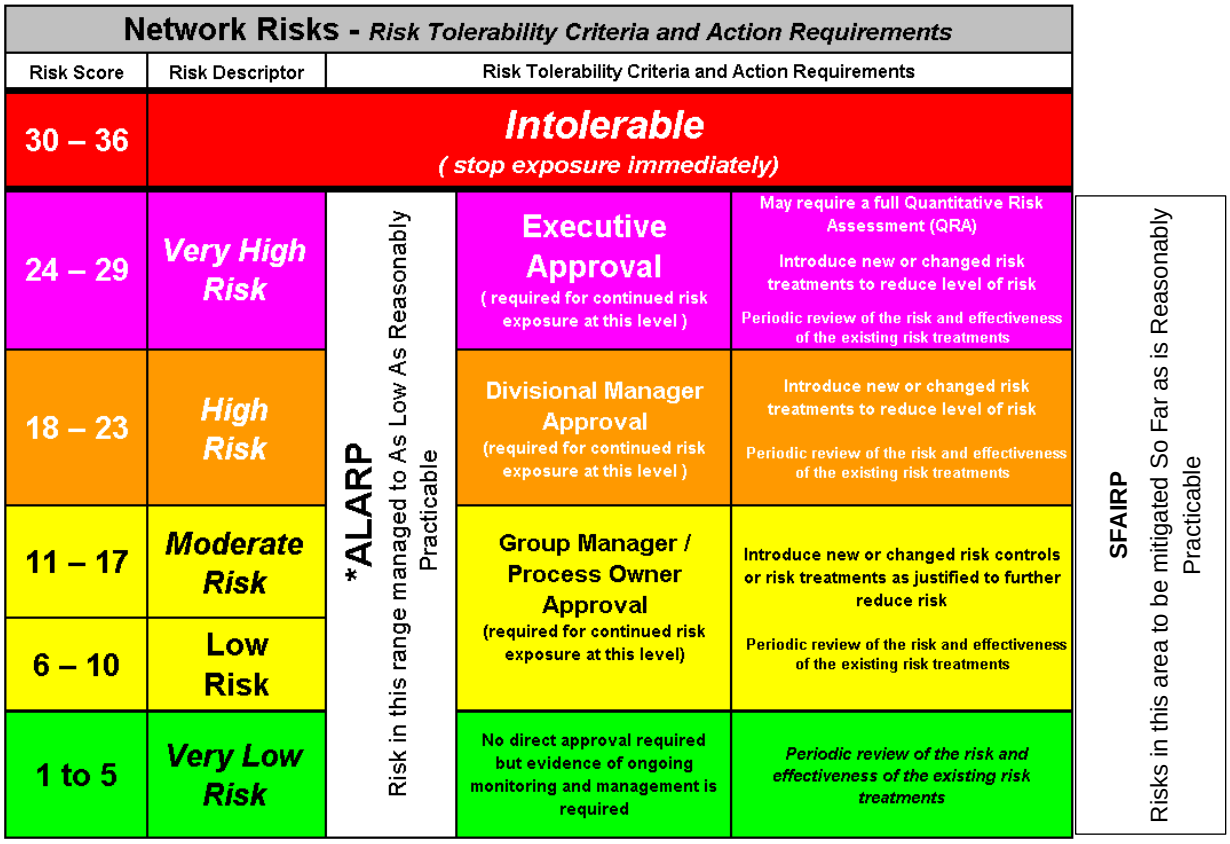

Figure 1: A Risk Tolerability Scale for evaluating Semi-Quantitative risk score

Appendix F. Reconciliation Table

Reconciliation Table Conversion from $18/19 to $2020	
Business Case Value	
(M$18/19)	$18.60
Business Case Value	
(M$2020)	$19.30