

**ID06 Distribution Forecasting Tools
Consolidation & Replacement
Preliminary Gate 2 Business Case
2020-25
January 2019**



Preliminary Gate 2 Business Case

ID06 Distribution Forecasting Tools Consolidation & Replacement



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1 EXECUTIVE SUMMARY

1.1. Background & Business Problem

Distribution Network Service Providers (DNSPs) such as Energex and Ergon Energy must conduct distribution forecasting and network planning activities in accordance with the National Electricity Rules (NER).

In recent years, regulators and other stakeholders have demanded higher degrees of analytical rigour for distribution forecasting, in order to validate the planned distribution capital works program.

Presently, Energex and Ergon Energy develop demand forecasts down to distribution feeders (Energex) and to zone substations (Ergon Energy) based on historical demand and weather data. Traditionally, customer energy usage patterns were relatively stable and electricity was mainly supplied from large power plants. Established forecasting models and assumptions therefore provided the required forecast accuracy.

This is no longer the case as energy usage behaviours have significantly changed in recent years. In today's environment, the customer chooses how to generate and use electricity resulting in growing complexity of Energex and Ergon Energy's forecasting tasks.

Both companies have limitations in capability to determine demand and energy requirements at the Low Voltage (LV) level of the network. This results in a lack of detailed forecasting and planning for the LV networks and a consequential lack of information regarding how the LV networks are being used by customers. The growing penetration of Distributed Energy Resources (DER), particularly including solar photo voltaic (PV) generation, and the focus on demand tariffs have highlighted a need to better understand the load requirements of the LV networks.

This investment proposal primarily responds to the need for a sustainable and fit-for-purpose ICT solution to support Energex and Ergon Energy's distribution load forecasting processes. At the time of the proposed investment, the existing legacy forecasting tools will be between 13 and 17 years of age. In the case of the key legacy Substation Investment Forecasting Tool (SIFT), the system designers and subject matter experts have since left the organisation and there are limited available skills to continue maintaining the in-house developed platform.

The current situation therefore represents a supportability and business continuity risk in relation to Energex and Ergon Energy's forecasting function and to the companies' compliance with regulatory reporting obligations. The reporting requirements include the obligations to deliver Distribution Annual Planning Reports (DAPRs), annual and five yearly Regulatory Information Notice (RIN) reporting, and demand forecast reporting to Powerlink, the Queensland Transmission Network Service Provider (TNSP).

1.2. Investment Overview

This investment proposal ensures the ongoing supportability, sustainability, security and suitability of Energex and Ergon Energy's distribution forecasting tools, processes and related regulatory reporting.

It delivers sustainable capability to accurately forecast energy demand at relevant points in the network, including LV and small area network modelling. Traditional forecasting tools, methods, models and assumptions are no longer sufficient in an environment with growing penetration of solar PV, batteries, electric vehicles, energy saving appliances and other customer side changes.

1.3. Options Analysis

Three options are considered in this business case:

- Option 1 – Proceed with the consolidation and replacement of distribution forecasting tools (preferred)
- Option 2 – Independent Energex and Ergon Energy distribution forecasting tools replacement
- Option 3 – Do minimal

“Option 1 - Proceed with the consolidation and replacement of distribution forecasting tools” is the preferred option, as it ensures sustainability, supportability and security of the companies' distribution forecasting and

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regulatory reporting. It meets all the business case objectives, it is aligned with Energy Queensland's strategic objectives and is consistent with Energex and Ergon Energy's obligations under the National Electricity Rules. This option also supports Energy Queensland's planned productivity improvements which result in a forecast 10% reduction in indirect costs and 3% improvement in program of work labour costs.

"Option 2 - Independent Energex and Ergon Energy distribution forecasting tools replacement" is viable, but requires duplication of costs across the two distributors, with limited opportunity for process alignment and improvement.

"Option 3 – Do minimal" defers renewal of the companies' legacy distribution forecasting tools. It therefore represents a material risk to the companies' continued delivery of their network asset management and service delivery obligations.

1.4. Financial Summary¹

1.4.1 Energex Option Comparison

1.4.2 Ergon Energy Option Comparison

1.4.3 Energex Expenditure Summary (Option 1 – Preferred)

1.4.4 Ergon Energy Expenditure Summary (Option 1 – Preferred)

¹ Bracketed figures indicate negative values.

1.5. Benefits

The preferred option delivers benefits including:

- Sustainment of the companies' distribution forecasting tools for ongoing supportability, serviceability, security and suitability.
- Continues to meet AER asset reporting requirements, as well as all other regulatory obligations.
- Improves consistency of demand and energy forecasts at all relevant levels of the network.
- Improves network reliability, utilisation and performance

The investment is also a critical enabler of Energy Queensland's planned productivity improvements which result in a forecast 10% reduction in indirect costs and 3% improvement in program of work labour costs.

The consolidation of distribution forecasting supports this improvement with benefits including:

- Process improvement through reduced manual actions.
- Aggregation of distribution forecasting workload for optimal workforce productivity.
- Distribution forecasting delivery improvement through consistency of scenario modelling and common calculations and assumptions.
- Enhanced trend and scenario modelling capabilities providing more granular understanding of future demand, driving improved network capital investment decision-making.
- Network investment plans can be tailored to the local requirements of particular network segments (small area modelling capabilities).
- Opportunity to reduce or defer capital investment through better analysis of customer energy usage and targeting of demand management programs.
- Opportunity to deploy non-network alternative solutions, through a more granular understanding of the low voltage network.

1.6. Investment Risks

1.7. Customer Focus

The investment in forecasting tools replacement provides sustainable capability to understand network demand and the impact of changing network technologies and usage (including solar PV, batteries, electric vehicles, energy efficient appliances etc).

With more accurate forecasting, capital investments in the electricity network are optimised for the benefit of the customer and the community.

2. INVESTMENT OVERVIEW

2.1. Background and History

Distribution Network Service Providers (DNSPs) such as Energex and Ergon Energy must conduct distribution forecasting and network planning activities in accordance with the National Electricity Rules (NER).

Each year, a forecast is built using historical data, future network shifts and growth models to prepare 10 year forecasts of demand. In recent years, regulators and other stakeholders have demanded higher degrees of analytical rigour for distribution forecasting, in order to validate the planned distribution capital works program.

Energex and Ergon Energy's forecasting groups undertake scenario modelling which identify future network constraints. With this information, the planning groups then perform network modelling activities to analyse possible network augmentation options to address the forecasted network constraints.

Presently, Energex and Ergon Energy develop demand forecasts down to distribution feeders (Energex) and to zone substations (Ergon Energy) based on historical demand and weather data. Traditionally, customer energy usage patterns were relatively stable and electricity was mainly supplied from large power plants. Established forecasting models and assumptions therefore provided the required forecast accuracy.

This is no longer the case as energy usage behaviours have significantly changed in recent years. In today's environment, customers choose how to generate and use electricity resulting in growing complexity of Energex and Ergon Energy's forecasting tasks.

Both companies have limitations in capability to determine demand and energy requirements at the Low Voltage (LV) level of the network. This results in a lack of detailed forecasting and planning for the LV networks and a consequential lack of information regarding how the LV networks are being used by customers. The growing penetration of Distribute Energy Resources (DER), particularly including solar photo voltaic (PV) generation, and the focus on demand tariffs have highlighted a need to understand the load requirements of the LV networks.

2.2. Business Problem and Rationale

The proposal is justified on the basis of compliance, sustaining current capability and providing suitable capability for the changed electricity network and customer environment.

Key issues include:

- **Aging ICT assets**

This investment proposal primarily responds to the need for a sustainable and fit-for-purpose ICT solution to support Energex and Ergon Energy's consolidated distribution load forecasting processes. At the time of the proposed investment, the existing legacy forecasting tools will be between 13 and 17 years of age. In the case of the key legacy Substation Investment Forecasting Tool (SIFT), the system designers and subject matter experts have since left the organisation and there are limited available skills to continue maintaining the in-house developed platform.

The current situation therefore represents a supportability and business continuity risk in relation to Energex and Ergon Energy's forecasting function and to the companies' compliance with regulatory reporting obligations. Reporting requirements include the obligations to deliver Distribution Annual Planning Reports (DAPRs), annual and five yearly Regulatory Information Notice (RIN) reporting, and demand forecast reporting to Powerlink, the Queensland Transmission Network Service Provider (TNSP).

- **Regulatory obligation business continuity**

The replacement of SIFT will ensure that Energex and Ergon Energy can meet their obligations for accurate and timeline network forecast reporting, including:

- **Distribution Annual Planning Report (DAPR)**

Energex and Ergon Energy must each prepare a Distribution Annual Planning Report (DAPR). This five-year rolling plan (accessible on the Energex and Ergon Energy websites) is a distillation of the forecast demand underpinning the network investment strategies and plans. SIFT is

currently key to development of the DAPRs, both directly through its demand forecasts for the sub-transmission networks and indirectly through the assistance it provides to planners who use SIFT outputs within their modelling analysis.

- **Substation Security Regulatory Requirement**

SIFT assists in sub-transmission planning by providing a framework to model the lifecycle of substations and their connections to external entities. The tool supports forecasting of substation requirements driven by elevated demand, aging network elements or new industry.

- **Regulatory Information Notice (RIN) Reporting**

Energex and Ergon Energy have an obligation to submit annual and five-yearly forecasts as part of the RIN reporting requirements. SIFT is the key tool supporting the companies' compliance with the RIN forecasting requirements.

- **Inability to account for changing customer load patterns**

In recent years, there has been a significant shift in how and where electricity is produced and stored. Customers have taken a much greater interest in their energy consumption and there is an increased awareness about climate change impacts. Solar PV installations on commercial and residential rooftops are common, the penetration of batteries is increasing and electric vehicles are a significant consideration for the future.

This change drives the need to conduct forecast scenario modelling for smaller geographical areas and at a lower level of the network, compared to traditional distribution models (i.e. centralised, large scale generation supplying large geographic areas). Small area forecasting applies a bottom up approach to modelling. The modelling starts at the land parcel level and then aggregates up to the distribution transformer level, 11kV feeder level and eventually to the zone substation and transmission connection point level. The implementation of a bottom up approach enables Energex and Ergon Energy to manage the network assets in accordance with ISO55000 asset management standards.

Currently at Energex and Ergon Energy, the capabilities for developing small area network demand and energy forecasts are lacking. Instead of utilising land use data, customer load data, demographic data, and other customer and network sources, distribution forecasts are based on historical load data (e.g. customer meters) and assumptions. A sustainable solution is needed that is capable of generating small area and LV forecasts in a systematic and repeatable manner.

Small area forecasting supports the following outcomes:

- Consistency of demand and energy forecasts at all levels of the network
- Analysis of load growth areas and the key drivers of this growth
- Analysis of customer electricity usage and the impact of DER and new technologies
- Analysis of demand management options and effectiveness
- Linkage of capital and operating expenditure to specific customer energy and demand drivers
- Maintaining network reliability, utilisation and performance optimisation as demand becomes less cyclic in nature

2.3. Investment Objectives

This investment in distribution forecasting tools consolidation and replacement will deliver on the following objectives:

- Ensure ongoing supportability and sustainability of ICT platforms to support the distribution forecasting process.
- Replace and consolidate the distribution forecasting tools, enabling consistent state-wide processes and improved forecasting accuracy.
- Deliver required capability to determine demand and energy requirements at all relevant levels of the network.
- Deliver required capabilities to determine small area network demand and energy forecasts.
- Support productivity improvement through reduced manual process intervention (e.g. manual data sourcing, data preparation and uploading into SIFT).
- Support reporting productivity improvement through consolidation of forecasting models.
- Support improved capital investment planning, through enhanced trend and scenario modelling capabilities with contemporary methods and tools.
- Establish common data sources and algorithms for consistent state-wide modelling.

3. STRATEGIC ALIGNMENT

3.1. Alignment to Energy Queensland Strategic Objectives

This investment aligns with the Energy Queensland Strategic Objectives in the following ways:

Strategic Objective	How this investment contributes to the Strategic Objective of EQL	Impact
<p>1. Community and customer focused</p> <p>Maintain and deepen our communities' trust by delivering on our promises, keeping the lights on and delivering an exceptional customer experience every time.</p>	<p>The investment in forecasting tools replacement provides sustainable capability to understand network demand and the impact of changing network technologies and usage (including solar PV, batteries, electric vehicles, energy efficient appliances etc).</p> <p>With more accurate forecasting, capital investments in the electricity network are optimised for the benefit of the customer and the community.</p>	<p>Medium</p>
<p>2. Operate safely as an efficient and effective organisation</p> <p>Continue to build a strong safety culture across the business and empower and develop our people while delivering safe, reliable, and efficient operations.</p>	<p>This investment supports productivity improvement through reduced manual process intervention and enhances forecast modelling to better match the current and future environment.</p>	<p>High</p>
<p>3. Strengthen and grow from our core</p> <p>Leverage our portfolio business, strive for continuous improvement and work together to shape energy use and improve the utilisation of our assets.</p>	<p>This investment delivers improved distribution modelling and forecasting capabilities, including low voltage level capabilities, maintaining network stability as demand becomes less cyclic in nature.</p>	<p>Medium</p>
<p>4. Create value through innovation</p> <p>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.</p>	<p>The investment aligns corporate load (demand and energy) time series data sources, providing a common framework for demand analysis and innovation across Energex and Ergon Energy.</p> <p>The investment provides sustainable capability to simulate the effects of alternative events, scenarios and interventions (e.g. simulation of network tariff change impacts, demographic developments, changes in technology penetration or effectiveness).</p>	<p>Medium</p>

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3.2. Alignment with National Electricity Rules (NER)

The table below details the alignment of the proposed solution with the NER capital expenditure objectives as regulated by the AER.

NER Objective Alignment	Rationale
<p>6.5.7 (a) (2) The forecast capital expenditure complies with all applicable regulatory obligations or requirements associated with the provision of standard control services</p>	<p>This investment is required to maintain Energex and Ergon Energy’s capabilities to accurately forecast energy and network demand, enabling prudent capital network expenditure through optimised network plans.</p> <p>The proposed ICT expenditure ensures compliance with regulatory reporting requirements, including compliance with the DAPR and RIN reporting obligations.</p>
<p>6.5.7 (a) (3) The forecast capital expenditure maintains the quality, reliability and security of supply of standard control services</p>	<p>This investment is required to maintain Energex and Ergon Energy’s capabilities to accurately forecast energy and network demand, including the impacts of current and potential network utilisation trends (e.g. Solar PV, batteries, electric vehicles).</p> <p>Through these forecasts, Energex and Ergon can continue to ensure the quality, reliability and security of standard control services.</p>
<p>6.5.7 (c) (1) (i) The forecast capital expenditure reasonably reflects the efficient costs of achieving the capital expenditure objectives</p>	<p>Costs for this investment have been forecast based on knowledge of recent and historical market procurements for equivalent capability and services, experience from previous investments, as well as through specialist advice and internal subject matter expertise.</p> <p>Energy Queensland undertakes competitive market procurement processes to ensure cost efficiency in project cost and operational expenditure.</p> <p>Energy Queensland also has a cloud services strategy which assesses each potential investment to ensure the optimal use of cloud and internal services with considerations of cost, risk, service requirements and other parameters.</p>
<p>6.5.7 (c) (1) (ii) The forecast capital expenditure reasonably reflects the costs that a prudent operator would require to achieve the capital expenditure objectives</p>	<p>The requirement for this investment is premised on industry typical ICT Asset Lifecycle Management principles to prudently and efficiently ensure the supportability, serviceability and security of Energex and Ergon Energy’s business systems.</p> <p>Currently this investment has been analysed to a “Preliminary Gate 2” level. Prior to investment, a Gate 3 business case will be prepared with further detail to be assessed in accordance with the established investment governance processes.</p>
<p>6.5.7 (c) (1) (iii) The forecast capital expenditure reasonably reflects a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objective</p>	<p>Costs for this investment have been forecast based on knowledge of recent and historical market procurements for equivalent capability and services, experience from previous investments, as well as through specialist advice and internal subject matter expertise.</p> <p>Further detailed cost build up will take place in development of the Gate 3 business case.</p> <p>This detailed cost build up may be subject to further competitive market procurement processes, sourcing analysis and peer consultation.</p>

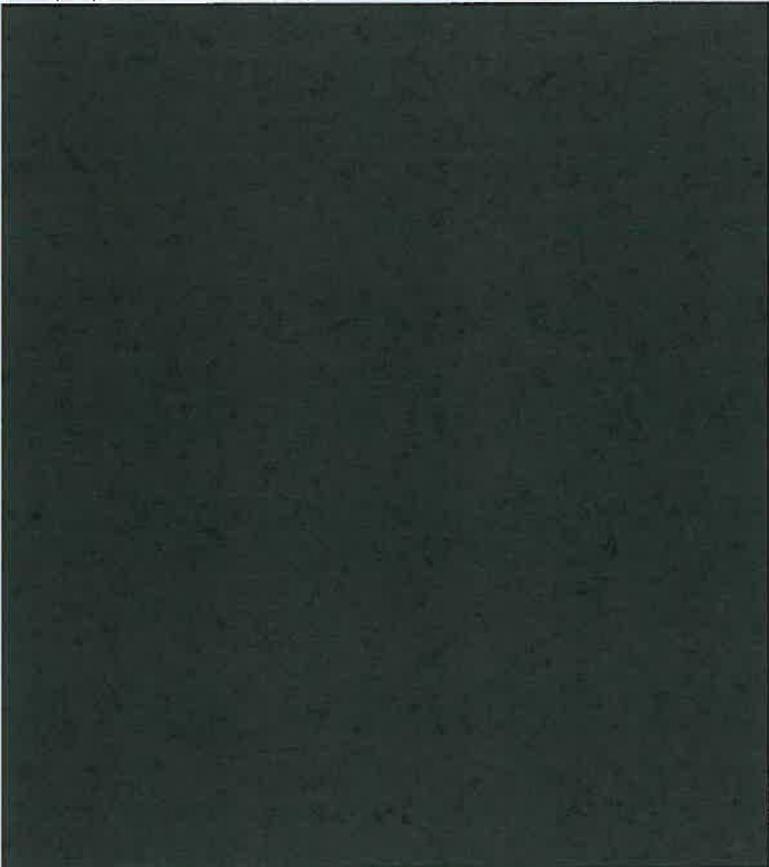
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3.3. Alignment with the Digital Office Application Asset Management Guidelines

The table below indicates alignment of the solution with the **Digital Application Asset Management Guidelines**:

Digital Application Asset Management Guidelines Assessment	Rationale
<p>Distribution Forecasting Tools are classified as Systems of Differentiation according to the PACE layer categorisation described in Energy Queensland’s Digital Application Asset Management Guidelines.</p> <p>These guidelines describe key defining criteria for Systems of Differentiation including that they:</p> <ul style="list-style-type: none"> • Support business processes which are understood and dynamic. • Utilise information that is core to the business and other information that is sourced externally or generated as part of the process. <p>On the above basis, the guidelines forecast that Systems of Differentiation should maintain currency, supportability and effectiveness through the following investment lifecycle.</p> <ul style="list-style-type: none"> • Minor Upgrade – 2 years after implementation • Major Upgrade – 5 years after implementation • Replacement – 7 years after implementation <p>The guidelines further describe that Upgrade and Replacement investments should consider the extent of “obsolescence” of the solution. E.g.</p> <ul style="list-style-type: none"> • Technical Obsolescence – The solution is still functional but not supportable. • Financial Obsolescence – The cost of maintaining the solution outweighs the value derived from it. • Asset Obsolescence – The asset has reached the end of its reasonable functional life as indicated through failure rates, inability to meet business requirements etc. 	<p>The Distribution Forecasting Tools proposed for consolidation and replacement through this investment will meet the criteria for replacement identified in the guidelines.</p> <p>The proposed investment is planned to conclude in FY25.</p> 

3.4. Regulatory Implications

Distribution forecasting tools are an essential enabler of Energex and Ergon Energy's compliance with legislative and regulatory obligations as Distribution Network Service Providers (DNSPs).

Regulatory obligations include:

- **DAPR Reporting**

Energex and Ergon Energy have an obligation to publish DAPRs in accordance with the NER. These reports include:

- Planning for sub-transmission and distribution network growth
- Asset repair and replacement planning
- Planning for future demand on the network
- Capacity and load forecasts by region
- Current and future limitations on our sub-transmission and distribution networks
- Possible solutions for network limitations

- **RIN Reporting**

Energex and Ergon Energy have an obligation to submit network forecasts as part of the annual and five yearly RIN reports.

4. INVESTMENT SCOPE

4.1. Functional Scope

Energy Queensland comprises multiple business areas and functions as defined in the organisation’s Business Reference Model.

The proposed investment in Distribution Forecasting Tools Consolidation and Replacement is essential for the ongoing efficient, sustainable support of Energy Queensland’s business areas and functions as listed below.

Business Area	Business Function	Business Reference Model Description
Network Forecasting and Planning	Infrastructure and Markets Forecasting	A function that uses relevant external inputs and trends (e.g. regulatory, demographic, policy, climate, land use, resource availability, location, cost, price, economic and technology) as input to model probable outcomes.
	Network Reporting	A function to report on network performance, forecasts and investment plans. This includes the production of regulatory reports. This function is not represented explicitly in the organisational chart of Energen or Ergon Energy, but rather embedded in various functions across the Network Forecasting and Planning business capability.
	Network Strategy and Policy	A business capability to develop the detailed plan for the physical network, based on the Network Strategy and Policy. The capability analyses the current asset capability, develops, analyses and compares network and non-network options and delivers optimised plans to meet future requirements derived from a variety of forecasts.
Enterprise Information Management	Business Analytics Management	This function focuses on collecting, storing and presentation of data to support decision-making. This includes activities such as reporting and analytics.
	Enterprise Data Management	This function focuses on data modelling, analysis, design and the implementation of those models including the testing, migration and deployment.
Network Information Management	Network Information Governance	A function to enact the enterprise information governance framework for Network Information.
	Network Information Operational Management	A function to ensure the execution of plans developed by the Network Information Standards and Planning function. This is an operational function. Certain operational aspects of management of network information (e.g. GIS data, Information Quality Assurance etc.) may be directly allocated to this function, others may be allocated to other functions across Network Asset Management or Service Delivery.
	Network Information Standards and Planning	A function to provide standards for the management and provision of network information, in alignment with and within the frameworks of the Enterprise Information Management function. Such standards include: Definition of Information Lifecycle, Quality Standards, Security Classification, Logical Modelling, and Information Services provided to the rest of the organisation
	Enterprise Data Management	This function focuses on data modelling, analysis, design and the implementation of those models including the testing, migration and deployment.

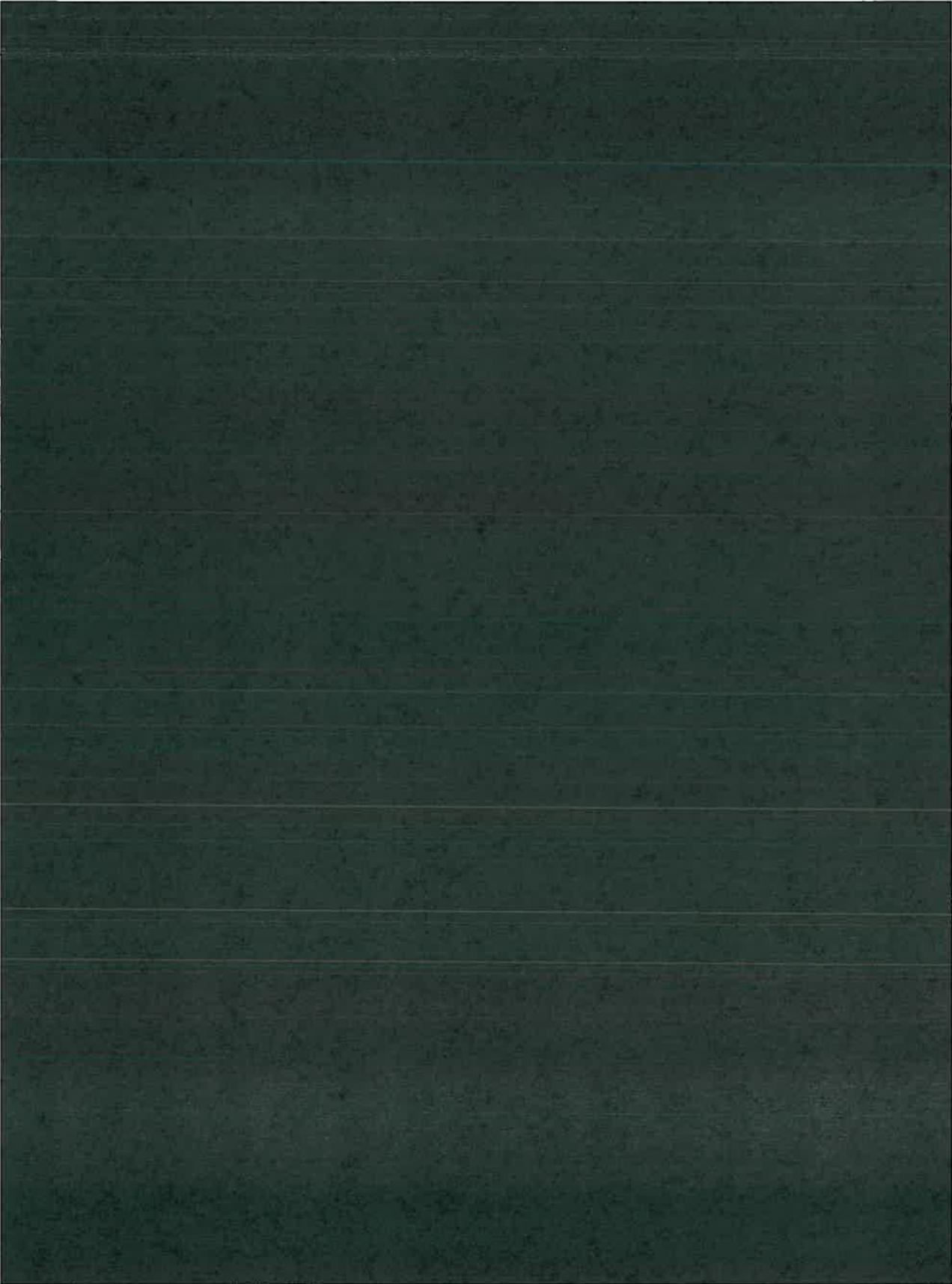
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4.2. Solution Overview

4.2.1 Current State (2018)



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4.2.2 Interim State (start of the proposed investment)

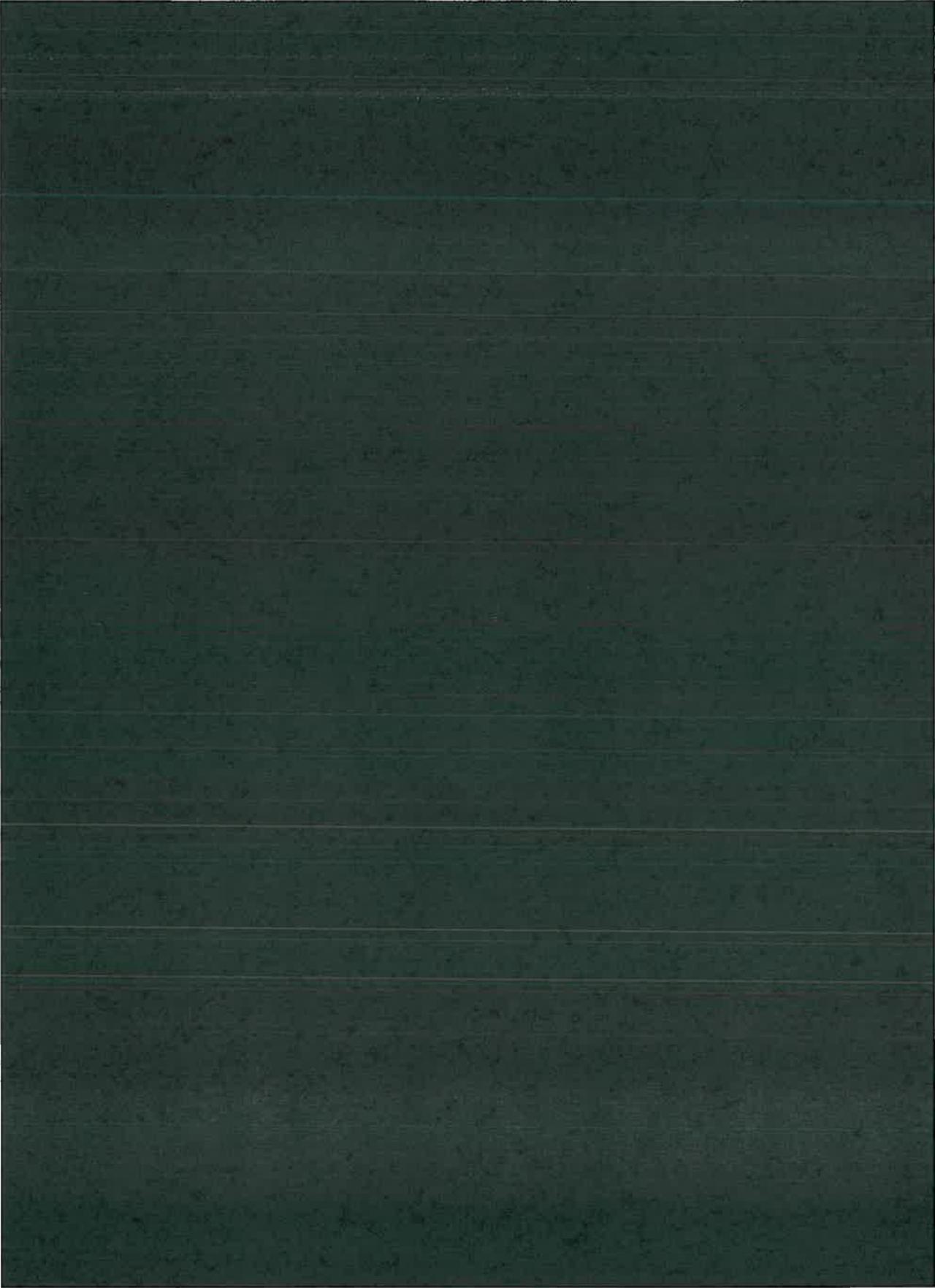


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4.2.3 Target State (end of the proposed investment)



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4.3. Assumptions

This business case is based on the following assumptions.



- The initiative will be delivered following completion of the ERP EAM program.
- The scope, inclusions, exclusions, costs and impacts of the initiative will be further detailed through the Gate 3 business case prior to investment. This may be subject to competitive procurement processes as appropriate to ensure cost efficiency of delivery.
- Previous investments shall be leveraged where possible.

4.4. Dependencies

This investment is dependent on the following programs, projects or business activities.

Program/Project	Dependency	Effect
ERP EAM Program	The ERP EAM program will migrate the companies' Asset, Works, Finance, HR, Payroll and Procurement processes and data mastering from the existing Ellipse platforms and repositories to the new unified ERP EAM solution and Enterprise Intelligence Platform. The ERP EAM system is a key data source for distribution forecasting.	Distribution forecasting requires various data from the Unified ERP EAM system (approved projects, strategic projects, project status, standard estimates, project sub-types, construction class categories). ID06 Distribution Forecasting Consolidation & Replacement could proceed prior to completion of the ERP EAM program, but this would require greater expense due to the need to integrate with the two legacy ERP EAM systems.
ID01 GIS Consolidation & Replacement	The ID01 GIS Consolidation & Replacement initiative will re-platform the companies' GIS spatial network model management capability. The GIS platforms are key data sources for distribution forecasting.	 ID06 Distribution Forecasting Consolidation & Replacement could proceed prior to ID01, but this would require greater expense due to the need to integrate with the two legacy GIS systems.
ID015 Network Planning Tools Consolidation & Replacement	ID015 will replace the existing planning tools Planning tools make use of distribution forecasting, to be replaced through this business case.	 Ideally, ID015 and ID06 should be scoped in parallel, to identify optimal off-the-shelf solutions that integrate seamlessly.
ID08 Information Repositories Consolidation & Replacement	ID08 Information Repositories Consolidation & Replacement transitions the residual data sets and tooling to the Enterprise Intelligence Platform. It also aligns corresponding business processes for state-wide consistency and efficiency.	The distribution forecasting process imports data from numerous data sources for modelling and analytics purpose. It also publishes the outcomes of forecasting studies in SIFT for access by network planners and other teams. The solution delivered through the Distribution Forecasting Tools Consolidation & Replacement will leverage the Enterprise Intelligence Platform datastore.

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Program/Project	Dependency	Effect
ID02 Network Operations Consolidation & Replacement	ID02 Network Operations Consolidation & Replacement builds on the companies' Unified DMS platform, and consolidates Energex and Ergon Energy's outage management, switching, SCADA configuration management and protection configuration management capability.	ID06 Distribution Forecasting Consolidation & Replacement could proceed prior to ID02, but this would require greater expense due to the need to integrate with the two legacy sets of Network Operations systems.

5. OPTIONS ANALYSIS

This section considers the following options analysis:

- Option 1 – Proceed with the consolidation and replacement of distribution forecasting tools (Preferred Option)
- Option 2 – Independent Energex and Ergon Energy distribution forecasting tools replacement
- Option 3 – Do Minimal

5.1. Option 1 – Proceed with the consolidation and replacement of distribution forecasting tools (Preferred Option)

The existing Energex and Ergon Energy legacy distribution forecasting tools will be replaced for ongoing sustainability, supportability and security as described in section 4.2.3. State-wide consolidation and alignment of business processes, models and calculations will also be implemented for best practice efficiency and effectiveness.

5.2. Option 2 – Independent Energex and Ergon Energy distribution forecasting tools replacement

The existing Energex and Ergon Energy legacy distribution forecasting tools will be replaced or renewed for ongoing supportability, security and serviceability.

For Energex, this would involve the replacement of SIFT and NLF. For Ergon Energy, this would involve the replacement of SIFT.

No state-wide consolidation or alignment of business processes, models and calculations would occur.

5.3. Option 3 – Do Minimal

No significant investments in Energex or Ergon Energy's distribution forecasting tools or processes would occur in the FY21-25 regulatory control period, with replacements deferred until the FY26-30 period.

The existing platforms would therefore be locked down without further change to minimise risk.

A comparison of these options is provided over page.

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5.4. Option Comparison

Each option has been assessed against key assessment criteria contained in the table below.

Assessment Criteria	Option 1 - Proceed with the consolidation and replacement of distribution forecasting tools (Preferred Option)	Option 2 - Independent Energex and Ergon Energy distribution forecasting tools replacement	Option 3 – Do Minimal
Advantages	<p>Consistent with the business case objectives, this option:</p> <ul style="list-style-type: none"> Ensures ongoing supportability and sustainability of ICT platforms to support the distribution forecasting process. Replaces and consolidates the distribution forecasting tools, enabling consistent state-wide processes and improved forecasting accuracy. Delivers required capability to determine demand and energy requirements at all relevant levels of the network. Delivers required capabilities to determine small area network demand and energy forecasts. Supports productivity improvement through reduced manual process intervention (e.g. manual data sourcing, data preparation and uploading into SIFT). Supports reporting productivity improvement through consolidation of forecasting models. Supports improved capital investment planning, through enhanced trend and scenario modelling capabilities with contemporary methods and tools. Establishes common data sources and algorithms for consistent state-wide modelling. 	<p>Partly consistent with the business case objectives, this option:</p> <ul style="list-style-type: none"> Ensures ongoing supportability and sustainability of ICT platforms to support the distribution forecasting process. Supports productivity improvement through reduced manual process intervention (e.g. manual data sourcing, data preparation and uploading into SIFT). Delivers required capability to determine demand and energy requirements at all relevant levels of the network. Delivers required capabilities to determine small area network demand and energy forecasts. 	<p>This option does not effectively achieve any of the objectives of the business case.</p> <p>It does however represent the lowest near-term expenditure on distribution forecasting tools by deferring replacement investment into the FY26-30 period.</p>

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Assessment Criteria	Option 1 - Proceed with the consolidation and replacement of distribution forecasting tools (Preferred Option)	Option 2 - Independent Energen and Ergon Energy distribution forecasting tools replacement	Option 3 – Do Minimal
Disadvantages	<p>This option meets all the objectives of the business case. However, the following disadvantage is recognised:</p> <ul style="list-style-type: none"> The consolidation of distribution forecasting tools requires significant input from subject matter experts. This includes settling common forecasting methodologies, models and input sources. 	<p>This option does not meet the following objectives of the business case:</p> <ul style="list-style-type: none"> Does not replace and consolidate the distribution forecasting tools, enabling consistent state-wide processes and improved forecasting accuracy. Therefore, this option does not support the forecast Energy Queensland 10% reduction in indirect costs and 3% improvement in program of works labour costs. Does not support reporting productivity improvement through consolidation of forecasting models. Does not support improved capital investment planning, through enhanced trend and scenario modelling capabilities with contemporary methods and tools. Does not establish common data sources and algorithms for consistent state-wide modelling. <p>Furthermore, this option involves material investment in the parallel Energen and Ergon Energy solutions which has the following additional disadvantages:</p> <ul style="list-style-type: none"> The transition from existing legacy systems to parallel independent replacement solutions involves substantial cost and complexity, for an outcome, which may not represent the optimal target-state solution. Like-for-like replacement of SIFT and NLF are not feasible. Therefore, the Distribution Forecasting Tool replacement activity included in Option 1 is effectively duplicated in Option 2 for both companies. 	<p>This option does not meet any of the business case objectives and will not provide the sustainable, supportable and suitable distribution tools that are essential to appropriately forecast network utilisation and network investment requirements into the future.</p> <p>Based on significant change in network usage (including customer energy usage trends, changing energy demand profiles, energy efficiency technologies, DER and other new network technologies), this is an unacceptable option.</p> <p>This option does not support the forecast Energy Queensland 10% reduction in indirect costs and 3% improvement in program of works labour costs. This will impact the companies' FY26-30 revenue requirements, resulting in a negative price outcome for customers.</p>

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Assessment Criteria	Option 1 - Proceed with the consolidation and replacement of distribution forecasting tools (Preferred Option)	Option 2 - Independent Energex and Ergon Energy distribution forecasting tools replacement	Option 3 – Do Minimal
Key Identified Risks	<p>As the “preferred option”, a specific implementation risk assessment is detailed in section 10.2.</p> <p>Key amongst these risks are:</p> <ul style="list-style-type: none"> • Resource capacity and availability – mitigated through the use of market-provisioned services and established practices, tools and techniques. • Energex / Ergon Energy alignment – mitigated through current work practice alignment focus, with the recognition that some differences in Energex and Ergon Energy’s respective operating environments exist. 	<p>Similar to Option 1, this option involves a substantial investment. Therefore, the risks are similar as follows:</p> <ul style="list-style-type: none"> • Resource capacity and availability – mitigated through the use of market-provisioned services and established practices, tools and techniques. <p>Also, the following additional risk exists for this option:</p> <ul style="list-style-type: none"> • Continued development of disparate Energex and Ergon Energy systems and tools is not supported by the merged business structure of Energy Queensland and the newly aligned business processes of the group. Therefore the value derived from future investments is reduced. • Continued forecasting process and system inconsistencies may result in sub-optimal Energex and/or Ergon Energy network capital works programs through lack of alignment on effective best-practice forecasting methods. 	<p>See section 10.1 for a more specific organisational risk assessment.</p>

6. PREFERRED OPTION

“Option 1 - Proceed with the consolidation and replacement of distribution forecasting tools” is the preferred option, as it ensures sustainability, supportability and security of the companies’ distribution forecasting and regulatory reporting. It meets all the business case objectives, it is aligned with Energy Queensland’s strategic objectives and is consistent with Energex and Ergon Energy’s obligations under the National Electricity Rules. This option also supports Energy Queensland’s planned productivity improvements which result in a forecast 10% reduction in indirect costs and 3% improvement in program of work labour costs

“Option 2 - Independent Energex and Ergon Energy distribution forecasting tools replacement” is viable, but requires duplication of costs across the two distributors, with limited opportunity for process alignment and improvement.

“Option 3 – Do minimal” defers renewal of the companies’ legacy distribution forecasting tools. It therefore represents a material risk to the companies’ continued delivery of their network asset management and service delivery obligations.

6.1. Delivery Timeline and Approach



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7. INVESTMENT BENEFITS OVERVIEW

This section outlines the benefits associated with the investment. This business case has currently been analysed to a “Preliminary Gate 2” level. As such, the benefits will be further detailed, tested, and verified in preparation of the Gate 3 business case prior to investment.

This initiative is primarily an ICT Asset Replacement of legacy systems, required to ensure the ongoing sustainability, supportability and security of business critical capability. Energy Queensland will leverage the opportunity associated with this ICT replacement to also enable planned productivity improvements, resulting in a forecast 10% reduction in indirect costs and a 3% improvement in program of works labour costs. The benefits listed below represent contributions to the overall Energy Queensland productivity improvement targets.

7.1. Financial and Other Benefits

Area	Benefits Identified	Value
Financial Benefits		
Distribution Forecasting Productivity	<ul style="list-style-type: none"> • Distribution forecasting process improvement through reduced manual actions. • Aggregation of distribution forecasting workload for optimal workforce productivity. • Distribution forecasting delivery improvement through consistency of scenario modelling and common calculations and assumptions. 	
Capital Works Program Optimisation	<ul style="list-style-type: none"> • Enhanced trend and scenario modelling capabilities provide a more granular understanding of future demand, driving improved network capital investment decision-making. • Network investment plans can be tailored to the local requirements of particular network segments (small area modelling capabilities). • Opportunity to reduce or defer capital investment through better analysis of customer energy usage and targeting of demand management programs. • Opportunity to deploy non-network alternative solutions, through a more granular understanding of the low voltage network. 	
Other Benefits		
ICT Asset Management	<ul style="list-style-type: none"> • Sustainment of the companies’ distribution forecasting tools for ongoing supportability, serviceability and security. 	Sustainment
Safety & Risk	<ul style="list-style-type: none"> • Improved scenario modelling and better decision-making ensures that distribution forecasts match the actual demand, thus mitigating security of supply risk. 	Risk Mitigation
Customer	<ul style="list-style-type: none"> • Identifying problem areas (technical and capacity) as they develop (e.g. electric vehicle hot spots) may result in fewer customer complaints due to more accurate forecasts in small area grids. • Improved customer connection processes and timeframes as a result of more accurate forecasting. • Improved interface with owners of large renewable plants. 	Reputation
Compliance	<ul style="list-style-type: none"> • Compliance with regulatory reporting requirements e.g. DAPR, RIN. • Compliance with the NER, ensuring prudent and efficient investment in the distribution system. • Compliance with ISO55000 asset management standards. 	Compliance

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8. FINANCIAL ANALYSIS

The table below summarises the potential cost inclusions to deliver the outcomes described in this business case.

Phase	Description / Rationale
All Phases	Project management
	Project support
	Internal corporate logistics / overheads
	Communications and engagement
	Review and assurance (excluding normal Internal Audit functions)
Planning & Procurement Phase	Tender facilitation, probity management and legals
	Gate 3 business case development
	Development of planning deliverables (e.g. PMP, Stakeholder, and Communications Plan etc.)
	Software licences, hardware purchases, cloud services procurement
Design Phase	Software, infrastructure, and information design
	Data profiling and migration design
	Solution architecture
	Integration design
	Business process design
	Organisational change design and change management planning
Build, Integrate, Test and Deploy Phase	Data migration and ETL (Extract, Transform, Load) build
	Data migration execution (incl. Trial Migrations, Dress Rehearsals, Verification etc)
	Software, infrastructure, and environment configuration
	Integration build
	Business process design and organisational change implementation
	Testing (incl. information consistency, capacity, performance, and load, security etc.)
	Training
	Production deployment
Warranty Phase	Post- implementation operational support
	Transition to business-as-usual (BAU) support
	Post- implementation review

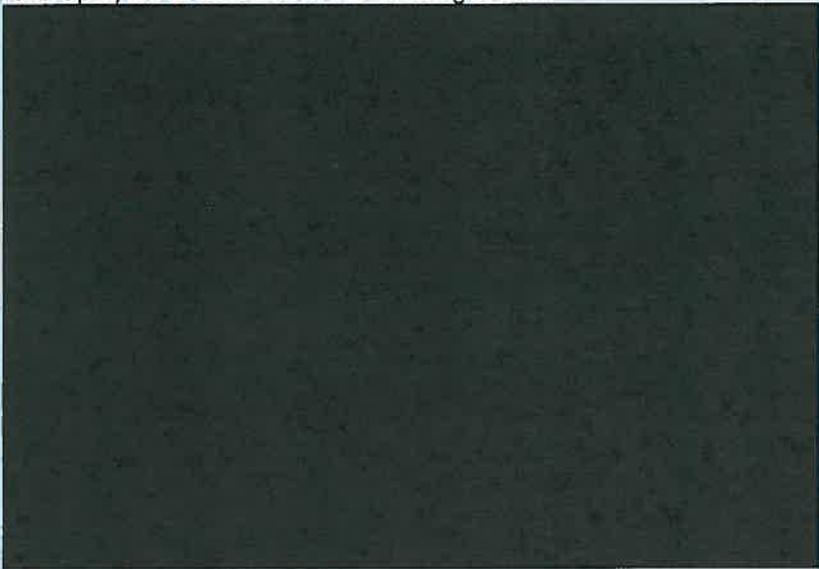
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8.1. Cost Assumptions

The table below summarises the key cost assumptions for the initiative.

#	Assumption	Description / Rationale
1	Project phasing and deployment	<p>The initiative will be delivered over an 18 month elapsed period with an up-front design phase followed by multiple deployments. The deployment plan will be structured with consideration of:</p> <ul style="list-style-type: none"> • Alignment with other dependent initiatives. • Sequencing to maximise business performance benefit. • Intention to progressively transition to the new solution through a sequence of capability deployments.
2	Use of market services	<p>The initiative will be delivered through a team comprising internal subject matter experts and external solution delivery specialists, to ensure project cost efficiency and mitigation of project risk.</p>
3	Energex and Ergon Energy costs	<p>The project costs for Energex and Ergon Energy are consistent with the effort and complexity of transitioning each company from their respective current state to the common target state. The respective estimates (CapEx and OpEx) are as described in the following section.</p>
4	Option 2 (Independent Energex and Ergon Energy distribution forecasting tools replacement)	
5	Option 3 (Do Minimal)	

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8.2. Financial Summary²

8.2.1 Energex Option Comparison



8.2.2 Ergon Energy Option Comparison



8.2.3 Energex Expenditure Summary (Option 1 – Preferred)



8.2.4 Ergon Energy Expenditure Summary (Option 1 – Preferred)



8.3. NPV Calculation Parameters

The above NPV and financial calculations are based on the following parameters.

- The Energy Queensland Net Present Value (NPV) model has been used to calculate the NPV calculations for this business case.
- The financial analysis has been based over a 10 year period after an 18 month phased implementation period.
- 5.40% Regulated Rate of Return/WACC is applied with present values discounted to FY17/18.

² Bracketed figures indicate negative values.

9. PROGRAM DELIVERY

9.1. Program Governance & Delivery

The governance and delivery model depicted in Figure 4 (below) is planned to be used for delivery of the initiative.

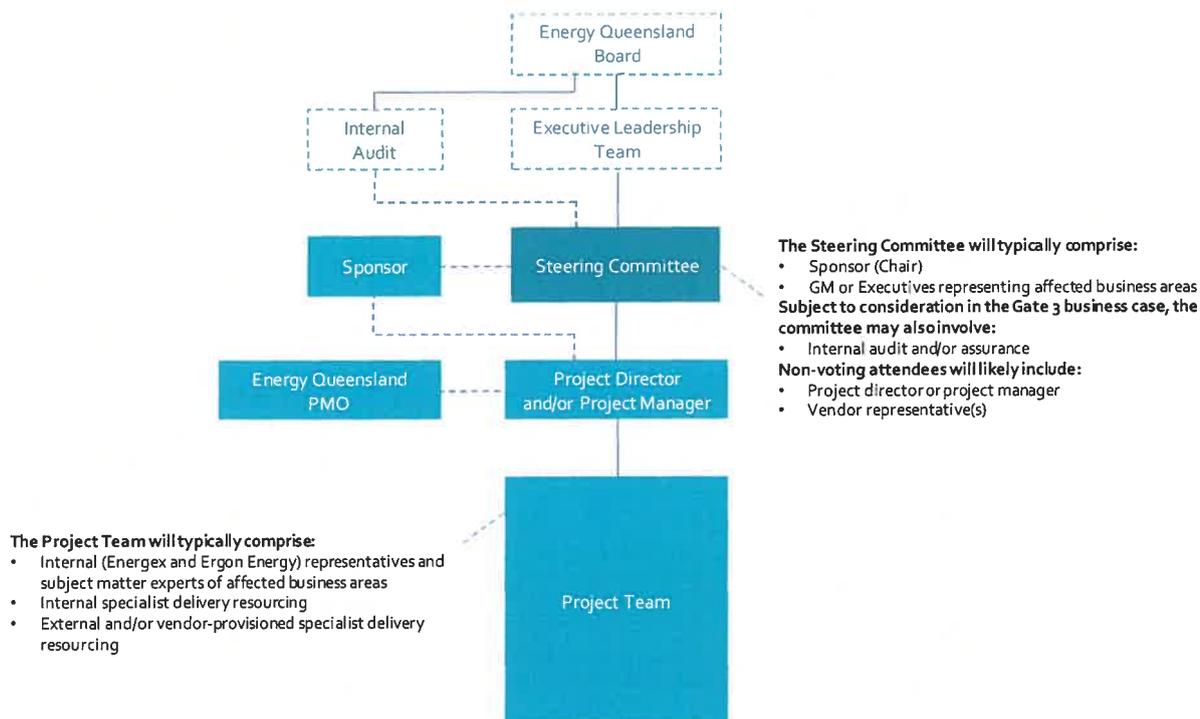


Figure 4 Governance and delivery model

Role	Key Accountabilities
Steering Committee	<p>Provides a single point of accountability for delivery of the initiative in accordance with the business case, as well as decision making aligned with strategic directions of the company. The committee governs the initiative with appropriate balance between delivered outcomes (time, fitness for purpose, cost), risk, business impact, and enabled business value.</p> <p>Responsibilities</p> <ul style="list-style-type: none"> • Attend and be an active participant in committee meetings • Foster positive communications outside of the committee regarding the initiative • Be the voice of the initiative, including communications where appropriate to the Group Executive, Energy Queensland Board, and other key stakeholders • Review and approve/reject any request for change (change requests) to the agreed scope, budget, schedule, or deliverables. • Ensure all approved change requests align with the program objectives • Ensure program quality outcomes are balanced with other competing priorities • Review each completed phase (or defined stages or gates) and provide go/no-go direction after consideration of quality, risk, cost, and schedule • Undertake a Post Implementation Review (PIR) • Ensure the appropriate independent auditing and review of the program is undertaken at the logical stage gates of the program

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Role	Key Accountabilities
Sponsor	<p>The Sponsor is accountable for delivering the business value enabled by the initiative and meeting the objectives set through the business case.</p> <p>Responsibilities</p> <ul style="list-style-type: none"> • Oversee development of the business case • Oversee development of the project management plan (PMP) working closely with the Project Director • Monitor and advise on delivery outcomes working closely with the Project Director and/or Project Manager • Ensure that any proposed changes of scope, cost or delivery timeline are checked against possible impacts to program benefits • Approve Change Requests within delegated authority levels • Ensure Change Requests have been endorsed by all impacted parties (Business Change, Design, Delivery, Finance, and BAU) • Brief Executives and Board on program progress • Ensure that the benefits realisation plan is realistic and achievable
Project Director and/or Project Manager	<p>The Project Director and/or Project Manager has responsibility for the delivery of the overall initiative while maintaining the balance of competing priorities and alignment with initiative objectives as specified in the business case and as directed by the Steering Committee.</p> <p>Responsibilities</p> <ul style="list-style-type: none"> • Deliver the overall initiative outcomes • Agree delivery strategies with the Sponsor and the Steering Committee • Develop the PMP and oversee specification of all initiative deliverables including assessment of interdependencies and appropriate sequencing across the initiative • Manage development of the communications plan and ongoing communications with guidance and feedback from key stakeholders • Manage mobilisation of the initiative, including resource provision and procurement • Oversee technical delivery of solution design, development, implementation, integration, testing, and data conversion • Oversee the delivery of training, deployment, organisational change management, and business process re-engineering • Resolve all issues concerning project plans, schedules, budgets, risks, and issues as they relate to the initiative • Manage cross-project dependencies, scope, and resourcing issues • Ensure audit feedback is actioned in a timely, verifiable manner and validated
Program Management Office	<p>The Program Management Office is a centralised Energy Queensland business function, which provides coordination, standards, administrative support, and end-to-end reporting for Energex and Ergon Energy's business transformational and ICT initiatives.</p> <p>Responsibilities</p> <ul style="list-style-type: none"> • Provide a central repository and framework for all program and project issues and risks • Co-ordinate and manage all project plans under guidance from the Project Managers and/or Project Directors • Overall program / project risk mitigation management • Overall program / project issue management • Program financial tracking and reporting • Deliverables monitoring • Program key performance monitoring and reporting

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Role	Key Accountabilities
Project Team Members	<p>The Project Team undertakes the core delivery of the project under the direction of the Project Director and/or Project Manager. The team typically comprises internal representatives and subject matter experts of affected business areas as well as internal and vendor-provisioned delivery resourcing.</p> <p>Responsibilities</p> <ul style="list-style-type: none"> • Develop and deliver assigned project deliverables • Identify issues and record, monitor, and report status • Manage issues with appropriate actions • Escalate issues as required • Attend reference groups and other forums as required

9.2. Stakeholder Management

The following tables summarise the key internal and external stakeholders for the investment. A detailed stakeholder management plan will be developed as part of delivery planning for the initiative.

9.2.1 Key Internal Stakeholders

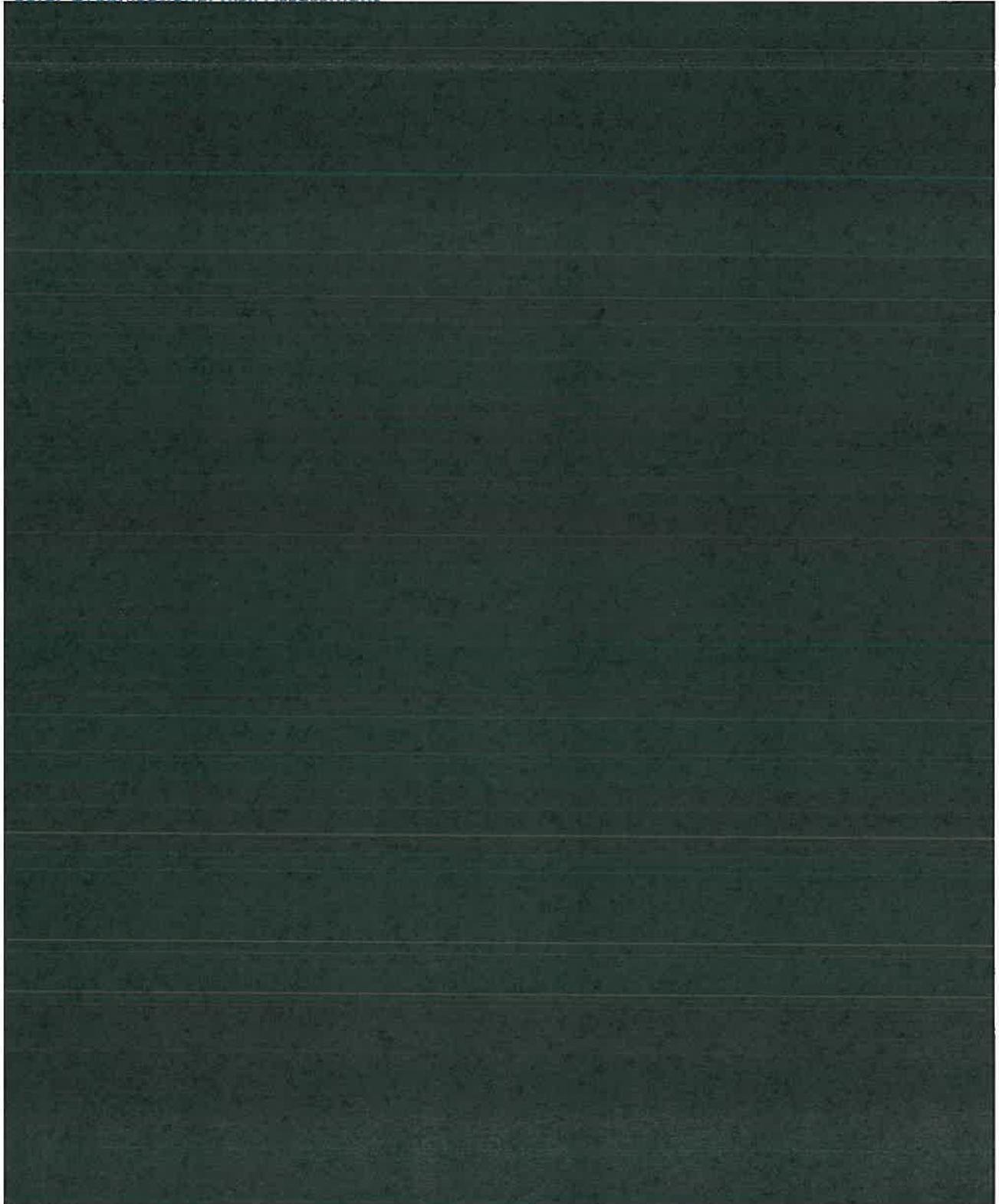
Stakeholder	Interest
Executive General Manager Asset Safety and Performance	<ul style="list-style-type: none"> • Oversight of the Asset Management business processes, systems and people.
Asset Management Group	<ul style="list-style-type: none"> • Efficient and effective asset management business processes, systems and tools.
Network Forecasting Group	<ul style="list-style-type: none"> • The forecasting group will be the primary user of the toolset. • Efficient and effective tools for network scenario modelling and analysis. • Forecasting tools that are “fit for purpose” and easy to use.
Network Planning Group	<ul style="list-style-type: none"> • Easy access to accurate, up-to-date load forecasting information and data for network planning activities.
Network Design Group	<ul style="list-style-type: none"> • Easy access to accurate, up-to-date load forecasting information and data for network design activities.

9.2.2 Key External Stakeholders

Stakeholder	Interest
Regulators	<ul style="list-style-type: none"> • Accurate forecasting of future network limitations, supporting optimised, prudent network capital investment plans. • Timely delivery of DAPR and RIN reporting.
Community	<ul style="list-style-type: none"> • Optimised network investment plans which maintain energy security based on prudent and efficient expenditure. • Interest in the Energex and Ergon Energy’s DAPR.

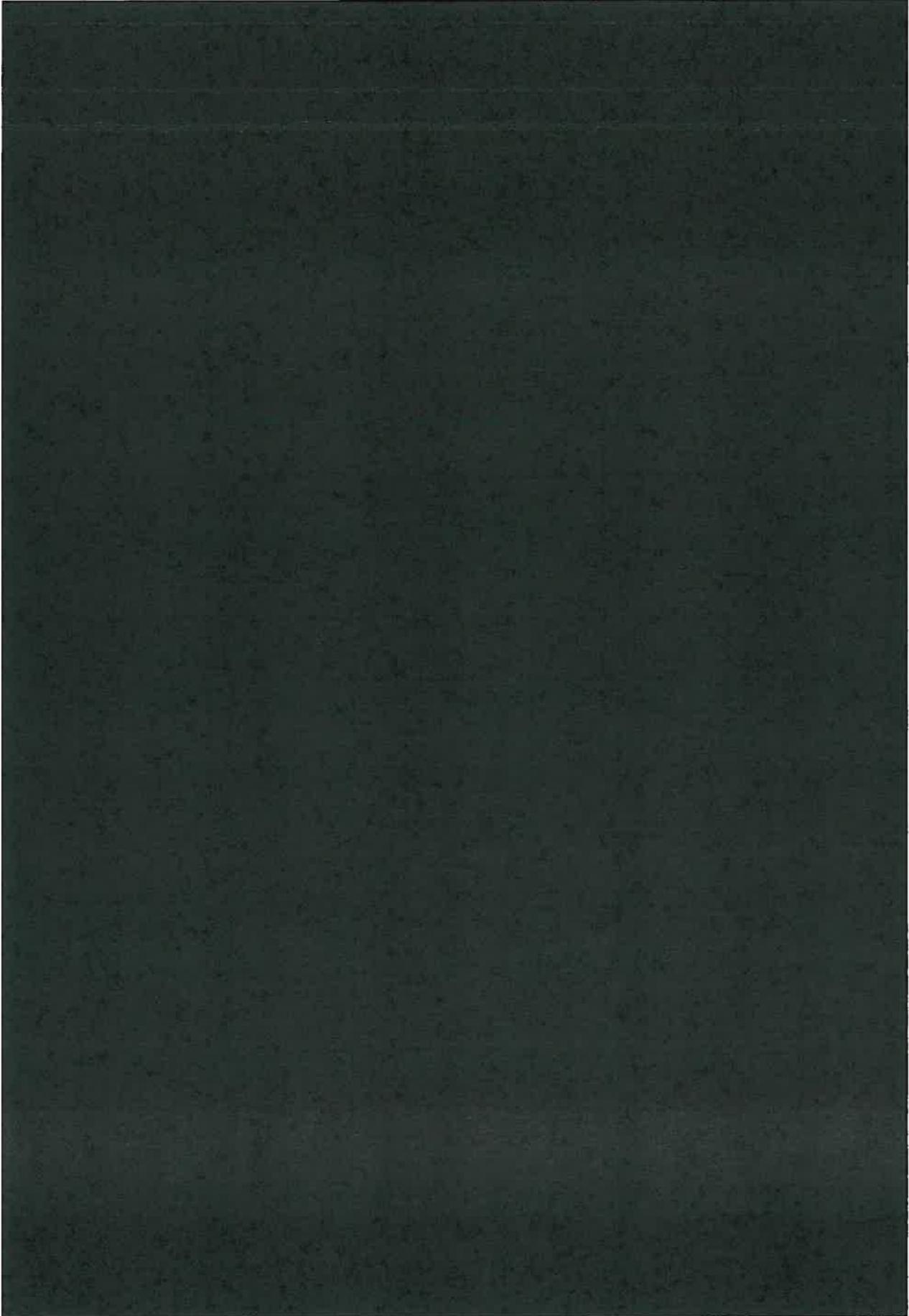
10. RISK ASSESSMENT

10.1. Organisational Risk Assessment



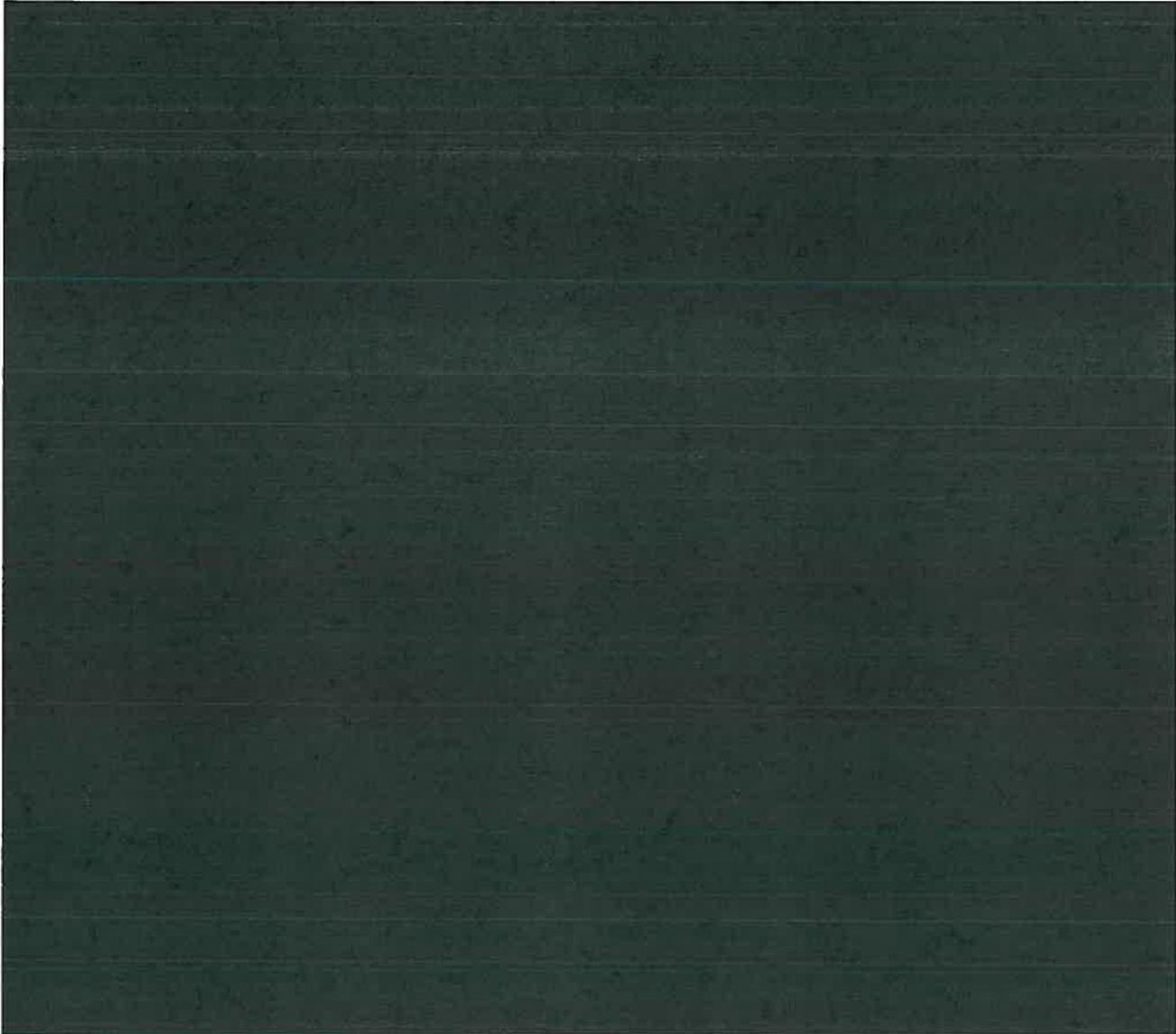
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10.2. Preliminary Implementation Risk Assessment

This section provides a preliminary assessment of the key implementation risks of the preferred investment option.

Risk Description	Inherent Risk	Planned Mitigation	Residual Risk
<p>Risk 1. Resource capacity and availability The initiative requires mobilisation of a skilled delivery team comprising internal subject matter experts and external solution delivery specialists.</p>	Moderate	<p>Continue to perform prudent program management planning to minimise internal resourcing conflicts, ensuring adequate capacity is committed to each initiative prior to delivery.</p> <p>Also prior to delivery, verify the availability of external solution delivery expertise through market procurement processes.</p>	Low
<p>Risk 2. Energex / Ergon Energy alignment Given Energex and Ergon Energy's disparate legacy processes and information holdings, it may prove difficult to achieve the intended alignment and synergy in the target models.</p>	Moderate	<p>Through the establishment of Energy Queensland, Energex and Ergon Energy business units are working methodically to align work practices and procedures for state-wide efficiency and best practice.</p>	Low
<p>Risk 3. Availability of LV network data The modelling of the LV network requires the availability of an accurate LV network and LV asset data. In some areas of the network, data quality is known to require improvement.</p>	High	<p>Energex and Ergon Energy are currently improving LV network datasets through business-as-usual processes.</p> <p>ID01 GIS Consolidation & Replacement will also support the unification of the two LV network models and datasets for consistency of analysis.</p>	Low

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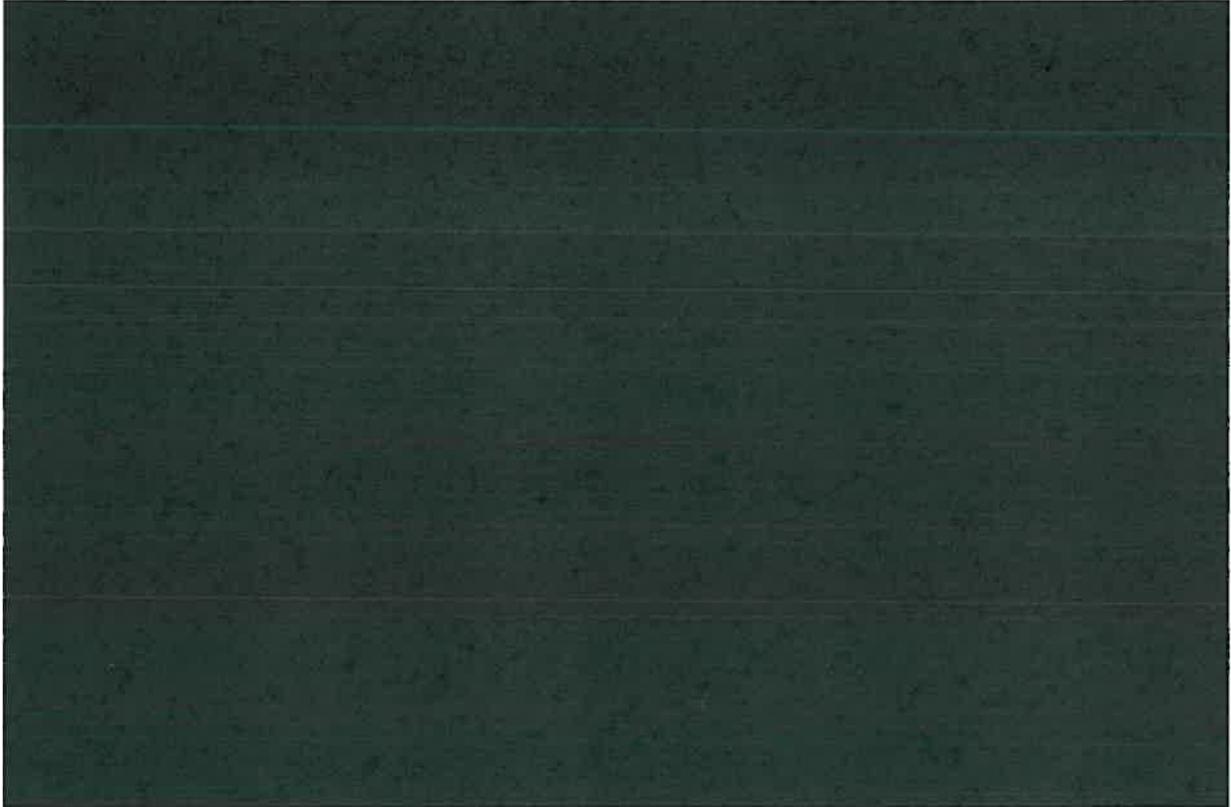
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11. CHANGE IMPACTS

The below section details the potential impacts to occur across the Energy Queensland environment during and after the implementation of this investment.

11.1. Investment System Impacts



11.2. People & Process Impacts



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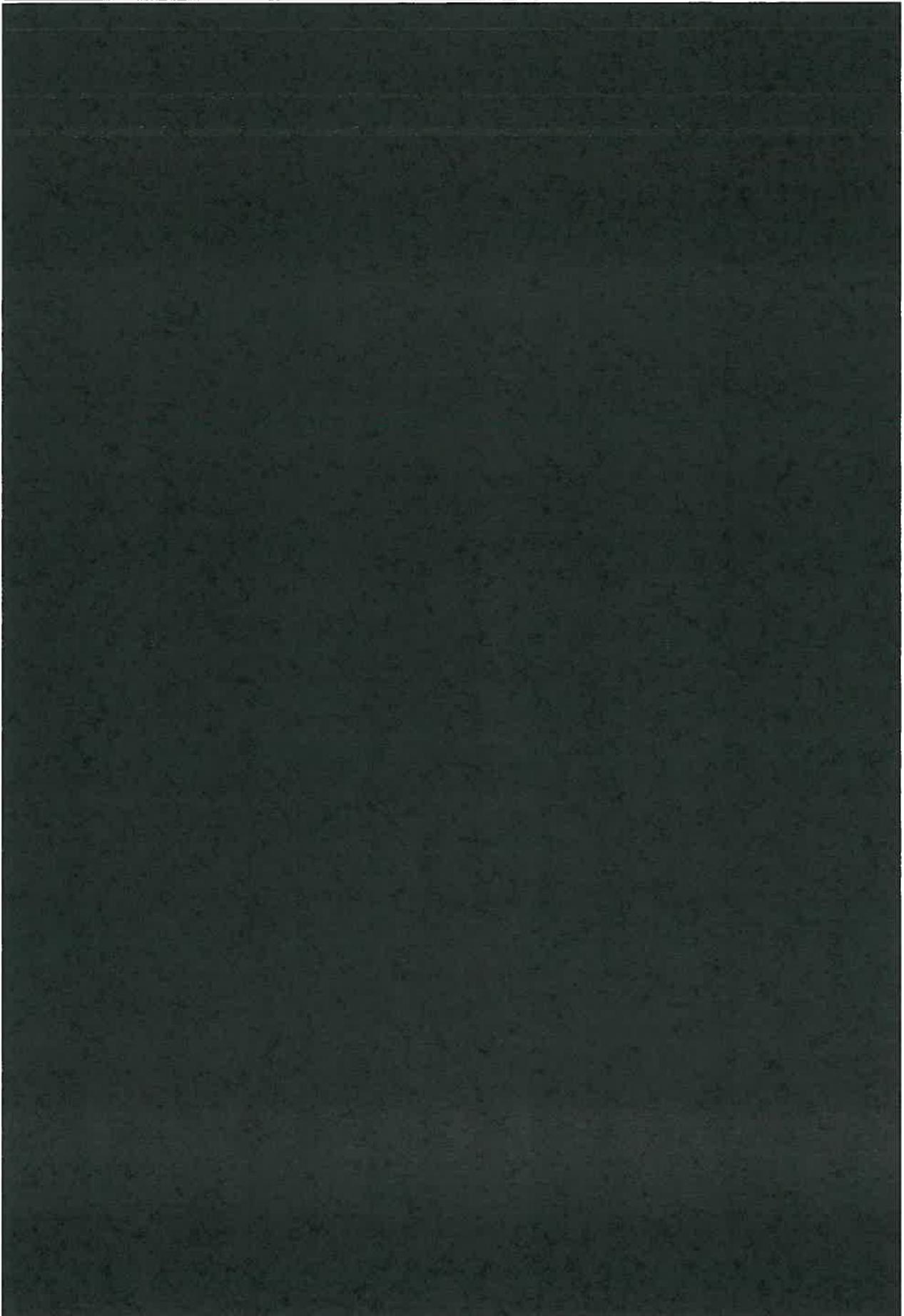
APPENDIX A - GLOSSARY

This section describes key terms and acronyms used in this document.

Term	Definition
BESS	Battery Energy Storage Systems
CapEx	Capital Expenditure
DAPR	Distribution Annual Planning Report
DFD	Energex's distribution feeder demand forecasting and planning tool
DNSP	Distribution Network Service Provider (i.e. the Energex and Ergon Energy distribution businesses)
EAM	Enterprise Asset Management system supporting functions including Asset and Works Management
ECORP	Ergon Energy's corporate data repository
ERAT	Energex house developed data store for equipment ratings
ERP	Enterprise Resource Planning system supporting functions including Finance, Human Resource Management, Payroll and Procurement
GIS	The Energy Queensland Geographic Information and Network Model Management Systems
HR	Human Resources
ICT	Information Communication Technology
LARA	Load At Risk Assessment
LV	Low Voltage
MSS	Minimum Service Standards
MVA	Mega Volt Amp
MVA_r	Mega Volt Amp reactive
MW	Mega Watt
NER	National Electricity Rules
NetPlan	Energex's distribution feeder demand forecasting and planning tool
NLF	Network Load Forecasting, an Energex built database
NPV	Net Present Value
OpEx	Operating Expenditure
OSI PI Historian	PI Historian is a network data historian application with a highly efficient time-series database. OSIsoft is the vendor.
SCADA	Supervisory control and data acquisition
SCS	Standard Control Services
SIFT	Substation Investment Forecasting Tool
Smallworld	Ergon Energy's GE-supplied GIS
STPIS	Service Target Penalty and Incentive Scheme
WACC	Weighted Average Cost of Capital
DLF	Distribution Load Forecasting

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APPENDIX C - Preliminary functional requirements

The appendix summarises a preliminary set of functional requirements for further detailed consideration during development of the Gate 3 business case.

- Dynamic load (MVA, MW and MVar) and energy forecasting (in pseudo-real-time)
 - Forecasting of the remaining system and plant capacities (to individual asset levels)
 - Forecasting different levels of Solar PV, BESS, electric vehicles and large renewable connections
 - Forecast future network risks
 - Forecasting network performances (e.g. MSS/STPIS trends correlated to demand, energy, new technology and customer trends)
 - Forecasting demand and energy of different and mixed customer categories
 - Forecasting network economics
 - Forecasting spatial weather change (not only ambient temperature) and interface with global climate change trends to co-relate weather (and risks) with operation of renewable systems
 - Supporting regulatory requirements (e.g. DAPR, RIN and DLF)
-
- Visualisation and reporting capabilities

