Endeavour Energy

ICT INVESTMENT PLAN

1 JULY 2019 – 30 JUNE 2024

EXECUTIVE SUMMARY

CHAPTER 1

1.0 EXECUTIVE SUMMARY

Endeavour Energy is proposing a total of $91.2 million ($ real 2018-19) of capital expenditure (Capex) for non-network information, communication and technology (ICT) for the 2019-24 regulatory control period, commencing 1 July 2019. Endeavour Energy has developed a prudent non-network ICT capital program to deliver the key objectives of the distribution business.

The capital program has been developed to provide ICT assets that are pragmatic, efficient, scalable and re-useable to ensure the ongoing reliability, safety and security of supply to network customers. Furthermore, the program seeks to improve the capabilities of our network to provide the types of new services increasingly demanded from our customers driven by technological advances in energy generation and storage.

This document outlines the required non-network ICT capital expenditure forecast for Endeavour Energy to efficiently meet the obligations of a Distribution Network Service Provider (DNSP) in the delivery of Standard Control Services. It also demonstrates how the ICT capital expenditure forecast meets the objectives, criteria and factors set out in the National Electricity Rules (NER).

The capital expenditure presented in this document is in real 2018-19 dollars. All costs shown in this document have been adjusted to reflect only the standard control services portion of Endeavour Energy's distribution network business, unless otherwise stated.

Endeavour Energy's ICT capital expenditure forecast for the 2019-24 regulatory control period by ICT Capex purpose is shown in the table below:

2019-24 ICT Capex Purpose						
Purpose (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
ICT Asset Extension	1.9	3.7	4.3	4.4	2.9	**17.2**
ICT Asset Remediation	0.2	1.2	0.6	0.3	-	**2.3**
ICT Asset Replacement	22.1	8.2	8.0	6.6	7.9	**52.9**
ICT Capability Growth	6.4	3.6	3.6	2.8	2.3	**18.8**
Total	**30.6**	**16.8**	**16.5**	**14.1**	**13.1**	**91.2**

Table 1: 2019-24 ICT Capex Purpose Summary

From the table above, $52.9 million (or 58%) of the forecasted ICT Capex for the 2019-24 regulatory period predominately relates to ICT Asset Replacement. This is the result of the following key factors:

- Changing regulatory landscape which requires the replacement of ICT assets in order to comply with increased regulatory requirements (e.g. ICT Security requirements of the Network Operator Licence);
- Ageing ICT application and infrastructure landscape as a result of Endeavour Energy's historical ICT investment lifecycle and prudent asset extensions can no longer efficiently support the corporate objectives and the safety, reliability and security of the network (i.e. some applications are over 20 years old and now require replacements in line with consultant recommendations and good industry practice); and
- Changing business and customer expectations as a result of emerging technologies and adoption of mobile technologies (e.g. business and customers are increasingly demanding real-time self-service access to information).

When compared with the current regulatory period, Endeavour Energy's 2019-24 ICT Capital Investment Plan, is materially in line with current period allocations. The following graph demonstrates the non-network ICT Capex expenditure over the current and forthcoming regulatory periods. An increase in ICT expenditure in the current period follows the NSW Treasury transaction activities which saw the long term concession of Endeavour Energy to a consortium of private investors in June 2017. The new owner strategy included establishing a new ICT landscape to support Endeavour Energy's focus of improving overall efficiency to deliver better outcomes for customers.

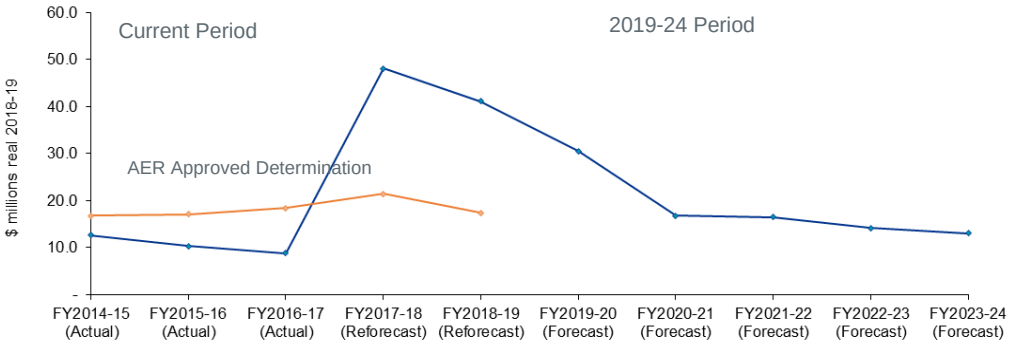


Figure 1: 10 year non-network ICT Capex trend

$m; real 18-19	2009-14	2014-19	2019-24
ICT Capex	93.81	120.80	91.2
Allowance	137.25	91.0	-
Difference	43.44	-29.8	

Table 2: 10 year non-network ICT Capex Allowance vs Spend

The non-network ICT expenditure is made up of four investment areas that align with Endeavour Energy's corporate themes and strategic direction. The four ICT investment areas for 2019-24 are:

1. **Maintain Core Systems**: Continue consolidation and technical refresh of legacy systems to the Endeavour Energy enterprise resource planning (ERP) platform to ensure the safety, reliability and security of the network;
2. **Sustain Reliability of ICT Services**: Technical refresh of critical underlying ICT infrastructure and operations capability to allow Endeavour Energy to meet the network business objectives;
3. **Maintain Security Standards**: Programs to continue Endeavour Energy's compliance with regulatory and legislative requirements to ensure we are able to efficiently detect, protect and mitigate against increasing cyber security threats; and
4. **Engage the Customer and Enable Network Efficiency**: Implementation of initiatives to address feedback from customers and to deliver capability for the network business to continue to drive efficiencies.

The following table provides an overview on how the ICT investment areas underpin and support Endeavour Energy's corporate themes.

		Corporate Theme			
	ICT investment area mapped to Corporate theme	**Affordable, safe and reliable network**	**Investing for growth in Western Sydney**	**Enabling customer choice and future network strategy**	**Regulatory compliance**
ICT Investment Area	1. Maintain Core Systems	✓	✓	✓	✓
	2. Maintaining Security Standards	✓		✓	✓
	3. Sustain Reliability of ICT Services	✓		✓	
	4. Engage the Customer and Enable Network Efficiency	✓		✓	

Table 3: Alignment of ICT investment areas to Corporate Themes

The ICT Investment Plan is broken down into the following investment areas for the 2019-24 regulatory period.

ICT Program Summary 2019-24						
Description (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Maintain Core Systems	[redacted]					
Maintaining Security Standards						
Sustain Reliability of ICT Services						
Engage the Customer and Enable Network Efficiency						
Total						

Table 4: 2019-24 ICT Capex Summary

As seen in the table above, maintenance of core systems represents 37% of planned non-network ICT capital expenditure for the 2019-24 regulatory period, 32% of expenditure is dedicated to ensuring the reliability of ICT services, 15% relates to improving customer engagement models and the remaining 16% is allocated to maintaining ICT security standards across core applications, network and infrastructure.

INTRODUCTION

CHAPTER 2

2.0 INTRODUCTION

2.1 Purpose

The purpose of this document is to set out the ICT Capital Investment Plan required to ensure delivery of the technology capabilities needed by Endeavour Energy over the 2019-24 Australian Energy Regulator (AER) regulatory period. This investment is required to maintain compliance and continue to put downward pressure on electricity prices by supporting our ongoing efficiency. A well-functioning IT system will support productivity improvements and improved asset management decisions. It is also required to support customer choice and control in the future as new technologies emerge and customers require access to more timely information. Our aim is to facilitate these technologies and to ensure customers receive the information they require to make informed energy choices.

2.2 Scope

Development of the ICT Capital Investment Plan includes analysis and consideration of the following:

- The feedback we receive from customers. Specifically, customers' priorities for the 2019-24 period remain reducing electricity prices, maintaining the reliability and safety of our services and facilitating the transition to new technologies.
- The overall approach and ICT governance process for developing the ICT Investment Plan, forecasts and cost estimates;
- Processes to prudently test the necessity of proposed investment initiatives including identification of supporting assumptions, risk outcomes and the evaluation of alternative investment options;
- Evaluation of Endeavour Energy's performance and ICT outcomes achieved to date in the current AER determination period;
- Assessment of the key business, industry and regulatory drivers impacting prioritisation and investment decisions;
- Emerging customer trends and the capabilities required to leverage from increased Distributed Energy Resources (DER) uptake.
- Assessment of industry peers and alignment to industry good practices;
- Assessment of the proposed capital expenditure against the AER Capital Expenditure Objectives; and
- The Maintaining Security Standards investment area includes capital expenditure relating to the security of Operational Technology (OT) systems as well as Endeavour Energy corporate security function. OT supports the systems required for the direct provision of network and grid services (e.g. SCADA systems) and related function of securing these gateway assets. The ICT security function underpins all other areas of the business and manages Endeavour Energy's data centres, network, communications, systems and infrastructure footprint (e.g. finance and human resources systems).

2.3 Structure

This document is structured as follows:

Section	Heading	Description
3.0	Investment Context	This section provides an explanation on how the ICT Investment Plan aligns to the Endeavour Energy corporate strategic themes as well as the benefits obtained from previous investment, key industry and technology trends informing the ICT Investment Plan.
4.0	2019-24 ICT Investment Plan	This section provides an overview of the overall 2019-24 ICT Investment Plan, summarising the four investment areas and providing an overview of the forecasted non-network ICT Capex in the AER's ICT Capex Purpose categories.
5.0	Maintain Core Systems	This section describes planned 2019-24 ICT investments relating to the continuation of the consolidation and rationalisation of bespoke applications to the Enterprise Resource Planning (ERP), Enterprise Asset Management (EAM), and Billing platforms.
6.0	Maintaining Security Standards	This section articulates the 2019-24 ICT Security program to comply with the Network Operator Licence conditions and investment required to respond to the changing business requirements of web, mobile devices and digital interaction with customers and suppliers.
7.0	Sustaining Reliability of ICT Services	This section describes planned ICT investments relating to cloud enablement, ICT Operations and infrastructure and telecommunications technical currency program for the 2019-24 regulatory period.
8.0	Engage the Customer and Enable Network Service Efficiency	This section sets out planned 2019-24 ICT investments for customer engagement, mobility, automation and data analytics. These investments will improve customer engagement, service levels and access to energy use and consumption/generation data.
Appendix A	ICT Investment Governance	This section provides an overview of the ICT Investment Governance framework which has been applied to the development of the ICT Investment Plan for 2019-24 and articulates how the governance model continues to be applied in a business-as-usual (BAU) scenario.
Appendix B	NER Objective and Criteria Alignment	This section outlines how each ICT investment area aligns to the NER Capital Expenditure Objects and Criteria.
Appendix C	Abbreviations	Terms and abbreviations.

Table 5: Document Structure

INVESTMENT CONTEXT

CHAPTER 3

3.0 INVESTMENT CONTEXT

The 2019-24 ICT Investment Plan is aligned to Endeavour Energy's corporate strategic direction which seeks to address customer feedback and continue to meet the regulatory obligations of a DNSP. Furthermore, it leverages existing ICT investments and takes into consideration emerging industry trends and technological advancements.

The purpose of this section is to provide an explanation on how the ICT Investment Plan aligns to the Endeavour Energy corporate strategic themes as well as the benefits obtained from previous investment and key industry and technology trends informing the ICT Investment Plan.

ICT expenditure is required to ensure the reliability, performance and security of technology systems, data and end point devices. Our ICT function provides the following core capabilities:

- Compliance with jurisdictional licence conditions and regulatory obligations of a DNSP;
- Supporting functions in delivering network services and corporate functions such as asset management, customer management, and financial reporting;
- Meeting customer requirements, which includes:
    - Provision of secure, accurate and timely communication with customers through automated, self-service and mobile capabilities; and
    - Improving the efficiency and prudency of our services to put downward pressure on electricity prices.

The Endeavour Energy ICT Investment Plan has been developed with the following considerations:

- Benefits achieved as a result of investments in the current regulatory control period;
- Evolving industry requirements and leveraging technology advances including increasing use of mobile and emerging technologies and the expectation of a self-serve workforce and customer base;
- Customer priorities and expectations of the ability for our network to facilitate new services including infrastructure to support greater energy monitoring and trading opportunities; and
- Business wide focus and stakeholder support for electricity cost/price restraint achieved through prudent investment decisions.

3.1 Alignment to Corporate Themes

3.1.1 Overview of Corporate Themes

ICT provides critical business support to meet our obligations as a DNSP. The primary role of ICT is to ensure the reliability, performance and security of technology systems, data and end point devices. ICT systems are instrumental in delivering our network and corporate functions such as asset management, network billing, customer management and financial reporting. In addition, ICT is a strategic enabler that supports business objectives. The prudent adoption of technology enables the delivery of better services to our customers at a lower cost over time.

In the latter part of the current regulatory period it has been recognised that the current application suite which includes legacy systems and their support hardware for core business

processes, was an increasing risk to the delivery of cost effective business as usual operations and the achievement of future corporate goals. Previous underinvestment in ICT combined with the complexities associated with transitioning towards an integrated distribution network has meant that significant investment was required to achieve the flexibility necessary to manage a modern electricity network. The focus on investment in the current regulatory period has been the implementation of a technically current ERP and billing platform that will support the consolidation and rationalisation of the Endeavour Energy application suite. The resulting simplified, technically current platform provides the stability needed to maintain a reliable and secure technology platform to engage customers, support mobility, business continuity, integration and business intelligence.

The ICT Investment Plan aims to invest and deploy best fit / best value technology to support the current business operations and achievement of corporate goals. Investment in technology will enable Endeavour Energy to increasingly leverage data driven decision making in key areas of asset management and workforce management. The ICT Investment Plan is developed from demonstrated business needs that align to each of Endeavour Energy's corporate themes. Related business needs are developed into ICT Investment Areas which consist of a number of Major Programs required to deliver business outcomes. Each Major Program is comprised of minor Programs which deliver a specifically identified business need, meet a regulatory requirement or mitigate an escalating business risk. All programs are subject to Endeavour Energy's ICT governance processes prior to approval and release of funding.

Each investment area identifies the strategic objectives and the business drivers from which potential ICT projects have been identified and prioritised. The rationale for this approach is to maximise technology investment and directly contribute to the attainment of strategic and operational goals.

Based on Endeavour Energy's strategic direction the Corporate Themes over the next five-year period are as follows:

Corporate Theme	Description

Affordable, safe and reliable network	• Endeavour Energy's key focus is maintaining a reliable and safe network in a sustainable and affordable way for customers.
	  ◦ Safety is our highest priority; we foster a proactive and consistent approach to hazard identification, risk assessment and the effective management of risk through the implementation of preventative controls and actions. Our prime objective is to create a workplace that is safe and an organisational culture in which no one knowingly participates in an unsafe act.
	  ◦ Affordability continues to be a focus, with a strategic goal of reducing the network portion of customer's bills over time.
	  ◦ A continued commitment to sustainably investing in the network to maintain its security, reliability and resilience.

Investing for Growth	• Endeavour Energy aims to support the prosperity of NSW by delivering and maintaining an electricity network which is able to service the needs of high growth priority areas in Western Sydney.
Enabling Customer Choice and Future Network Strategy	• Endeavour Energy is looking for opportunities to leverage our traditional network business model to better service our customers under a customer centric culture and business model. • Endeavour Energy is committed to facilitating greater customer choice amid an environment which is being impacted by emerging technologies and new models for the way customers consume and produce electricity.

Corporate Theme	Description
Regulatory Compliance	• Endeavour Energy supports the current regulatory framework and is committed to complying with regulatory obligations and promoting industry reforms that lead to improved long-term outcomes for customers and stakeholders.

Table 6: Endeavour Energy's Corporate Themes

3.1.2 Alignment of ICT Investment Areas to Corporate Themes

ICT provides critical business support to meet our obligations as a DNSP in line with our strategic direction. More specifically, ICT provides the technology tools and data to enable the business to efficiently manage our current network safely and reliably, supports the effective planning of the network, fulfils corporate and regulatory obligations, and with the prudent adoption of technology enables the delivery of better services to customers at a lower cost over time.

With the corporate strategic direction and outcomes as key drivers, four core ICT investment areas have been identified for the 2019-24 period through a rigorous prioritisation process. The ICT Investment Plan outlines the required expenditure in application software developments, infrastructure, operating systems, security, network communications and devices. Namely:

1. **Maintain Core Systems**: Continue consolidation and technical refresh of legacy systems to the Endeavour Energy enterprise resource planning (ERP) platform to ensure the safety, reliability and security of the network;
2. **Sustain Reliability of ICT Services**: Technical refresh of critical underlying ICT infrastructure and operations capability to allow Endeavour Energy to meet the network business objectives;
3. **Maintain Security Standards**: Programs to continue Endeavour Energy's compliance with regulatory and legislative requirements to ensure we are able to efficiently detect, protect and mitigate against any cyber security threats; and
4. **Engage the Customer and Enable Network Efficiency**: Implementation of initiatives to address feedback from customers and to deliver capability for the network business to continue to drive efficiencies.

The following table shows how the ICT investment areas in the Investment Plan align to each of Endeavour Energy's Corporate Themes in order for Endeavour Energy to deliver on the strategic outcomes.

		Corporate Theme			
	ICT investment area mapped to Corporate theme	**Affordable, safe and reliable network**	**Investing for growth in Western Sydney**	**Enabling customer choice and future network strategy**	**Regulatory compliance**
ICT Investment Area	1. Maintain Core Systems	✓	✓	✓	✓
	2. Maintaining Security Standards	✓		✓	✓
	3. Sustain Reliability of ICT Services	✓		✓	
	4. Engage the Customer and Enable Network Efficiency	✓		✓	

Table 7: Alignment of Corporate Themes to ICT Program(s)

3.2 Current Regulatory Period (2014-19)

ICT has been a key contributor and enabler to numerous efficiency initiatives, including the most recent Endeavour 2020 program. This program has contributed to reducing the network component of bills for the average residential customer by $75 over the last 5 years.

During the current regulatory period, Endeavour Energy underwent an intensive transaction process which resulted in an Australian-led consortium of long-term investors acquiring 50.4% ownership of the rights to manage Endeavour Energy's network assets under a 99-year lease. The transaction resulted in a changed regulatory environment and strengthened security obligations for Endeavour Energy.

In light of these changing business and industry drivers, the following key outcomes are targeted to be achieved during the 2014-19 regulatory period:

- Delivery of the finance automation and risk management program providing an upgrade to data stores and reports for operational decision making and redesigning the accounts payable process to realise efficiencies;
- Commencement of the program to remediate business risks presented by the end of life Enterprise Resource Planning (ERP) platform, with the implementation of an industry standard ERP platform, consolidation of the network billing function and decommissioning of the 20 year old network billing system, Banner. This program aims to deliver improved asset management processes and develop the platform to ensure future customer data requirements and engagement practices maintain compliance with current and future regulatory obligations;
- Delivery of a widespread ICT security uplift to achieve compliance with the new Network Operator Licence obligations and build the foundation for further investment to maintain security standards and retain compliance;
- Refresh of ageing ICT infrastructure to maintain a reliable and assured business platform, ensure technical currency, reduce operational risk, provide flexibility and mitigate rising ICT operational costs;
- Delivered the technological foundations for improved field and network management processes by continuing mobile process automation and improvements to workforce scheduling tools; and
- Laid the initial foundation for the alignment and integration of OT and Information Technology (IT) asset information data to optimise business processes and enhance the decision making to reduce risks. This program provides a platform for future investment to integrate customer and Accredited Service Provider (ASP) data, respond to changing customer engagement models, improve data driven decision making, support the OT implementation of an Advanced Distribution Management System (ADMS) and hasten response time to future industry transformation as identified in the Energy Networks Australia (ENA) roadmap.

Prior to the completion of the transaction process some planned ICT investments were temporarily deferred to ensure investment in new systems and programs did not conflict with the priorities and strategic objectives of the new business partners.

Some of the investments which were deferred and reprioritised include:

- Outage management system technical currency upgrade;
- Outage data mart upgrade and enhancements;
- Implementation of an operational asset data store and data mining capability;

- Low voltage control management aiming to provide improved monitoring and management of the low voltage network; and
- Process improvements including collaboration tools, streamlined document approval processes and e-recruitment system enhancements.

Following the transaction and strategic guidance of the new owners, Endeavour Energy has started several programs of work to ensure it will be able to maintain the security, reliability and safety of the network in line with the approved determination.

3.3 2014-19 ICT Capital Expenditure

The AER approved $91.0 million ($ real 2018-19) for ICT capex the current 2014-19 regulatory control period. We forecast that there will be an over spend of $29.8m for ICT non-network capex, as a result of investment in the new ICT landscape initiated by the new owners, however this has been offset against reductions in network capex.

The following four principles guided ICT investment strategy and enabled prudent delivery of the forecasted capital program for the 2014-19 AER regulatory submission:

- Alignment to the direction and priorities of the business and ICT;
- Clarify the balance between the demands of the business, ICT delivery capability, performance management and governance;
- Establish a basis for the ongoing management of information and communications technology assets within Endeavour Energy; and
- Provide an overall context for making key decisions with a long-term direction.

Endeavour Energy's forecast result for the 2014-19 regulatory period reflects an expenditure that is below the approved determination.

Current Period Reconciliation						
Description (A$ millions real 2018/19	FY2014-15 (Actual)	FY2015-16 (Actual)	FY2016-17 (Actual)	FY2017-18 (Forecast)	FY2018-19 (Forecast)	Total
AER Approved Determination	16.8	17.1	18.4	21.4	17.4	**91.0**
Actual / Forecast Expenditure	12.6	10.3	8.8	48.0	41.1	**120.8**
Difference	**4.1**	**6.7**	**9.6**	**(26.7)**	**(23.7)**	**(29.8)**

Table 8: 2014-19 AER Period Reconciliation

The first three financial years of the current period reflects a period of underspend for non-network ICT. A number of key drivers resulted in this underspend including:

- A re-categorisation of projects that initially were non-network ICT into the Operational Technology category;
- Operating expenditure (Opex) constraints as a result of the AER decision for the current regulatory resulted in deferment and reprioritisation of capital programs that would have resulted in on-going Opex; and
- The NSW Government's decision to proceed with the 99 year lease of Endeavour Energy resulted in a Capex freeze for non-core Capex programs during the transaction process.

With the completion of the Transaction, the new strategic direction and an exponentially increasing risk profile due to ageing infrastructure and applications, Endeavour Energy has forecasted an increased Capex program for the final two years of the current regulatory period that is within approved ICT capital expenditure.

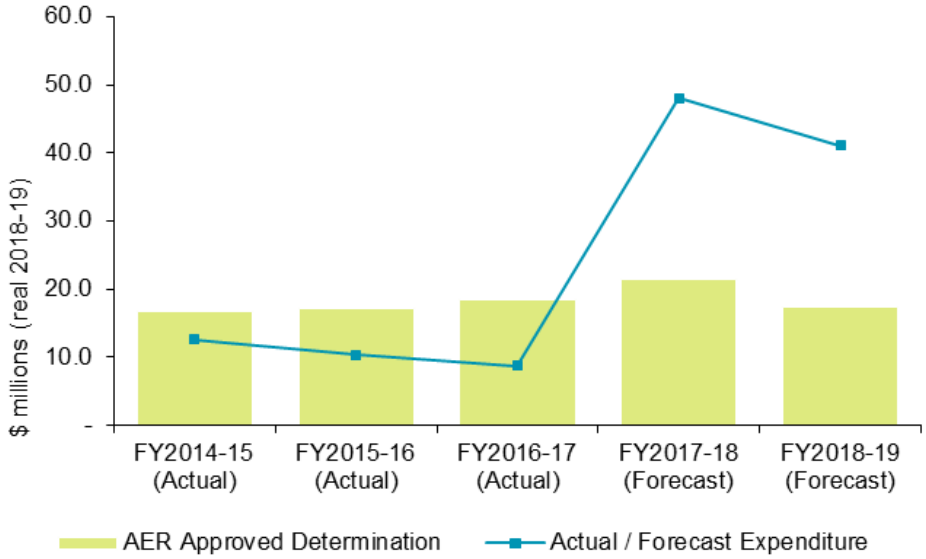


Figure 2: 2014-19 AER Period Reconciliation

3.4 Explanation of Differences

The following table provides the rationale for the differences in expenditure during the current regulatory period.

Program of Work	Rationale
F1 Finance and Risk Technical Currency Program **I1** Infrastructure Technical Currency **NB2** Network Billing and Customer Management Technical Currency	Early in the current period, a feasibility study was undertaken to determine the most efficient approach to maintaining the technical currency of Ellipse (ERP solution) and the ongoing cost effectiveness of using an outsourced provider for customer data and network billing (MBS and Banner). This study was delayed due to the NSW Government's 99 year lease of Endeavour Energy. With the transaction finalised, further feasibility analysis has been undertaken with the development of an ERP consolidation program which to be delivered over a three year period, commencing in the final two years of the current period and into the 2019-24 period. Following the deferral of upgrade works for Ellipse and network billing due to the transaction process, Endeavour Energy's prudent governance process has determined that the most cost effective solution for Endeavour Energy now and into the future is to undertake the application consolidation and rationalisation program. This program will ensure continued maintenance and the reliability of our core ERP, asset management and network billing systems.
I4 ICT Security Program	As a result of the 99 year lease of Endeavour Energy, a number of new ICT Security requirements are required to meet our Network Operator Licence conditions (e.g. commitment to the Environment Minister to align with the industry standard of ISO 27001:2013). These requirements were not accounted for, as part of the 2014-19 submission and consider these to be new requirements. Through the Governance processes, Endeavour Energy has prudently deferred and reprioritised ICT Capex initiatives within approved Total non-network ICT allowance to meet these

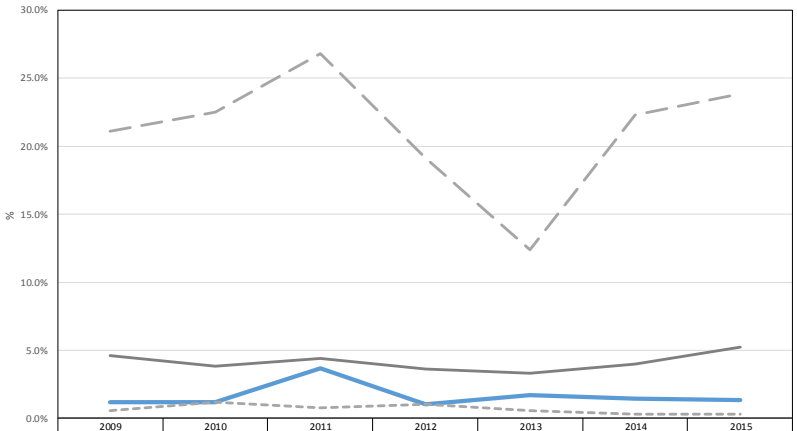
Program of Work	Rationale
	regulatory requirements.
N1 Asset Management Systems Technical Upgrade	Deferral of Capex relating to the Distribution Management System (DMS), Outage Management System (OMS) and the Low Voltage (LV) Control Management programs Internal re-categorisation from non-network ICT to OT resulted in capital expenditure not being incurred by ICT. Implementation of some data analytics capability to enable Risk and Condition based monitoring has been deferred as it is dependent on DMS and OMS programs being implemented.
NB1 Network Billing Regulatory Compliance Program	Endeavour Energy's 2014-19 regulatory ICT Capex submission did not include an allowance for Power of Choice as the requirements were unknown at the time of last submission. Since our submission, Power of Choice requirements have been confirmed and mandated for Endeavour Energy to implement. Additional expenditure was required within these programs of work to ensure Endeavour Energy had the capability to meet regulatory obligations by December 2017.

Table 9: Rationale for material under and over spend for current period

3.5 Benchmarking

According to benchmarking analysis conducted by KPMG, Endeavour Energy's non-network ICT capital expenditure is consistently below the industry mean from 2009 to 2015. This is a result of Endeavour Energy's prudent approach to ensuring ICT assets are utilised throughout their entire lifespan, with targeted investments to ensure longevity and minimum total cost of ownership. The following benchmarks for ICT Capex and ICT Totex (i.e. operating and capital expenditure) demonstrates the efficient and prudent expenditure profile.

Non-network ICT capital expenditure as a percentage of capital expenditure

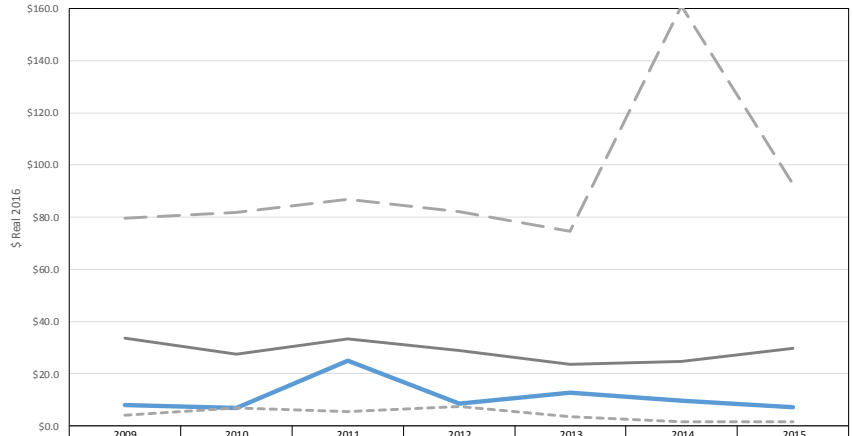


	2009	2010	2011	2012	2013	2014	2015
Endeavour	1.2%	1.2%	3.7%	1.0%	1.7%	1.4%	1.4%
Minimum	0.6%	1.2%	0.8%	1.0%	0.5%	0.3%	0.3%
Maximum	21.1%	22.5%	26.8%	19.2%	12.4%	22.3%	23.8%
Mean	4.6%	3.8%	4.4%	3.6%	3.3%	4.0%	5.2%
N_DNSP	14	14	14	14	14	14	14

Note: Metric is calculated by dividing the non-network IT capital expenditure by capital expenditure, presented in percentage

Figure 3: Non-network ICT capital expenditure as a percentage of capital expenditure, Source: KPMG Endeavour Energy IT Benchmarking Report

Non-network ICT Capex per customer



	2009	2010	2011	2012	2013	2014	2015
Endeavour	$7.8	$7.0	$24.9	$8.5	$12.7	$9.6	$7.0
Minimum	$4.0	$7.0	$5.3	$7.4	$3.5	$1.5	$1.6
Maximum	$79.7	$81.8	$87.0	$82.2	$74.7	$161.1	$92.8
Mean	$33.7	$27.5	$33.3	$28.9	$23.7	$24.7	$29.7
N_DNSP	14	14	14	14	14	13	13

Note: Metric calculated by dividing non-network IT capital expenditure by number of customers

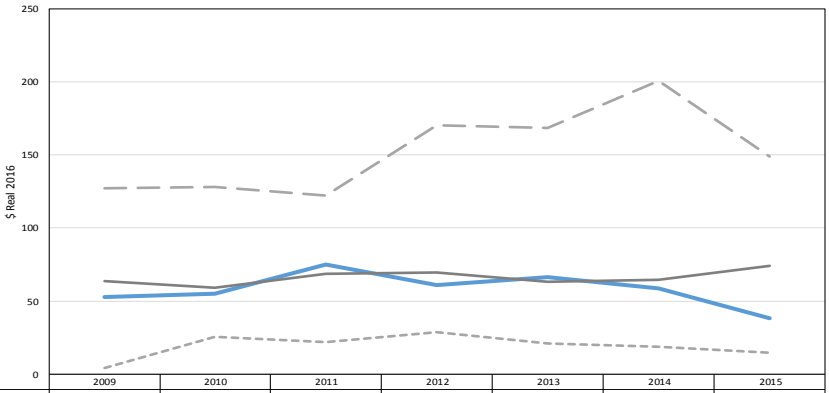
Figure 4: Non-network ICT Capex per customer, Source: KPMG Endeavour Energy IT Benchmarking Report

In 2011, Endeavour Energy ICT undertook the refresh of core systems and infrastructure platforms. This was followed by a period of lowered ICT Capex. In line with industry practice (ICT technology refreshes every five to seven years); Endeavour Energy has commenced a refresh of its aging application environment over the remaining years of the current AER period to ensure a secure, sustainable and reliable foundation to support the business into the future.

Introducing a more streamlined and contemporary collection of applications will allow improved quality of service provided to our customers. Back office processes will be expedited through increased automation and become less prone to human error. Information required to provide timely and accurate responses to customer enquiries will be made more accessible as we further expand real time data input capabilities. Refreshing core ICT systems will contribute to business efficiency improvements, long-term cost reductions and increased support capabilities.

In the current regulatory period, Endeavour Energy's non-network ICT Capex as a percentage of Capex has decreased whereby the industry mean has increased.

Non-network ICT Totex per customer



	2009	2010	2011	2012	2013	2014	2015
Endeavour	$52.9	$54.9	$74.9	$60.7	$66.5	$58.8	$38.4
Minimum	$4.2	$25.4	$21.6	$28.7	$21.2	$18.6	$14.7
Maximum	$127.4	$128.0	$122.2	$170.2	$168.6	$200.7	$148.9
Mean	$63.7	$59.1	$68.5	$69.8	$63.3	$64.5	$74.0
N_DNSP	14	14	14	14	14	14	14

Note: Metric calculated by dividing the sum of non-network IT capital expenditure and operating expenditure by number of customers

Figure 5: Non-network ICT Totex per customer, Source: KPMG Endeavour Energy IT Benchmarking Report

Endeavour Energy's ICT Totex has been decreasing since 2012, however, considering the customer growth of Endeavour Energy's franchise area over the past years and continued growth forecasts into the future, Endeavour Energy will need to prudently consider its investments to ensure it can continue to provide a sustainable and affordable service whilst continuing to meet the safety, security and reliability requirements of the network.

3.6 Industry and Business Context

Endeavour Energy is faced with an increasingly complex industry outlook which is rapidly evolving through network technology advancements, changing customer expectations and business delivery models, combined with strengthening regulatory and compliance requirements.

3.6.1 Business Drivers

A number of key events and regulatory changes have occurred in the current regulatory period. These have influenced the overall business strategy and the ICT Investment Plan for the forthcoming regulatory period. The table below outlines the key business drivers.

Business Drivers	Description
Strategic Direction	• On 11 May 2017 the Endeavour Energy lease transaction was completed. Endeavour Energy's management is committed to supporting the requirements and direction of the new operator, drawing on the embedded leadership capabilities and considerable experience in change management to adapt to new requirements and strategic focus of the consortium; • The overall strategic direction includes ensuring the ICT landscape supports the focus of improving efficiency to deliver better outcomes for customers and lowering customer bills over time; • Endeavour Energy's new operators have reaffirmed the existing commitment to provide a safe, affordable and reliable distribution network, with a view to efficiently responding to changing customer priorities; and • Supporting the development and growth of infrastructure in Western Sydney.
Changing Customer Service Expectations	• Endeavour Energy's recent consultation with consumer groups has identified that customers expect more control over electricity costs, they would prefer to rely less on grid connected energy and they are concerned about the value they receive. In the context of this feedback, the ICT Capital Investment Plan contains investment in systems and processes to deliver customer self-service and improved information flows to fulfil National Energy Customer Framework (NECF) obligations.
Regulatory Obligations	Australian Energy Market Operator (AEMO) • Endeavour Energy must comply with the regulations and licensing requirements of the AEMO. The core systems that support Endeavour Energy's critical business processes are over a decade old and carry the inherent risks of an ageing platform and potential hardware failure. Investment in systems and processes is required to ensure: ◦ Continued provision of core network services and asset management; ◦ Management of collection, reconciliation and reporting of metering and network data; and ◦ Network billing and revenue management.

Business Drivers	Description
	National Energy Customer Framework • In order to comply with NECF obligations, Endeavour Energy must make changes to operating models, processes and systems to improve customer service. Ongoing investment in systems and processes is required to: ◦ Maintain accurate customer and premise records; ◦ Deliver safe connections and disconnections of supply; ◦ Provide timely communications of planned and unplanned interruptions to supply; ◦ Provide customers with access to information through cost effective communication channels; and ◦ Enhance vulnerable customer management and notifications. Distributor Licence Obligations • In addition to pre-existing regulatory requirements, the long term partial lease has imposed new regulatory obligations and licence conditions. Additional regulatory compliance obligations include: ◦ New reporting requirements; ◦ New licensing conditions; and ◦ The National Critical Infrastructure resilience. • Endeavour Energy's 2019-24 ICT Investment Plan focuses on maintaining security standards to meet Critical Infrastructure licence conditions through the implementation of network vulnerability tools, enablement of real time security alerting and data loss prevention controls.

Table 10: Business Drivers

3.6.2 Technology Drivers

Advances in technology and telecommunications means that Endeavour Energy requires ICT investment in order to maintain alignment with industry peers and adopt a "digitalisation of business" process. Further, advances in technology are also rapidly influencing the ways in which data is received and collected and ultimately, relied upon to service changing customer needs.

A number of major technology trends have been identified that will impact on the utilities industry, with many of them expected to influence operations in the near future. Major technological factors are impacting Endeavour Energy and its business partners, requiring strategic responses. The following key technology drivers are impacting our business today and will continue to do so into the next regulatory period.

Technology Trend	Description
Information & Data Security	• Endeavour Energy is highly reliant on information that is captured, stored, processed and delivered by ICT systems and the associated infrastructure, network, control and communication facilities. The protection of this information requires a holistic approach, covering elements of behaviour, processes and technology. • Endeavour Energy is undertaking a Security Improvement Plan across the company to ensure information systems and assets are difficult to

Technology Trend	Description
	compromise, have minimised vulnerabilities, resilient to cyber-attack and maintain compliance with the Critical Infrastructure Licence conditions of the new Distributor Licence by June 2020.
Changing Workforce and Workforce Mobility	• New technologies such as battery storage, smart meters, electric cars, home energy management systems, solar photovoltaic (PV), Internet of Things (IoT) and smart appliances are driving corresponding changes in the required workforce skills. • Digitised technologies and understanding consumer and energy consumption information as well as integrating old and new technologies will be essential skills required to safely work in this rapidly changing utilities industry. • The skills of the field worker will need to evolve to be able to embrace changes in technology with embedded ICT capabilities. • Technologies entering the market in the coming decade will have advanced componentry enabling the interconnectivity of multiple devices to the internet and workers will be required to obtain the necessary ICT and cabling skills to install, configure, connect and fault find, both onsite and through remote commissioning. • The use of wearable devices such as head-mounted displays with augmented reality (e.g. smart glasses and smart watches) will be increasingly used in data collection in the field as well as to monitor the health and safety of the field worker. • Endeavour Energy has successfully implemented field force automation initiatives across the business. This has enabled crews to become connected by providing them with mobile devices, mobile broadband and automated apps to get more jobs done in a day, more time-on-tools and less time in travel. This also facilitates ongoing training and communication and enables users to achieve the 2020 goal of a framework for a Digital Worker. The initial and on-going training requirements to maintain digital field works is a key challenge for ICT.

Table 11: Technology Drivers

3.6.3 Industry Trends

The major industry drivers shaping how technology will be used in the in the energy industry and for Endeavour Energy include:

Industry Drivers	Description
Cyber Security	• Rapid technological changes to critical infrastructure assets have led to increasing cyber connectivity of these assets. Maintaining and strengthening the integrity of Endeavour Energy's information and communications system that control our network remains a high-priority due to the ever-increasing risk of system hacking and cyber-attack. Endeavour Energy remains ever-vigilant in this regard, and this requires ongoing development in cyber-security and business continuity plans affecting the network operational-technology assets.
New Technology Opportunities	• The Network Transformation Roadmap released by the ENA and CSIRO in April 2017 highlights that the electricity system supporting Australia's economy and lifestyle, is experiencing transformation on an unprecedented scale. • Australia's energy industry continues to be shaped by changing customer

Industry Drivers	Description
	expectations and the growth of technology connecting to the grid, such as solar PV, batteries and electric vehicles. These technologies offer new ways to operate and maintain the network and will have to be safely and appropriately managed. • New market entrants with new technology product offerings are providing greater customer choice (e.g. Power of Choice program), leading to a disaggregation of the traditional energy supply chain. The energy industry is undergoing transformational change with Australian distributors commencing technology product trials or offering different service models for their customers. • Advances in smart network devices and telecommunications are facilitating a smarter grid, enabling fast, reliable and comprehensive communication with substations and intelligent field devices, providing greater insight into the current loading and condition of the network. • The electricity landscape is evolving and therefore the role of the network is expected to change significantly with the increasing use of 'two-way' energy flow.
Changing Customer Expectations	• Technological advances and the era of digitalisation have enabled the consumer to become more than just the end user within the electricity supply chain. The increasing choice, flexibility and independence that electricity consumers now possess, has seen the rise of the prosumer. As consumers evolve into prosumers, through generating portions of their own electricity needs, knowledge of how to monitor, assess and modify their use of electrical energy will be required. The digital literacy level of consumers will vary greatly and will require distributors to adapt to a wide range of consumers. • Progression into the digital world is fundamentally changing not only products but the methods, services and interactions that consumers demand from businesses within all economies. Customers no longer expect to have to pick up a phone to communicate with their network provider; instead information is expected to be available online and through multiple social media channels. • The transformation of the energy supply chain is underpinned by the changing customer expectations and behaviours who want more control over their energy options and costs. The role of the traditional grid is evolving to enable customer-driven take up of new services, such as renewable generation, battery storage, electric vehicles and home automation.

Table 12: Industry Drivers

The 2019-24 ICT Investment Plan for non-network ICT looks to appropriately mitigate the risk associated with industry drivers, whilst leveraging the potential opportunities in a cost effective manner.

SUMMARY OF 2019-24 ICT CAPITAL EXPENDITURE

CHAPTER 4

4.0 ICT INVESTMENT PLAN 2019-24

The 2019-24 non-network ICT Investment Plan consists of four ICT Investment Areas which seek to maintain the safety, reliability and security of the distribution network. The planned expenditure is in line with approved Capex allocations for previous determination periods.

The purpose of this chapter is to provide an overview of the overall 2019-24 ICT Investment Plan, summarising the four ICT investment areas and provide an overview of our non-network ICT Capex forecasts in the AER's ICT Capex Purpose categories.

4.1 Overview of ICT Investment Plan

Endeavour Energy's non-network ICT Capex program for the 2019-24 is forecast to be $91.2 million (Standard Control Services, $ real 2018-19). The ICT Investment Plan consists of the following ICT investment areas:

1. **Maintain Core Systems**: Continue consolidation and technical refresh of legacy systems to the Endeavour Energy enterprise resource planning (ERP) platform to ensure the safety, reliability and security of the network;
2. **Maintain Security Standards**: Programs to continue Endeavour Energy's compliance with regulatory and legislative requirements to ensure we are able to efficiently detect, protect and mitigate against any cyber security threats;
3. **Sustain Reliability of ICT Services**: Technical refresh of critical underlying ICT infrastructure and operations capability to allow Endeavour Energy to meet the network business objectives; and
4. **Engage the Customer and Enable Network Efficiency**: Implementation of initiatives to address feedback from customers and to deliver capability for the network business to continue to drive efficiencies.

The following table provides a summarised breakdown of the four ICT investment areas.

ICT Program Summary 2019-24						
Description (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
MC1 Consolidate and Rationalise Applications	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MC2 Application Technical Currency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Maintain Core Systems	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CS1 Network Operation Licence Conditions	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CS2 Information Security Infrastructure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
CS3 Vulnerability Management	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Maintaining Security Standards	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SR1 Infrastructure and End User Computing	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SR2 Telecommunications	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SR3 ICT Operations	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
SR4 Cloud Enablement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Sustain Reliability of ICT Services	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
EN1 Customer Engagement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
EN2 Mobility Enablement	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
EN3 Data, Analytics and Insights	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Engage the Customer and Enable Network Efficiency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 13: 2019-24 ICT Investment Plan Summary

The first year of the 2019-24 regulatory period will reflect the completion of the core systems consolidation program commenced in the 2014-19 regulatory period.

Following the completion of Year 1, this will return to a "run the business" level of ICT Capex expenditure as evidenced through the 10 year ICT Capex trending in the figure below.

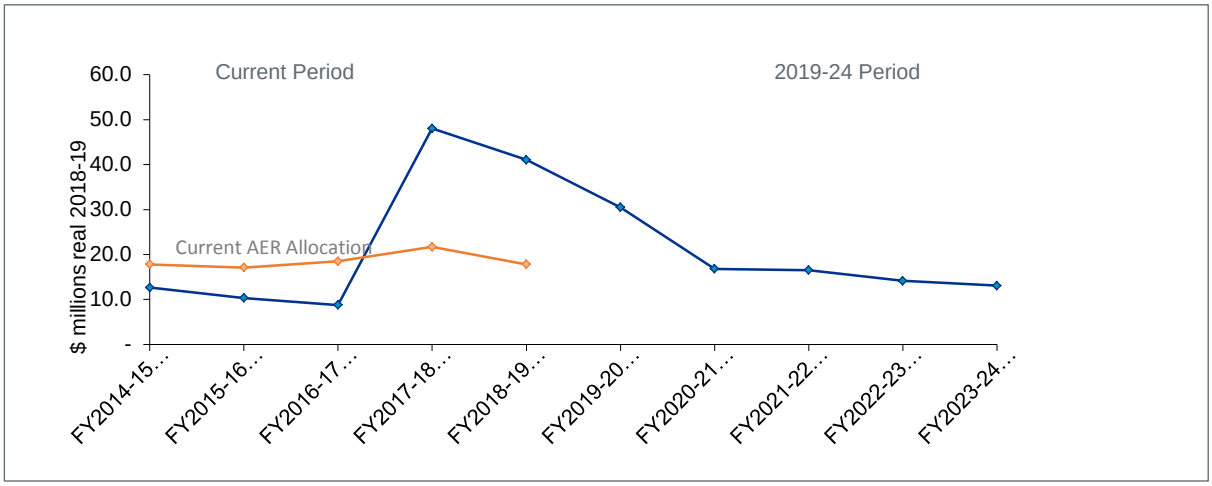


Figure 6: Ten year non-network ICT Capex trend

The following table provides a breakdown of Endeavour Energy's non-network ICT Capex forecast into the four ICT Purposes categories.

2019-24 ICT Capex Purpose						
Purpose (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
ICT Asset Extension	1.9	3.7	4.3	4.4	2.9	**17.2**
ICT Asset Remediation	0.2	1.2	0.6	0.3	-	**2.3**
ICT Asset Replacement	22.1	8.2	8.0	6.6	7.9	**52.9**
ICT Capability Growth	6.4	3.6	3.6	2.8	2.3	**18.8**
Total	**30.6**	**16.8**	**16.5**	**14.1**	**13.1**	**91.2**

Table 14: 2019-24 ICT Capex Forecast by ICT Purpose

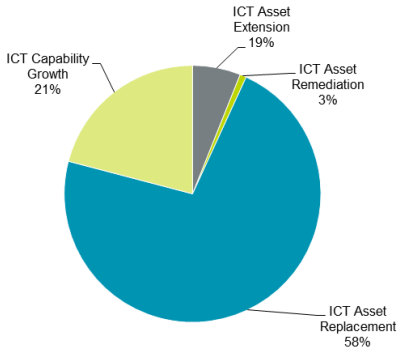


Figure 7: ICT Capex Purpose

Of the proposed $91.2 million ($ real 2018-19), 58% of all planned non-network ICT expenditure for the 2019-24 regulatory period is related to ICT Asset Replacement which is consistent with the need to replace the ageing ICT application and infrastructure environment. 21% of planned expenditure is forecast to ensure Endeavour Energy has the ICT capability to support the forecasted growth of the business, customer expectations and demand. The remaining 21% expenditure relates to the remediation and extension of capability of this environment to meet the customer engagement requirements and enable network efficiency of a prudent DNSP.

MAINTAIN CORE SYSTEMS

CHAPTER 5

5.0 MAINTAIN CORE SYSTEMS

During the 2009-14 and 2014-19 regulatory periods, the ICT investment strategy has been focused on incremental investments to maintain the capability of our core ICT systems. This strategy proposes to continue investing in core ICT systems to ensure efficient, reliable and secure systems are in place to support the safety, reliability and security of the network business and achievement of corporate goals.

The purpose of this chapter is to describe the planned ICT investments to upgrade, consolidate and, where required, remediate applications critical to ensuring the safety, reliability and security of the network.

The strategy for maintaining core systems throughout previous regulatory periods has been to leverage previous investments, some made over 20 years ago, to ensure maximum value for the business. This has resulted in an application landscape that is significantly aged, inflexible and in some cases, out of vendor support. Endeavour Energy has adopted a 'best of breed' approach when investing in new capability in the past which has led to a varied application landscape, with a large number of niche systems supporting critical functions. This program of work will look to rationalise and simplify the ICT landscape, implementing single source of truth systems and reducing integration complexity. This will ultimately result in a more agile and responsive ICT landscape that is better suited to maintaining the safety and reliability of the network business.

5.1 Introduction

In December 2017, the Board approved a program of work to rationalise and consolidate the ageing and inflexible application landscape.

This program of work is forecasted to be complete over three years, including the first year of the next regulatory period (FY2019-20) and predominately focuses on ensuring benefits (both tangible and intangible) can be realised by the business.

5.2 Summary of ICT Expenditure

The following table provides a summary of planned ICT Capex for the 2019-24 regulatory period:

Maintain Core Systems						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
MC1 Consolidate and Rationalise Applications	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
MC2 Application Technical Currency	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 15: Maintain Core Systems Summary

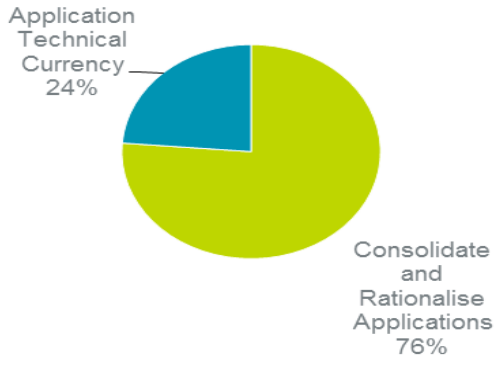


Figure 8: Maintain Core Systems Expenditure Allocation

Per the breakdown opposite, 24% of forecasted Core Systems expenditure is focused on the technical currency. The remaining 76% of expenditure is forecasted to enable completion of the consolidation and rationalisation applications program commenced during the current regulatory period.

5.3 Consolidate and Rationalise Applications

5.3.1 Program Summary

The Consolidate and Rationalise Applications program of work focuses on simplifying Endeavour Energy's ICT application landscape. This program of work is largely made up of expenditure relating to the completion of a three year ERP and Billing consolidation program (64% of total expenditure over the five year period) as shown in the table below.

MC1 Consolidate and Rationalise Applications						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
ERP and Billing Consolidation and Rationalisation Program	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Process Efficiency Program	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Enterprise Service Bus	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
ADMS Integration	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Consolidate Geographical Information Systems	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Metering Rationalisation Program	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Satellite Application Consolidation and Rationalisaton	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 16: Consolidate and Rationalise Applications Summary

The following table provides a high level description of the scope of each program.

Program name	High level scope
ERP and Billing Consolidation and Rationalisation Program	Continuation of the ERP and Billing consolidation program commenced in the current period. This phase will focus on the consolidation of ageing applications into the single solution including the current Metering and Network Billing applications implemented over 20 years ago and health and safety solutions.
Process Efficiency Program	Leveraging functionality implemented in the application consolidation and rationalisation program to promote efficiencies.
Enterprise Service Bus	Implementation of an Enterprise Service Bus to enable efficient integration of the consolidated application stack and provide an industry standard mechanism to enable IT and OT convergence into the future. Provide platform for integration of applications that are not rationalised as part of the ERP consolidation program.
ADMS Integration	Develop and implement integration layer between the rationalised ERP solution and the Advanced Distribution Management System (ADMS) solution to enable the network business to make data driven decisions through refreshes of master asset data for work allocations relating to defects and faults.
Consolidate Geographical Information Systems	Consolidation and rationalisation of ageing and disparate best-of-breed Geographical Information Systems (GIS) into a single solution. This will enable the network business to improve their decision making processes around asset management through timely and accurate access to spatial data which can be overlaid with asset data.
Metering Rationalisation Program	Replacement of ageing, expensive and proprietary handheld devices with contemporary multi-use handhelds (e.g. iPhones).
Satellite Application Consolidation and Rationalisation Program	Consolidation of satellite applications with similar functionality to simplify Endeavour Energy's application stack reducing integration complexity, support vendors and increase agility when responding to changing business needs.

Table 17: Consolidate and Rationalise Applications Scope Summary

5.3.2 Business Need

During the 2014-19 regulatory period, Endeavour Energy began a three year program to consolidate and rationalise its application stack to improve integration capabilities and streamline data capture and storage processes. The ERP and billing application consolidation and rationalisation program commenced during the final two years of the current regulatory period and will be completed in the first financial year of the new regulatory period. The business needs driving this program includes:

- ICT risk was increasing year-on-year (predominately driven by ageing ICT software assets), with previous mitigation plans becoming increasingly expensive and inefficient to maintain;
- Increasing regulatory and reporting requirements (e.g. NECF, Network Operator Licence Conditions, and Power of Choice etc.) for Endeavour Energy have required the implementation of piecemeal applications to meet niche requirements. This has

created a highly complex architecture which limits agility to respond efficiently to business needs and resulted in increased implementation costs for solutions;

- The network business and customers are expecting increased levels of self-service capability within the organisation;
- Endeavour Energy is required to achieve ISO 55001:2014 compliance as part of its Network Operator Licence. The ERP and billing application consolidation and rationalisation program is a key enabler for the business to achieve and maintain compliance;
- The objective of the network business is to ensure increased productivity and time-on-tools are enabled through a flexible and contemporary ICT environment; and
- The business expects an increasing level of capability from ICT when responding to business requirements (e.g. faster response times when developing mobile applications, performing data analytics etc.). Endeavour Energy's legacy systems generated issues related to interoperability and maintaining technical currency which increased the complexity and development time of solutions to meet business needs.

5.3.3 Options Analysis

A high level options analysis has been conducted below for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Applications and hardware operating on out-of-support or extended support agreements leading to increased risks relating to the reliability and security of the environment; • Increased ICT and business Opex to continue to implement manual processing to enable Endeavour Energy to maintain the safety, reliability and security of the network; • Requirement to sustain and operate a complex highly integrated set of disparate systems, leading to lack of agility to deliver to business needs; • Unable to leverage increased data analytics capability to make informed data driven decisions across the business including, but not limited to, asset replacements, work scheduling, defect and fault management. This would result in the network business being unable to meet its corporate objectives around productivity; • Lack of support for the network business in its objective to achieve and maintain ISO 55001:2014 compliance, as per network operator licence conditions. This may lead to alternative inefficient and unsustainable methods of achieving compliance.	No

Option	Description	Preferred Option?
Option 2: Implement the Consolidate and Rationalise Applications Program	Advantages: • Endeavour Energy's core business operations will be operating on contemporary, supportable and fit-for-purpose solution which will enable Endeavour Energy to efficiently maintain reliability; • Consolidated application architecture will increase our responsiveness to business needs by reducing the complexity of the environment; • Reduction of development costs and time to market for business improvement initiatives; • Enable the use of data within decision making processes to enable the network business to make more informed, efficient and prudent decisions regarding the reliability, safety and security of the network; • Remove the need for manual processing for new requirements through leveraging contemporary system capability; • Improve efficiency of operations and prudency of asset management decisions which will benefit customers through improved quality of services to our customers. • Continue to support business led initiatives and objectives with solutions that meet industry standards (e.g. ISO 55001:2014 compliance); and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for our customers. Disadvantages: • Capital expenditure will be required.	Yes

Table 18: Consolidate and Rationalise Applications Options Analysis

5.3.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Consolidated application landscape resulting in reduced vendor and ICT licence complexity and potential vendor cost efficiencies;
- Simplified ICT architecture to enable faster and more efficient responses to changing business and regulatory requirements;
- Improved self-service capability for the business and customers allowing ICT personnel to focus additional time on more critical matters; and
- Enable Endeavour Energy to be in line with its peers with contemporary and integrated solutions that are supportable, reliable and provide a vendor roadmap for the future.

5.4 Application Technical Currency

5.4.1 Program Summary

The Application Technical Currency program is an on-going program of work to ensure the ICT applications that support business processes are supportable, reliable and fit-for-purpose. This program of work is on-going and covers software version upgrades, licence true-ups and growth.

MC2 Application Technical Currency						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Legacy Application Remediation						
Application Technical Currency Program						
Total						

Table 19: Application Technical Currency Summary

The following table provides a high level description of the scope of each program.

Program name	High level scope
Legacy Application Remediation	Targeted remediation activities of legacy applications to mitigate current ICT related risks due to ageing architecture and limited vendor and industry experience (due to out-dated and unsupported development languages and technologies).
Application Technical Currency Program	On-going software and technology upgrades to core ICT systems in line with manufacturers recommendations to ensure that the ICT systems supporting the business are supportable, reliable and secure.

Table 20: Application Technical Currency Scope Summary

5.4.2 Business Need

To ensure Endeavour Energy can maintain the security, safety and reliability of its distribution network, ICT must ensure it can maintain the reliability of its ICT systems supporting critical business processes and functions. To enable ICT to meet the expectations of the business, investments are required to maintain the technical currency of underlying ICT applications in line with vendor recommendations.

5.4.3 Options Analysis

A high level options analysis has been conducted below for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure Disadvantages: • During the current period, Endeavour Energy embarked on a critical application consolidation and remediation program. The final year of the three year program is within the first year of the 2019-24 regulatory period. Selection of "Do Nothing" option, would result in Endeavour Energy not maintaining the technical currency of its environment leading	No

Option	Description	Preferred Option?
	to reduced performance and reliability, inefficient processes, increasingly complex ICT architecture and lost benefits; • Increasing likelihood of outage to core business applications as a result of applications becoming unstable; • ICT applications supporting critical business functions may not be updated in line with vendor recommendations, potentially exposing Endeavour Energy to increased ICT risk. Unpatched software may lead to negative impacts on the reliability, safety and security of the network (e.g. inability to patch ICT security vulnerabilities if software is not upgraded to the latest version); • Endeavour Energy will be unable to leverage potential productivity gains from later software versions where vendors may introduce new functionality; • Supportability of ICT applications may be compromised if Endeavour Energy does not maintain software updates in line with vendor recommendations (e.g. some vendors may not support software that is not on the latest version or version N-1); and • Endeavour Energy will not be operating in line with industry best practice if software patching and technical currency programs are not carried out in line with vendor recommendations.	
Option 2: Implement Application Technical Currency Program	Advantages: • ICT applications and firmware underpinning Endeavour Energy's business process (critical and non-critical) are updated in line with vendor recommendations ensuring supportability and reliability; • Endeavour Energy will be able to complete the legacy application remediation program of work and will be able to continue to maintain the current levels of performance and reliability; • In addition to stability improvements, bug fixes and security patches, software updates may also provide new or streamlined functionality in which Endeavour Energy can benefit through recommended technical currency updates; • Improved levels of system performance and reliability will provide improved quality of services and outcomes for our customers; • Endeavour Energy will align to industry best practice, ensuring ICT applications are appropriate, technically current, supported and maintained; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for our customers. Disadvantages:	Yes

Option	Description	Preferred Option?
	• Capital expenditure will be required.	

Table 21: Application Technical Currency Options Analysis

5.4.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Consolidated application landscape resulting in reduced vendor and ICT licence complexity;
- Application environment will continue to run on software versions that are vendor supported and maintained, reducing potential time-down and maintenance windows; and
- System up-time, reliability and availability metrics will be maintained to ensure the business has access to the ICT systems support critical business operations regarding the safety, reliability and security of the distribution network.

MAINTAINING SECURITY STANDARDS

CHAPTER 6

[redacted]

[redacted]

Maintain Security Standards						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
CS1 Network Operator Licence Conditions	[redacted]					
CS2 Information Security Infrastructure						
CS3 Vulnerability Management						
Total						

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted] Network Operator License Conditions

[redacted]

[redacted]

CS1 Network Operator Licence Conditions						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Data Classification Solution	[redacted]	-	-	-	-	[redacted]
Security Configuration Baseline Review Tool	[redacted]	-	-	-	-	[redacted]
Coverage of Centralised SIEM	[redacted]	-	-	-	-	[redacted]
Supplier Access Management	[redacted]	-	-	-	-	[redacted]
Data Loss Prevention	[redacted]	-	-	-	-	[redacted]
Application Whitelisting	[redacted]	-	-	-	-	[redacted]
Total	[redacted]	**-**	**-**	**-**	**-**	[redacted]

[redacted]

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[redacted]

CS3 Vulnerability Management						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Data Centre Segmentation (includes NPS)	[redacted]					
Identity and Access Management	[redacted]					
Centralised Authentication	[redacted]					
Substation Gateway	[redacted]					
Protection Relay	[redacted]					
Total	[redacted]					

[redacted]

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
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SUSTAIN RELIABILITY OF ICT SERVICES

CHAPTER 7

7.0 SUSTAIN RELIABILITY OF ICT SERVICES

During the 2009-14 and the current 2014-19 regulatory periods, ICT investment strategy has focused on managing the technical risk of the ICT environment, in line with Endeavour Energy's overall Capex approach. In the next five years, ICT infrastructure investments will enable the maintenance of security and operability of current assets, provide increased capacity and storage and leverage cloud technology to maintain a reliable and secure infrastructure platform to support increased customer engagement, mobility, business continuity, integration and business intelligence.

The purpose of this chapter is to describe planned ICT investments relating to, ICT Operations, infrastructure and telecommunications, technical currency program and cloud enablement for the 2019-24 regulatory period.

As evidenced throughout previous regulatory periods, Endeavour Energy's strategy for maintaining core infrastructure and telecommunications assets has been to continue to leverage previous investments and extract maximum value. Due to the continued management of a complex legacy environment and limited monitoring capability, Endeavour Energy is increasingly managing interoperability, capacity and storage constraints in order to maintain acceptable and supported services standards.

The ICT infrastructure and telecommunications strategy aims to build on previous investments by continuing a technical currency program and on best value/best fit basis, leverage cloud infrastructure services to simplify ICT operations and sustain reliable service standards. The outcome of this program will be an agile and flexible ICT organisation which is better positioned to respond to business needs and maintain the security, safety and reliability of our network business.

7.1 Introduction

Endeavour Energy's Sustain Reliability of ICT Services program seeks to maintain infrastructure and ICT assets underpinning the key business applications and critical business processes in order to maintain the quality and reliability of core network services. Endeavour Energy's ICT infrastructure capital program is predominantly driven by the following needs for investment:

- Complying with regulatory obligations, including the new Network Operator Licence Conditions;
- Risk of an inflexible infrastructure environment reducing our ability to meet future customer demands; and
- Maintaining reliability of supply by mitigating Endeavour Energy's rising operational ICT risk profile.

7.2 Summary of ICT Expenditure

The following table summarises the proposed 2019-24 regulatory ICT Capex spend required to maintain our ICT infrastructure service standards.

Sustain Reliability of ICT Services						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
SR1 Infrastructure and End User Computing	[redacted]					
SR2 Telecommunications	[redacted]					
SR3 ICT Operations	[redacted]					
SR4 Cloud Infrastructure	[redacted]					
Total	[redacted]					

Table 33: Sustain Reliability of ICT Services Summary

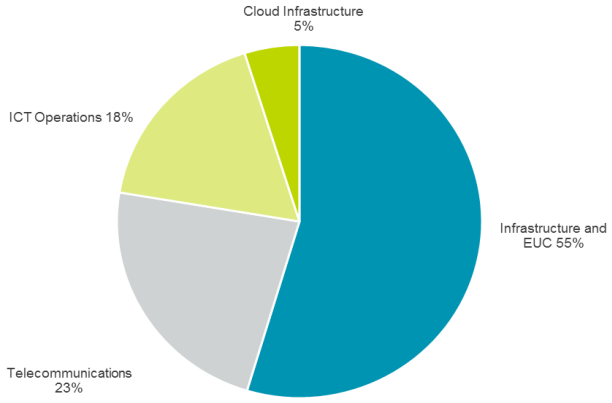


Figure 11: Sustain Reliability of ICT Services Expenditure Allocation

As depicted in the graph opposite, a combined 78% of expenditure will deliver technical currency of infrastructure assets and will be used to sustain reliability and supportability of platforms. Simplifying ICT operations represents 16% of expenditure and will facilitate improved automation and monitoring of service standards to meet regulatory obligations and the remaining 5% is focused on building a platform to enable future transition to cloud based service and delivery models.

7.3 Infrastructure and End User Computing

7.3.1 Program Summary

The Infrastructure and End User Computing (EUC) program will deliver technical currency of infrastructure and telecommunications assets to ensure Endeavour Energy continues to be in a position to provide reliable standard control services, avoid disruption to business and network services and continues to meet regulatory and obligations.

The following table provides a breakdown of the proposed programs within the Infrastructure and End User Computing program.

SR1 Infrastructure and End User Computing						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Midrange Computing Program	[redacted]					
Database Upgrade						
F5 and Load Balancer						
Web Application Server Technical Currency						
Storage and Backup						
Legacy System Data Storage						
Data Centre Facilities Management						
ESXi Virtualisation Technical Currency						
High Availability DR						
Tape Back-up and Cloud Archive						
Windows Desktop Upgrade						
Citrix Technical Currency						
Laptop / Desktop Program						
iPad Refresh Program						
Total						

Table 34: Infrastructure and EUC ICT Capital Forecast

The following table provides a high level description of the scope of each program.

Program name	High level scope
Midrange Computing Program and Active Directory Technical Currency	Refresh midrange service and storage infrastructure to ensure technical currency, continued support and maintain the reliability of ICT services. Refresh Active Directory to ensure technical currency, continued support and maintain the reliability of ICT services.
Database Technical Currency	Refresh Oracle and Structured Query Language (SQL) databases to ensure technical currency, continued support and maintain the reliability of ICT services.
F5 and Load balancer Technical Currency	Refresh F5 appliance and load balancers to ensure technical currency, continued support and maintain the reliability of ICT services.
Web Application Server (WAS) Technical Currency	Refresh WAS environment to ensure technical currency, continued support and maintain the reliability of ICT services.
Storage and Backup	Technical refresh of Commvault and Netapp backup solutions to ensure technical currency, continued support and maintain the reliability of ICT services.
Legacy System Data Storage	Implementation of a data storage plan and solution for the retention of legacy system data to minimise business risk and meet compliance requirements.
Data Centre Facilities Management	Continued maintenance and assessment of data centre facilities including refresh of environmental controls and safety standards and procedures to maintain best practice data centre management and meet security and regulatory obligations.
ESXi Virtualisation Technical Currency	Refresh physical and ESXi virtualisation infrastructure environment to ensure technical currency, continued support and maintain the reliability of ICT services.
High Availability of Disaster Recovery (DR)	Refresh of DR environment to deliver dual purpose high availability and replication capability services. This will mitigate the risk of disruption and ensure the resiliency of our ICT environment is compliant with industry standards.
Tape Back-up and Cloud Archive	Replacement of tape infrastructure to ensure technical currency, continued support and maintain the reliability of ICT services. Transition of archive processes and capability from physical infrastructure to cloud services.
Windows Desktop Refresh	Refresh Windows operating system environment to ensure technical currency, enhanced security and network resiliency and maintain the reliability of ICT services.
Citrix Technical Currency	Refresh Citrix environment to ensure technical currency, continued support and maintain the reliability of ICT services. Refresh XenApp and XenDesktop environments to ensure technical

Program name	High level scope
	currency, continued support and maintain the reliability of ICT services.
Laptop / Desktop Refresh Program	Refresh Laptop and Desktop devices to ensure technical currency, continued support and maintain the reliability of ICT services.
iPad Refresh Program	Refresh iPad devices used by field staff, to ensure technical currency, continued support and maintain the reliability of ICT services.

Table 35: Infrastructure and EUC Scope

7.3.2 Business Need

Components of Endeavour Energy's ICT environment are ageing, with infrastructure platforms approaching end-of-life and an increasing operational risk profile which requires remediation to avoid business disruption and maintain safe supply or network services. In addition, Endeavour Energy is increasingly experiencing capacity constraints and performance issues that are impacting on network service provision. Endeavour Energy is required to maintain the currency and capability of ICT infrastructure and EUC services to ensure continued vendor maintenance and support the reliable delivery of standard control services.

As Endeavour Energy's infrastructure platforms continue to age, it will become increasingly challenging to sustain service standards, avoid business disruption and respond to industry and regulatory reforms. The ICT infrastructure and EUC refresh program aims to ensure:

- Endeavour Energy's continued compliance with industry and regulatory requirements;
- Maintenance of a stable ICT environment which continues to enable the business to meet changing customer demands;
- Minimise Endeavour Energy's exposure to unacceptable levels of operational risk and disruption caused by:
    - ICT infrastructure supporting mission critical applications becoming increasingly unstable; and
    - Increasing risk of failure in older ICT infrastructure, resulting in unplanned production outages and business interruptions.

7.3.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delay of capital expenditure. Disadvantages: • Higher risk of business and service disruption to critical business processes as a result of capacity constraints. • Increase Endeavour Energy's operational risk to unacceptable levels as a result of an inability to restore technology with ageing	No

Option	Description	Preferred Option?
	backup solutions. Risk of disruption to supply of network services and disruption to maintenance schedules of field force; • Increasing likelihood of outage to core business applications as a result of infrastructure becoming unstable; • Higher risk of disruption to critical business processes as a result of infrastructure crashes. Business risk increases as a result of ageing infrastructure stack; • Potential for the loss of data as a result of unsupported and unstable database infrastructure; • Reduce Endeavour Energy's capability to meet the revised legislative obligations under the Electricity Supply Act 1995 including the classification of Endeavour Energy as Critical Infrastructure; and • Increased data security risk from ageing infrastructure, which requires further security investment to maintain control and security requirements.	
Option 2: Implement the Infrastructure and EUC Program	Advantages: • Leverages technology advancements to improve performance, enhance capacity, reduce the risk of failure and reduce support costs; • Reduced risk associated with delayed capital projects as a result of capacity constrained technical infrastructure; • Increased capability to respond to business requirements due to a transition to a cloud based model; • Reduce operational risk by maintaining the technical currency of infrastructure, EUC and operating systems; • Leverage current period infrastructure investments to ensure ongoing interoperability between the desktop platform and core infrastructure and application architectures; • Reduction in failure points and risk of infrastructure, operating system and EUC failure due to technical currency of system and maintenance agreements; • Reduction in risk associated with the loss of data due to technical currency of infrastructure and maintenance agreements; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for the organisation. Disadvantages: • Capital expenditure required.	Yes

Table 36: Infrastructure and EUC Options Analysis

7.3.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Stable infrastructure will facilitate regulatory and legislative compliance, to maintain a safe, reliable service for customers;
- Reduce the likelihood of operational disruption by maintaining technical currency of key infrastructure platforms, EUC platforms and devices;
- Deliver more flexibility in ICT infrastructure to enable quick ICT response times to changing customer engagement models and broader industry transformations as envisaged by the ENA Roadmap;
- Anticipated reduction in infrastructure related incidents due to a stable, more resilient infrastructure environment;
- Increased reliability of critical business services and systems as a result of technically current infrastructure;
- Improved ability to recover business operations in the event of an emergency situation;
- Invest in additional storage and compute to maintain current ICT service levels and support future requirements to meet network, business and population growth forecast for the Western Sydney Priority areas; and
- Increased capability to respond to business requirements due to transitioning to a cloud based model.

7.4 Telecommunications

7.4.1 Program Summary

The Telecommunications program will deliver technical currency and continued support of telecommunications infrastructure which aims to:

- Maintain current standards to ensure continued meeting of customer requirements and expectations;
- Retain flexibility to change communication requirements to meet industry transformation and changing customer models per the ENA roadmap;
- Sustain technical currency to enable reliable supply of standard control services;
- Avoid disruption to business and network services; and
- Continue to meet regulatory and industry requirements.

The following table provides a breakdown of the proposed programs within the Telecommunications program.

SR2 Telecommunications						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Core Switch Replacement						
LAN Switch Refresh						
Call Centre Refresh						
ICT Infrastructure Communications						
WAN Infrastructure Refresh						
Telephony Infrastructure Refresh						
End to End Communciations Monitoring						
Collaborative Technology Enablement						
Total						

Table 37: Telecommunications ICT Capital Forecast

The following table provides a high level description of the scope of each program.

Program name	High level scope
Core Switch Replacement	Refresh core network switches (Cisco 6509 and Nexus series) in line with manufacturer recommendations to ensure hardware currency, continued technical support and reliable provision of network services to the business and customers.
LAN Switch Refresh	Refresh of local area network (LAN) infrastructure which is at its end of economic and technical life thereby delivering a stable network service which will facilitate a reliable and stable ICT and business environment.
Call Centre Refresh	Refresh call centre and interactive voice response (IVR) solution to ensure technical currency, continued support and maintain the reliability of ICT services.
ICT Infrastructure Communications	Leveraging current cabling investments and continuing rollout of fibre connections, multiplexers and Wi-Fi points to network depot and office locations.
WAN Infrastructure Refresh	Refresh wide area network (WAN) infrastructure to ensure continued performance, maintain support and reliability of the network across all office and depot locations.
Telephony Infrastructure Refresh	Refresh telephony infrastructure (Cisco Voice gateways) to ensure continued performance, maintain support and reliability of communications services across all office and depot locations.
End to End Communication Monitoring	Implement monitoring tools to understand and monitor performance of business applications to deliver to required Service Level Agreements (SLA's).
Collaborative Technology Enablement	Implementation of network and telecommunications monitoring system to ensure prudent management of communications resources, maintain performance of the communications network and ensure communications service reliability.

Table 38: Telecommunications Scope

7.4.2 Business Need

Endeavour Energy's telecommunications and network infrastructure requires on-going investment to sustain technical currency, avoid service disruption and maintain the safe supply of network services. The introduction of technologies such as smart metering and the resulting increase in network traffic requires investment to enable increased traffic and provide tools to monitor and manage the increased volume of transactions in real time. Maintaining the technical currency of ICT assets allows Endeavour Energy to manage operational risk levels and continue to meet compliance obligations imposed within the Network Operator Critical Infrastructure Conditions.

In the 2019-24 AER period, asset life and support arrangements of current telecommunications assets will expire whilst the demand on these assets and higher bandwidth will continue to increase. Continuing to operate the business on ageing and unsupported infrastructure exposes operations to an unacceptable level of risk. Investment in a telecommunications refresh is required to ensure (avoid the following business risks):

- Continuation of vendor support for telecommunications and network assets;
- Stability of network assets to minimise rate of unplanned outages and incidents with the potential to interrupt critical business processes and standard control services;
- Reliability of communications methods with customers, staff and ASP's both in general operations and in response to emergency events;
- Stable communication capability is in place to support Endeavour Energy's safety priorities and provide assurance to customers, staff and regulatory bodies regarding the availability and security of network services;
- Leverage the technical advancements embodied in the technical currency upgrade;
- Capability is in place to leverage communications in response to changing consumer engagement models, requirements and expectations; and
- Maintain a communications platform which enables DNSPs to continue to comply with regulatory requirements and network operator licence conditions.

7.4.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Potential impact to critical business processes due to increased risk of system failure from communication and network performance issues; • Increased operating expenditure to support ageing equipment and enter into extended support agreements; • Risk of disruption to communications between depots, head office, ASPs and consumers with the potential to negatively	No

Option	Description	Preferred Option?
	impact the reliable supply of standard control services; • Reduce Endeavour Energy's capability to meet the revised legislative obligations under the Electricity Supply Act 1995 including the classification of Endeavour Energy as Critical Infrastructure; and • Increased security risk from ageing infrastructure, which requires further security investment to maintain control and security requirements.	
Option 2: Implement the Telecommunications Program	Advantages: • Reduce operational risk by maintaining the technical currency of ICT telecommunications and network assets; • Avoidance of expensive extended support agreements reducing the need for additional operating expenditure to maintain current systems; • Builds upon recent investments in telecommunications and network infrastructure; • Reduction in failure points and risk of infrastructure failure due to continuation of support and maintenance arrangements; • Reduction in risk associated with the loss of data due to technical currency of infrastructure and maintenance agreements; • Improved performance and service monitoring will reduce the risk of service disruption; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for the organisation. Disadvantages: • Capital expenditure required.	Yes

Table 39: Telecommunications Options Analysis

7.4.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Maintain technical currency of environment to avoid increased support costs (e.g. extended support contracts);
- Hardware and software responsible for protecting Endeavour Energy's ICT communications and network is supportable and upgraded to avoid service disruption;

- Ensure technical currency and resiliency of Endeavour Energy's telephony infrastructure which underpins the efficient operation of all customer and network services;
- Improvement in the capability to respond to customers and stakeholders with safety information in the event of an emergency and improved levels of customer services in response to changing expectations;
- Mitigate the risk of communications failure and ensure reliability of all standard control services leveraging the communications network;
- Provides a platform to leverage cloud, collaboration and communication technologies enabling Endeavour Energy to more effectively support industry initiatives and transformation as identified within the ENA Roadmap; and
- Invest in additional network capacity to improve performance and maintain current ICT service levels and support future demand requirements as a result of the high levels of network, business and population growth forecast for the Western Sydney Priority areas.

7.5 ICT Operations

7.5.1 Program Summary

The ICT Operations program will deliver the capability to maintain ICT service standards in an increasingly complex and growing technology environment. The program aims to ensure Endeavour Energy is able to forward plan and meet its compliance, capacity and performance objectives in a timely and structured manner. The following table provides a breakdown of the proposed programs within ICT Operations.

SR3 ICT Operations						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
CMDB, Lifecycle and Licencing						
Workflow and Integration Automation						
ICT Operational Analytics						
Total						

Table 40: ICT Operations Capital Forecast

The following table provides a high level description of the scope of each program.

Program name	High level scope
CMDB, Lifecycle and Licencing	Implementation of a configuration management database (CMDB) to consolidate system data and enable reliable support services. The CMDB will ensure efficient control and analysis of ICT assets throughout the operational maintenance lifecycle leading to improved service performance and quality. Implementation of licensing management tools to manage current obligations, plan for future purposes and look for opportunities for consolidation. Implementation of an infrastructure and application performance monitoring solution to ensure visibility of ICT asset performance. Enable effective decision making and allow ICT support optimisation to minimise outages and ensure reliability of services is maintained.
Workflow and Integration Automation	This program will provide the infrastructure required to sustain current ICT service performance levels including ICT operational support and process automation for the following: • self-service provisioning of application environments; • server, cloud, patching and release management;

Program name	High level scope
	• automation of security policies; and • self-service helpdesk.
ICT Operational Analytics	Apply data analytics capability to deliver efficient demand management planning and capacity management services. Leveraging ICT asset data will enable Endeavour Energy to plan for future requirements and implementation solutions while minimise disruptions to the business and ultimately the end customer.

Table 41: ICT Operations Scope Summary

7.5.2 Business Need

Endeavour Energy utilises technology to deliver business outcomes in the most effective and efficient way. The primary role of the technology function within Endeavour Energy is to ensure the reliability, performance and security of ICT assets and data underpinning core business, regulatory and customer processes. Endeavour Energy is required to continually invest in ICT operations to:

- Maintain delivery of an assured business platform by designing , implementing and supporting a scalable, reliable, secure and cost effective platform for business systems;
- Ensure the availability, integrity and reliability of computing resources;
- Run all business systems at agreed performance levels;
- Support compliance and risk requirements by leveraging technology to drive sustainable business operations and meet all operator, regulatory and legislative conditions; and
- Support the provision of standard control services, which are reliant on ICT services, in a cost effective manner.

The provision of a reliable, available and secure business platform is the primary goal of ICT operational services. Further investment in technology is needed to deliver the increased service levels required by the business as more users and more devices access applications and networks.

Endeavour Energy's ability to effectively forward plan and meet its compliance, capacity and performance objectives in a timely and structured manner is currently hampered by the lack of automated monitoring tools, limited access to support information, manual capacity and release management processes and clouded visibility of performance levels. The key business drivers for Operations initiatives are to reduce the cost of ICT services while providing flexibility and transparency of ICT services to achieve best practice results. The increasing need to achieve better ICT operational outcomes is driving the necessity for investment in systems and processes to:

- Manage operational and business risk through the provision of an assured business platform by proactively managing the technical currency of systems;
- Lower the cost of ICT support costs through improved tool sets;
- Introduce a configuration management database (single source of truth) to:
    - provide operational efficiencies through more accurate data in a single database;

- provide improved ICT asset and lifecycle management to track the age operating environments in a proactive manner;
- consolidate licences to enable more effective licence management and purchasing decisions; and

- Leverage ICT asset data to forecast capacity and automate workload management and decommission processes.

7.5.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Retention of a highly manual and resource intensive configuration management process; • Increased risk of knowledge loss and service disruption as information is contained in multiple databases and there is a heavy reliance on service providers and key personnel to provide knowledge; • Inability to find relevant system information leads to a risk of longer outages and longer return to service, resulting in higher operating costs; • Inadequate lifecycle management processes may result in continued support costs for already retired assets or slow identification of aging assets; • Late identification of ageing assets leads to sub-optimal replacement strategies which may increase operating expenditure due to the need to secure extended maintenance arrangements; • System performance monitoring will continue to be a highly manual process and may lead to delays in reaction and repair times; and • Reduce Endeavour Energy's capability to meet the revised legislative obligations under the Electricity Supply Act 1995 including the classification of Endeavour Energy as Critical Infrastructure.	No
Option 2: Implement the ICT Operations Program	Advantages: • Enables improved management of ICT assets to ensure business operations and users receive seamless service and timely return to service; • Provides a repository of information related to all components of Endeavour Energy's information systems to assess	Yes

Option	Description	Preferred Option?
	performance expectations and monitor and assess vendor service delivery; • Provide the ability to manage the asset lifecycle process and give ICT Operations full visibility of operating environments; • Enables proactive problem detection by using enterprise monitoring tools to deliver better service levels to business users and ultimately customers; • Lowers ICT operational expenditure and contributes directly to maintenance of low network tariff rates; • Provides a cost effective means to deliver risk mitigation to the business by enabling sustainable reliability of ICT services; • Improved operational performance and efficiency will provide improved quality of services and outcomes for our customers; • Proactive monitoring and allow maintenance and corrective action to be undertaken prior to an incident and thereby increase the reliability of ICT support and standard control services; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for the organisation. Disadvantages: • Capital expenditure required.	

Table 42: ICT Operations Options Analysis

7.5.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Increased availability of support information and visibility of asset performance may lead to reduced outage timeframes and improvements in average user minutes lost metrics, thereby improving the reliability of ICT services;
- Contributing to customer affordability and a reduction in operational costs through the automation of capacity, release, server and cloud management processes;
- Operational efficiency will be achieved through better capacity and performance management of ICT systems, ensuring that the end user experience is satisfactory;
- Improved self-service capability for the business and customers allowing personnel to focus additional time on more critical matters;
- Potential cost reduction will be achieved through better planning using ICT metrics as the baseline with which to plan further investment. This allows ICT to make sound decisions and act more strategically when decisions need to be made around licensing compliance, performance and capacity upgrades;

- Enterprise performance monitoring will improve overall system performance and efficiency, as well as allow planning for targeted upgrades to improve performance for end users resulting in improved efficiencies of operation; and
- Better management of ICT resources and enhanced ability to mitigate risks through early identification of high risk, end of life and / or underperforming systems.

7.6 Cloud Infrastructure

7.6.1 Program Summary

The cloud enablement program will enable Endeavour Energy to further leverage cloud services by maintaining the infrastructure required to support cloud integration, ensuring technical currency of development tools and delivering the governance and frameworks required for prudent cloud resource management.

SR4 Cloud Infrastructure						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
FUSE Technical Currency						
Cloud Readiness Program						
Cloud Management and Governance Program						
Total						

Table 43: Cloud Infrastructure ICT Capital Summary

The following table provides a high level description of the scope of each program.

Program name	High level scope
EAP Technical Currency	• Upgrade of Redhat JBOSS Enterprise Application Platform and Development and Operations Platform to maintain technical currency of cloud based development suite. This will ensure development tools used to support mobile and cloud based applications are operationally viable and continue to be supported.
FUSE Technical Currency	• Upgrade of JBOSS Fuse Integration Platform to maintain technical currency for the continued supply of reliable ICT integration services.
Cloud Readiness Program	• Implementation of an Application Programming Interface (API) gateway and technical currency of a cloud brokerage appliance to enable secure integration between internal systems, customers and ASPs.
Cloud Management and Governance Program	• Establishment of the framework and tools required to manage and monitor self-service cloud infrastructure provisioning and deliver prudent and efficient cloud resource management.

Table 44: Cloud Infrastructure Scope Summary

7.6.2 Business Need

The converging forces of commoditisation, with lower unit pricing, skills specialisation and increasing telecommunications capability means that organisations are no longer bound to host all their data and systems on their own infrastructure. In the case of utilities with a traditional preference for capital rather than operational expenditure, the agility provided by a transition to cloud-based infrastructure, software and databases will bring opportunities for Opex based pay-as-you-go models with budget and service model impacts.

Endeavour Energy has been investigating the prudent adoption of cloud service models and a cloud strategy which employs the following key principles:

- Expansion of current architecture, design, software development lifecycle (SDLC), governance frameworks, policies and operational processes to provide a foundation for the adoption of cloud delivery models; and
- Leveraging cloud services as a potential option (subject to TCO and cost benefit analysis) at technology lifecycle investment points such as technical currency refreshes or migrations.

The cloud infrastructure program will provide a flexible, agile and reliable platform to enable efficient on-boarding of new applications and processes while sustaining efficient compliance with industry requirements and regulatory obligations. As Endeavour Energy continues to grow, it will become increasingly difficult to meet business and customer demands and a flexible and elastic infrastructure environment will be required to respond to changing commercial and regulatory dynamics in a prudent and cost efficient manner. The adoption of further cloud based service models will be subject rigorous TCO and cost benefit analysis to ensure the most appropriate and prudent investment option is selected. Continuing the controlled adoption and roll out of cloud infrastructure services will mitigate the following operational, industry and regulatory challenges:

- Increased flexibility to respond to customer demands and evolving consumer models;
- Sustainable management of operational costs and a prudent reduction in future capital expenditure required to maintain technical currency;
- Mitigation of business and operational risk resulting from an increasing exposure to ageing technology infrastructure;
- Increased outages of core platforms due to existing on premise hardware not being supported by IT vendors;
- Non-compliance with regulations (e.g. document retention) due to insufficient storage or compute capacity for critical data and applications; and
- ICT infrastructure supporting mission critical applications becoming increasingly unstable.

7.6.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Increasing operational risk levels as a result of ageing cloud integration platforms; • Reduced ability for developers to manage cloud applications and infrastructure to respond to business and consumer requirements therefore reducing effectiveness in responding to ENA roadmap initiatives;	No

Option	Description	Preferred Option?
	• Increasing likelihood of outage to core business applications and disruption to critical business processes as a result of integration becoming increasingly unstable; • Reduce Endeavour Energy's capability to meet the revised legislative obligations under the Electricity Supply Act 1995 including the classification of Endeavour Energy as Critical Infrastructure; and • Misalignment of Endeavour Energy from industry trends relating to ICT infrastructure expenditure and shifting ICT service delivery models.	
Option 2: Implement the Cloud Infrastructure Program	Advantages: • Simplification of internal IT operations by providing a consistent approach to how the infrastructure is managed and maintained; • Leverage current period cloud investments to ensure ongoing interoperability between mobile applications, cloud integration and legacy systems; • Reduction in failure points and risk of cloud integration platform failure due to technical currency of system and maintenance agreements; • Enhanced governance mechanisms enabling prudent and efficient management of non-network ICT resources and cloud infrastructure; • Mitigates future business risks associated with ageing infrastructure and facilitated efficient compliance with regulatory and industry requirements; • Builds a platform for future cloud expansion which will enable flexibility through rapid scaling of compute and storage through to acceleration of on boarding of new applications and infrastructure; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for the organisation. Disadvantages: • Capital expenditure required.	Yes

Table 45: Cloud Infrastructure Options Analysis

7.6.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Ensure technical currency of cloud infrastructure to maintain regulatory and legislative compliance, to maintain a safe, reliable service for customers;
- Enable continued monitoring and improved management of current and future cloud environments ensuring ICT resources are managed prudently and efficiently;

- Reduce the likelihood of operational disruption by maintaining technical currency of key infrastructure and integration platforms;
- Alignment of Endeavour Energy to the ENA Roadmap Customer Outcomes; and
- Support the ENA Roadmap and future industry reform by providing facilitating improved customer interaction and increased flexibility to respond to changing customer requirements and business needs.

ENGAGE THE CUSTOMER AND ENABLE NETWORK SERVICE EFFICIENCY

CHAPTER 8

8.0 ENGAGE THE CUSTOMER AND ENABLE NETWORK SERVICE EFFICIENCY

The Customer Engagement and Network Efficiencies ICT Capital program will facilitate customer trust and collaboration, deliver improved customer outcomes and directly address our customer's feedback. In addition, the program will leverage current investments in mobility and data analytics solutions to deliver on our promise of an affordable, reliable and secure energy network designed to meet the current needs of customers while building a platform for future growth.

The purpose of this chapter is to describe planned ICT investment program relating to customer engagement, mobility, automation and data analytics for the 2019-24 AER determination period.

Core to Endeavour Energy's business is the ability to manage network and non-network assets in the most effective and efficient manner so as to drive positive business and social outcomes, which not only meet but exceed the expectations of our customer base. The Endeavour Energy ICT Customer Engagement and Network Efficiency Program has been developed with the following considerations:

- Endeavour Energy's customer-focussed corporate strategy;
- Maintaining compliance to regulatory obligations;
- Utilising the investment foundations delivered in the current regulatory control period;
- Driving strategic outcomes and decisions through improved data, mobility and automation capabilities; and
- Technological advancements impacting customer engagement, communication and collaboration models.

8.1 Introduction

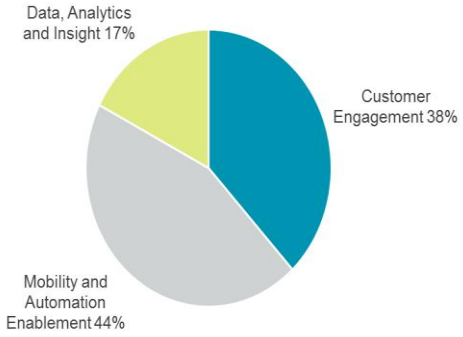
The Customer Engagement and Network Service Efficiency program will maintain the systems required to support customers, improve customer engagement and service levels, drive efficiency through automation and mobility solutions and deliver smarter decision making capability. Investment over the next five years is required to deliver the three major investment programs needed to achieve business and customer outcomes.

8.2 Summary of ICT Expenditure

The following table provides a summary of planned ICT Capex for the 2019-24 regulatory period:

Customer Engagement and Network Service Efficiency						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
EN1 Customer Engagement	[redacted]					
EN2 Mobility and Automation Enablement	[redacted]					
EN3 Data, Analytics and Insights	[redacted]					
Total	[redacted]					

Table 46: Customer Engagement and Network Service Efficiency Summary



As depicted in the graph opposite, a 44% of the proposed expenditure will expand and deliver mobility and field force automation initiatives. Streamlining customer engagement, collaboration and communications represents 38% of the proposed capital expenditure while the remaining 17% is focused on building data analytics and self-service capability.

Figure 12: Engage the Customer and Network Service Efficiency Expenditure Allocation

8.3 Customer Engagement

8.3.1 Program Summary

The Customer Engagement ICT Capital program will deliver improved customer service outcomes by simplifying access to key information and data, by providing a range of communication channels and choice through powerful self-service capabilities, while ensuring that our commitment and ability to maintain legislative compliance is not degraded.

EN1 Customer Engagement						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Customer Engagement Program	[redacted]					
Corporate Website and Intranet	[redacted]					
Outage Application and Notification Techical Currency	[redacted]					
Customer Self Service Data Usage	[redacted]					
NECF Compliance	[redacted]					
Vulnerable Customers	[redacted]					
Customer and ASP Security Enablement	[redacted]					
ASP Digital Interaction Enhancement	[redacted]					
Total	[redacted]					

Table 47: Customer Engagement ICT Capital Summary

The following table provides a high level description of the scope of each program.

Program name	High level scope
Customer Engagement	Establish a social media management capability and a customer portal

Program name	High level scope
Program	consolidating customer interaction points for Endeavour Energy and forming the base for customer information provisioning, connection and self-service capability.
Corporate Website and Intranet	Refresh of the corporate website and intranet is required to ensure technical currency, continued support and maintain the reliability of ICT services. In addition, this will refresh the integration capability between the external website and intranet with the ERP system and ASP portal to ensure security and performance are maintained.
Outage Application and Notification Technical Currency	Refresh of outage notification application, integration and web delivery channels to ensure technical currency, continued support to maintain the reliability of ICT services. This will also deliver continued compliance with National Energy Retail Law notification requirements.
Customer Self-Service Data Usage	Implementation of a solution to capture customer usage data and enable customer self-service access to data analysis and trends. This initiative aims to capture, integrate and consolidate metering data with the objective of providing self-service capabilities to consumers to drill into their usage data and enable customers to make informed decisions.
NECF Compliance	Initiatives to simplify the processes involved in ensuring Endeavour Energy meets NECF compliance obligations in the most efficient and accurate way possible.
Vulnerable Customers	Implementation of registration workflow processes and SMS for outage notifications for vulnerable customers and hospitals. Improve consumer service and allow customers to nominate preferred channels for notification.
Customer and ASP Security Enablement	Establish a secure solution for customer and ASP self-registration, authentication and account lifecycle management. Enable choice, control and transparency by streamlining self-service registration, simplifying authentication processes and enabling greater account management.
ASP Digital Interaction Enhancement	Technical refresh and implementation of enhancements for the ASP portal to streamline interaction requirements, improve online payments facilities and maintain regulatory compliance.

Table 48: Customer Engagement Summary

8.3.2 Business Need

A key strategic outcome for Endeavour Energy is the provision of a safe and reliable electricity network, managed in the long term interests of consumers which provides consumers with flexibility, choice and transparency. While Endeavour Energy recognises the need to be compliant with the National Energy Retail Law and associated regulatory obligations, it also recognises that consumer needs should be front of mind when considering current and future network services. Capital investment is needed to build a capability which ensures our consumer's current expectations are consistently achieved while building a platform which can be leveraged for future collaboration and changing engagement models (e.g. continued growth in the uptake of PVs, introduction of battery technology and the need for bidirectional energy flows).

While the industry is experiencing a range of regulatory and industry reforms, Endeavour Energy is committed to facilitating customer choice and providing customers with an interactive platform which supports new models for the way customers consume and eventually produce electricity.

In addition, our consumer consultation and industry directions process identified the following areas as top priorities for consumers:

- A lack of understanding of the market in general and distortion caused by conflicting information sources which contributes to limited trust between consumer and service provider; and
- A requirement for greater levels of visibility of consumer usage patterns, ability to analyse usage data transparently and provide the customer with the ability to take control and ownership of energy bills to manage affordability.

As well as the priorities identified by our internal consultation process, the Electricity Network Transformation Roadmap (CSIRO and Energy Networks Australia, April 2017) presented the following drivers for change which are expected to impact customer engagement models in the short to medium term future of the electricity industry:

- Increasingly diverse customer energy use and engagement;
- Growing trends for consumers to invest in alterative supply options and reduce traditional energy consumption patterns;
- New technology enabling multi-direction energy flows and the capability to turn consumers into producers of electricity;
- Uncertainty caused by reforms impacting the traditional electricity market supply chain; and
- Growth and uptake of digital platforms by consumers (web, mobile and enhanced collaboration) showing a gradual change in preferred communication channels.

As a result of the above factors, the Roadmap identified the following key network findings:

- The need for DNSPs to enhance relationships with customers built on improved data analytics capabilities and a deeper understanding of increasingly diverse customer needs;
- The need for networks to expand information services to enhance interactions with customers; and
- The need for networks to support the delivery and connection of an expanding range of innovative products and services to customers.

In light of the above feedback sourced directly from customers and as presented by industry body research, Endeavour Energy's customer and stakeholder facing solutions require ICT capital investment to deliver the following consumer, regulatory and business outcomes:

- Maintain safety standards by ensuring consumers have timely access to outage and general service information;
- Promote affordability for customers by providing greater transparency of energy usage patterns and delivering self-service capabilities to empower customers to take control of their consumption habits and electricity bills;
- Improve trust and facilitate customer understanding of the electricity market and the role of Endeavour Energy by providing accessible information sources and online communication channels;
- Promote a single view of customer services and experiences thus enabling faster and tailored responses to customers depending on specific concerns and issues;

- Improve customer experience by streamlining account management, self-registration, common process workflows and providing a portal for consumers to access their data and information;
- Improved online and digital access in addition to improved stability of online customer facing systems;
- Enable the effective capture and stable warehousing of consumer data to provide the foundation for consumer data driven decision making and enable greater flexibility for consumers through self-service analytics capabilities;
- Improve efficiency and effectiveness of notification processes including SMS and web channels;
- Ensure compliance with regulatory obligations including vulnerable customer NECF requirements, improving vulnerable customer interaction and outage notification processes;
- A platform that is able to scale with the expected population and consumption growth forecasts for the Western Sydney priority areas;
- A platform which consolidates customer touch points, systems and interactions and simplifies the management and maintenance of customer data; and
- Industry standard consumer facing systems and portals which enable the delivery of digital experience and communication channels expected by customers today.

8.3.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Inability of Endeavour Energy to respond to concerns raised during the customer consultation process; • Constrains the effectiveness of customer communication and collaboration which in turn inhibits Endeavour Energy's capability to manage network services in the long term interests of consumers; • Increased risk of inadequate servicing of customers due to customer data and information being stored in and accessed from many disparate systems; • Increased risk of ineffective SMS and outage notification processes leading to potential non-compliance with regulatory obligations; • Constrains ability to respond to changing industry requirements and consumer engagement models and	No

Option	Description	Preferred Option?
	negatively effects Endeavour Energy's ability to support future grid and industry transformations; • Delays customer self-service capabilities, minimises the data available to customers and does not provide customers with clear and transparent information to enable choice, control and flexibility; • Instability in customer facing systems may lead to increased service disruptions and cost intensive support agreements required to maintain ageing applications; and • Reduce Endeavour Energy's capability to meet the revised legislative obligations under the Electricity Supply Act 1995 and National Energy Retail Law.	
Option 2: Implement the Customer Engagement Program	Advantages: • Provides Endeavour Energy with the foundational capability to integrate all customer data in one location which will have positive service impacts when responding to customer cases; • Ensures Endeavour Energy maintains compliance with regulatory obligations including satisfying outage notification conditions and billing processes; • Provides the capability to expand online presence, creating new channels for customer collaboration and communication and thus providing better service levels to the end user; • Consolidates all relevant consumer information in one easily accessible and intuitive online location; • Improves the stability of Endeavour Energy's main outage management application; • Simplifies consumer, ASP and external stakeholder interaction processes and provides greater interaction flexibility between Endeavour Energy and these external parties; • Delivers choice and control to the customer by giving them the ability to analyse their own data and use this to make informed decisions regarding the energy needs, consumption and costs; • Enables introduction of customer self-service portals for improved customer engagement and collaboration; • Simplified ASP interaction and streamlining of account management processes leading to process efficiencies; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for the organisation. Disadvantages: • Capital expenditure required.	Yes

Table 49: Customer Engagement Options Analysis

8.3.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Potential productivity gains by reducing process errors, consolidated ASP and customer information in one location and allowing service staff to access required information from a single view;
- Improves Endeavour Energy's ability to segment customers and strengthen issue resolution through personalised customer service;
- Improved ability to gather required information and service culturally diverse and vulnerable customers;
- Improved customer service through self-service: availability of information, improved lodgement processes and status update tracking;
- Higher quality outage communications including a customised process for managing vulnerable customers which will enable accuracy and consistency in notification details;
- Consumer servicing capabilities that will scale with future growth and demand;
- Improved collaboration with consumers and external stakeholders, ensuring that future grid strategies and delivered in the best interest of all parties;
- High quality customer interactions leading to more effective and trusting customer / provider relationships; and
- Delivery of one of the key outcomes desired by consumers as identified through our consultation process - the need for greater transparency, understanding and control over consumer energy usage and resulting affordability effects.

8.4 Mobility and Automation Enablement

8.4.1 Program Summary

Due to the reliance of the network business on technology and data services, ICT has a crucial role to play in supporting the delivery of an efficient, affordable, safe and reliable network to end consumers. The Mobility and Automation Enablement initiatives will aim to deliver the following:

- Utilisation of previous investments in field force mobile devices to capture and integrate high quality data for better asset utilisation and maintenance resulting in sustained reliability of network services;
- Continue to provide applications to support ongoing regulatory and legislative requirements such as the National Heavy Vehicle, Ring-fencing training and environment assessments;
- Maintain compliance standards and ensure safety performance for all customers, staff and ASPs; and
- Investments in technical currency of existing mobile solutions to maintain current performance requirements in the most cost effective manner.

EN2 Mobility and Automation Enablement						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Field Mobility Solutions	[redacted]					
Field Mobility Security and Enterprise Enablement Solutions						
Mobile Application Refresh						
Document and Workflow Automation						
Total						

Table 50: Mobility and Automation Enablement ICT Capital Summary

The following table provides a high level description of the scope of each program.

Program name	High level scope
Field Mobility Solutions	Continued expansion and integration of the field force scheduling and mobility solution to widen the adoption of more effective and efficient maintenance and scheduling processes. This program will also continue development of new field based mobility applications and solutions including: • Automation of logistics and inventory processes; • Work Packet and equipment data update / capture for transmission and distribution maintenance activities; • Improved mobile solutions for asset inspection data capture; • In field GIS data capture and updates; and • Integration of mobile solutions to new ERP and asset management solutions.
Field Mobility Security and Enterprise Enablement Solutions	Implementation of a mobility technology framework and toolset to support continued mobile application development and management. Utilise a Development and Operations framework to ensure management and testing of applications remains as efficient as possible. This will provide the infrastructure and operational platform required to support an increased number of connected field workers.
Mobile Application Refresh	Refresh of current field force automation and mobile applications to ensure technical currency, continued support and maintain the reliability of ICT services and network services.
Document and Workflow Automation	Establish automated business process workflows using document management and ERP workflow solutions to enable more efficient documentation handling and storage while ensuring that Endeavour Energy is best placed to remain compliant with regulatory asset management (ISO 55001:2014) and data obligations.

Table 51: Mobility and Automation Enablement Summary

8.4.2 Business Need

Endeavour Energy's previous investment in field force automation through mobile scheduling and workforce management has been an economic and operational success. The Mobility and Automation Enablement program's primary aim is to continue expansion of this successful technology while leveraging new mobile solutions to ensure resiliency of operational processes, drive efficiencies and ensure network safety.

Investment in additional field force automation is critical to reduce costs of the field inspections and defect rectifications processes, increase workforce productivity, drive data quality and timeliness of data updates to support management of the network. Field workers will require greater two way access to send and receive real time asset and outage information to allow

timely and accurate updates for work completed in the field. This will also enable automated information capture at the point of the person doing the job and remove double handling of data entry.

In addition to investments in new mobility solutions, it is pivotal that current systems remain technically current in order to maintain supportability, reduce the risk of business disruption and ensure key business applications are reliable and fit for purpose. ICT capital investment is required for the continued rollout out of field force automation and mobility solutions to drive the following outcomes:

- Delivering improved customer reliability through better asset utilisation as a result of improved data quality, data management and data analytics to maintain the quality, reliability and security of the assets and services;
- Provide an ICT development framework which supports best practice management and building of mobile applications which promotes data security controls required to maintain regulatory compliance and data security conditions per the Network Operator Licence;
- Contain operating cost increases and maintain current levels of efficiency through the automation of business processes for field and office workers;
- Provide field workers with real time data capture and feedback capabilities to better inform on the job decisions and increase the effectiveness of job bundling, planning, supply chain and logistics processes; and
- Improved data collection will also help ensure network safety in the event of a natural disaster or wide spread outage. During storm incidents, resources will need to be deployed with appropriate levels of equipment, to the correct areas at the appropriate time with a great deal of flexibility. The ability to collect, integrate and deliver the data to support this capability will improve safety and emergency response processes.

8.4.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Increasing age and risk profile of mobility solutions increases the likelihood of material business and network disruption; • Continued realisation of efficiencies within core business operations will not be achieved; • The business will be unable to exploit new mobility technologies and leverage the benefits of investment in corporate asset management systems, ERP and data capabilities; • Continued risk of increased data entry errors due to manual	No

Option	Description	Preferred Option?
	processes and data capture; • A reduction in labour resources due to mobility solutions puts more pressure on work bundling and materials sourcing, Demand for source materials is unable to be optimally managed without additional data and appropriate planning processes and may lead to increased operational costs; and • Reduced reliability of network services as a result of ineffective and inefficient manual day-to-day field processes.	
Option 2: Implement the Mobile and Automation Program	Advantages: • Improved reliability of network services as a result of improved data capture leading to more informed planning and maintenance decisions; • Realisation of efficiencies and improved productivity as a result of reduced manual and time consuming processes; • Reduced risk of data errors causing ineffective decisions and network disruption; • Standardised, efficient and effective mobile ICT operations ensuring development of best practice for improved reliability of mobility solutions; • Alignment to network business strategy to support cost constraint and provision of an affordable service to consumers; • Continued compliance with regulatory obligations and new asset management system conditions imposed within the Network Operator Licence; and • Improved workforce scheduling, mobility and analytics will increase Endeavour Energy's ability to realise logistics management efficiencies. Disadvantages: • Capital expenditure required.	Yes

Table 52: Mobile and Automation Options Analysis

8.4.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Provides a foundation for a transition towards frontier network service provision and alignment with future regulatory and industry directions;
- Reliable and high quality field data capture leading to improved asset utilisation and service reliability;
- Leverages previous investments in mobility solutions to improve data quality, data management and data analytics to maintain the quality, reliability and security of network assets;

- Contain operating cost increases and maintain the efficiency levels through the automation of business processes for field and office workers;
- Better visibility of work and information for decision-making will result in more efficient delivery of field work and back office functions, leading to more value added time-on-tools in the field and reduced back end data capture and manual processing;
- A more efficient and productive field force will contribute to a safer network via optimal scheduling and improved maintenance processes; and
- Avoidance of costs as a result of improved productivity, reducing unnecessary travel to depots, route optimisation and minimisation of data entry. This will help managers target further improvements and optimisation in back office material purchases, work bundling and scheduling processes.

8.5 Data, Analytics and Insights

8.5.1 Program Summary

Underpinning the performance of core network and back office business functions is the ability to make informed decisions based on high quality, relevant data. Data quality, manipulation and the ability to drive insights from network data has a direct impact on the safety, reliability and affordability of network services. The aim of this program is to leverage previous investments in data analytics capability, ensure the tools and technology are in place to deliver data quality and continue the expansion of data driven decision making throughout Endeavour Energy's core network business functions through employee self-service capability.

EN3 Data, Analytics and Insights						
Projects (A$ millions real 2018-19)	**FY2019-20**	**FY2020-21**	**FY2021-22**	**FY2022-23**	**FY2023-24**	**Total**
Employee Self Service Reporting						
Data Lake Trials						
ETL Refresh						
Total						

Table 53: Data, Analytics and Insights ICT Capital Summary

The following table provides a high level description of the scope of each program.

Program name	High level scope
Employee Self-Service Reporting	Deliver an enterprise business solution which will provide employee self-service reporting capability for key business functions. This capability will be a platform for improved access to data, empowering users with the ability to utilise analytics and engage in smarter decision making, based on quality data driven outcomes across all areas of the business, from network asset management through to customer and outage management. This will improve productivity in field force tasks, improve asset management and expand our ability to segment and service customers more effectively and deliver the capability to provide a more affordable, safe and reliable network service for end consumers.
Data Lake Trials	Develop a data lake pilot to collate unstructured data from varying sources to support data analytics trials for asset management and customer service processes. Data lakes provide a flexible analytics solution to enable true employee self-service capability. In addition, data lakes do not require specialised hosting infrastructure or skills to support the solution which may lead to the realisation of ICT operational efficiencies.
Extract, Transform and	Refresh of ETL framework and tools to ensure high quality data is used for

Program name	High level scope
Load (ETL) Refresh	decision making, technical currency, continued support and maintain the reliability of ICT services.

Table 54: Data, Analytics and Insights Summary

8.5.2 Business Need

Through the current period, Endeavour Energy's investments in data governance and analytics capability, has successfully delivered improved asset management processes and has built the foundations for the support of future customer and regulatory needs in a rapidly evolving energy industry.

Leveraging past investments in field force automation and operational technologies has provided some cost efficiencies for network assets by allowing a reduction in site visits through access to real time data. A key network objective is to use operational data, to not only support conditioned based maintenance but to expand the utility of data analytics to additional network management functions, corporate support functions and customer management processes.

This drives the continued need for data collection and analysis mechanisms to support asset management and customer focused decisions and process optimisation. Investment in self-service capability, data mining tools, data transformation and retention infrastructure is required to support the continued optimisation program. The Data, Analytics and Insights program will provide the investment necessary to drive continued value from past analytics investments and maintain and enhance Endeavour Energy's data management capabilities in order to deliver:

- Optimal achievement of safety and regulatory compliance requirements;
- Realisation of corporate themes and strategic outcomes;
- Improved ability to deliver and respond to changing customer engagement models; and
- Realise affordability for the customer by driving opportunities for continued efficiency gains.

In addition, as the adoption of technology advancements such as the IoT continue to grow, analytics capability will need to extend to systems and data sources beyond that which are maintained in a traditional and structured data warehouse. The data lake proof of concept will provide the data necessary to expand analytics capabilities beyond the constraints of traditional data capture and integration processes. This program will play a significant role in placing Endeavour Energy at the forefront of customer service and asset management optimisation.

8.5.3 Options Analysis

A high level options analysis has been conducted for the purposes of the AER submission. Further options analysis to determine final project scope and implementation plans will be conducted as part of the Phase 1 and Phase 2 Business Case processes as documented within the ICT Investment Governance Chapter in Appendix A.

Option	Description	Preferred Option?
Option 1: Do Nothing	Advantages: • Delayed capital expenditure. Disadvantages: • Increasing age and risk profile of data analytics infrastructure increases the risk of poor data quality, reduces the capabilities	No

Option	Description	Preferred Option?
	available to the business and leads to sub-optimal decision making; • Continued realisation of efficiencies within core business operations will not be achieved; • The business will have reduced capability to exploit new data and leverage the benefits of investment in corporate asset management systems, ERP, mobility and field force automation systems; • Substantial risk to meet and sustain current and future regulatory obligations due to lack of quality data capabilities; and • Lack of analytic capabilities across the business leading to ineffective customer outcomes and degraded reliability of network services.	
Option 2: Implement the Data, Analytics and Insights Program	Advantages: • Improved reliability of network services as a result of improved data capture leading to more informed planning and maintenance and customer related decisions; • Delivers high levels of data quality, reducing the risk error and minimising ineffective decisions and network disruption; • Continued compliance with regulatory obligations and new asset management conditions imposed by the Network Operator Licence; • Enables Endeavour Energy to identify operational and industry trends early and respond quickly and proactively to the changing market place; • Empowers the business to make agile and informed decisions; • Enables opportunities to share relevant energy, consumption and cost information with customers; • Encourages deeper insights into consumer data and requirements and facilitates further exploration of collaboration opportunities with consumer and external stakeholders; and • Endeavour Energy's TCO framework will be applied to ensure this investment represents the best value outcome for the organisation. Disadvantages: • Capital expenditure required.	Yes

Table 55: Data, Analytics and Insight Options Analysis

8.5.4 Benefits

The benefits relating to this program as a result of the implementation of the preferred option will continue to be refined throughout Endeavour Energy's Governance and Business Case approval processes. However the following indicative benefits have been identified:

- Continued integration of asset information data will optimise business processes, enhance the decision making process and reduce costs and risks;
- Improved reporting and decision support tools to assist in sustainable and cost effective network management to deliver customer reliability and service standards;
- Employee analytics self-service capability will deliver improved ability to segment customers and tailor customised service offerings and responses to queries and concerns;
- Improved data quality, data management and data analytics ensures that the quality, reliability and security of the assets and services is maintained;
- Improved data quality through automated collection and integration while in the field will enable better decisions regarding asset maintenance which will drive improved safety outcomes for the network and consumers;
- Expansion of analytics capability will provide clear visibility of business challenges and the most effective action to respond to those challenges. In turn, this will enable Endeavour Energy to simplify and streamline compliance methods to meet regulatory and legislative obligations; and
- Provides greater visibility of consumer data and consumer experiences which will enable Endeavour Energy to make decisions in the long term interest of consumers and provides the business with the best platform to launch future initiatives to support changing industry and consumer engagement models.

Appendices

APPENDIX A

I. ICT Investment Governance

The ICT Investment Plan has been developed in line with Endeavour Energy's proven ICT governance framework with consideration of industry and technical trends and the application of a realistic forecasting methodology which has sought to leverage prior experience and market knowledge.

The purpose of this section is to provide an overview of the ICT Investment Governance framework which has been applied to the development of the ICT Investment Plan for 2019-24 and articulate how the governance model continues to be applied in a business-as-usual (BAU) scenario.

The ICT Investment Governance framework was adopted prior to the current regulatory period and has been consistently applied to manage ICT investments. The framework has evolved in line with Endeavour Energy's business needs and priorities (such as the inclusion of the Project Initiation Form (PIF) process in January 2017) and will continue to evolve as required during the 2019-24 period.

1. Introduction

The ICT Investment Governance framework has been applied to the 2019-24 ICT Investment Plan and is evidenced by:

- Review and endorsement of the ICT Investment program by Endeavour Energy's board;
- Engagement with the wider Endeavour Energy business and our customers to prudently ensure that ICT supports their requirements and needs; and
- Leveraged from previous experience and by accessing publicly available information including current market prices to formulate efficient and realistic expectations of costs for each of the proposed investments.

2. Development of ICT Capital Plan

The ICT Investment Plan is formulated on a principle which allows for long-term decision making and clarification between direction and priorities of the business. The ICT Investment Plan is required to identify, validate and present all key initiatives for funding allocation and clarification between the balance of demands of the business, ICT delivery capability, performance management and governance.

There are four major categories to ICT Investment and each offers the business opportunities to achieve business value:

- Mandatory;
- Risk;
- Improve; and
- Strategic.

ICT Investment Plan is forecast using a combination of a top-down approach based on historical expenditure for maintaining current IT systems and a bottom-up forecast for new systems based

on a demonstrated business need in accordance with the ICT Investment Plan. Trending expenditure from previous periods and benchmarking against other comparable DNSP's is also used to inform ICT forecasts.

The ICT Investment Plan is developed from demonstrated business needs that align to each of Endeavour Energy's corporate themes. Related business needs are developed into ICT Investment Areas which consist of a number of Major Programs required to deliver business outcomes. Each Major Program is comprised of minor Programs which deliver a specifically identified business need, meet a regulatory requirement or mitigate an escalating business risk. All programs are subject to Endeavour Energy's ICT governance processes prior to approval and release of funding.

3. Management of ICT Capital Demand

Endeavour Energy aims to achieve the maximum utilisation of technology by developing an optimised capital program which takes into account the demand for ICT capital investment for initiatives, ensuring the investment plan is clearly defined, business driven and suitably justified.

A prioritisation methodology is utilised in the management of the ICT Capital program of work. To ensure each project included in the AER submission and ongoing capital program will provide an appropriate level of business value, a process of prioritisation has been followed. Potential initiatives for inclusion where identified by:

- Referencing candidate project listing, eliminating those that were no longer required and reviewing those that had been deferred;
- Review of asset lifecycle to identify when technical currency projects would fall due during the next regulatory period; and
- Review of strategic initiatives with the business.

Projects that are considered mandatory in nature due to legislative or regulatory requirements have been included in the investment plan without the need for further prioritisation. For projects that are not considered mandatory, a combination of financial and non-financial criteria reflective of the business objectives has been used to provide a score for projects put forward for consideration based on a combination of:

- Total Cost of Ownership;
- Risk Mitigation;
- Strategic Fit; and
- Business Change Impact.

The following table provides the evaluation criteria for each project.

Evaluation Criteria	Description	Score	Weighting %
Business Risk Mitigation	BR1 - SafetyBR2 - Network Customer Impact BR3 - Significant Financial Loss BR4 - Reg/Legal Compliance BR5 – Reputation BR6 – Environment BR7 - Failure to deliver performance through people	Reduces: >4 BR risks = 5 4 BR risks = 4 3 BR risks = 3 2 BR risk = 2 1 BR risk = 1	9%

Evaluation Criteria	Description	Score	Weighting %
	BR8 - Strategic Objectives not delivered	n/a = 0	
ICT / OT Risk Mitigation	The project will reduce IT or OT failure / contribute to reducing operational risk, maintain low AUML	Minimise operational risk: Very High = 5 High = 4 Medium = 3 Moderate= 2 Minimal = 1 n/a = 0	14%
Alignment to Strategic / Corporate Themes	How well does this investment support the organisations strategic objectives?	Contribute to: >3 priorities = 5 3 priorities = 4 2 priorities = 3 1 priority = 2 Not at all = 1 n/a = 0	23%
Cost-Benefit/ Payback	Length of time before the benefits from the investment exceed the estimated investment cost - Payback Period.	Achieves payback in: 1-2 years = 5 2-3 years = 4 3-4 years = 3 4-5 years = 2 >5 years = 1 n/a = 0	19%
Business Change Impact - Architectural Fit	How well does this investment fit with the business and technical architecture and roadmap	Fit is: Strong= 5 Good, minimal exceptions = 4 Medium, some exceptions = 3 Low, several exceptions = 2 Does not fit = 1	16%

Evaluation Criteria	Description	Score	Weighting %
		n/a = 0	
Business Change Impact – Project Risk	What is the risk of implementation being more expensive, taking longer than planned, non-completion or the project or not achieving the planned benefits from the investment?	Change is: None = 5 Low = 4 Medium = 3 High = 2 Very High = 1 n/a = 0	9%
Dependency / Synergy	The project supports x no of projects or is dependent on x no of projects or is in the same program as x no of projects	Dependent / supports: >3 projects = 5 3 projects = 4 2 projects = 3 1 projects = 2 Related project = 1 n/a = 0	5%
Urgency	There is a mandatory or business critical reason the project needs to be implemented within x months	Implement within: <6 months = 5 6 months = 4 12 months = 3 18 months = 2 24 months = 1 n/a = 0	5%

Table 56: Prioritisation Matrix

Application of the criteria in the above prioritisation matrix serves to provide the following:

- Balanced program of work;
- Assurance that projects prioritised within the program are in alignment with the organisations goals and objectives; and
- Optimised ICT investment.

4. Economic Justification for Funding Approval

Programs within the forecasted expenditure do not automatically get funded. There is a four step process that must be successfully completed to receive total funding allocation for projects and initiatives within a program. At each step the business owner must be able to demonstrate the

value of the technology investment and articulate how proposed benefits will be or have been quantified, the processes for benefits realisation, as well as confirming project costs and the potential impact the issue being solved has on business operations. This ensures that only those projects that are shown to benefit the organisation, progress through to the more detailed phases. At any step in the process, a program of work or an initiative within the program can be cancelled or deferred pending more substantiative information to support the decision to fund. Due to this rigorous process, it is unlikely for a project to be cancelled or deferred once it enters the Phase 1 or Phase 2 Business Case stages. The steps are outlined in the flow chart and table below:

Step	Description	Outcomes Required for Next Step
1	Project Initiation Form (PIF)	• Business objectives; • Scope; • Background; • Business benefit; • Affected users; • Stakeholders; • Risks, issues and impacts; • Priority; • Timeframe; • iPad or Phone requirements for mobility; and • Other details.
2	Case for Change	• Business problem/opportunity defined; • Business outcomes/objectives agreed; • Success criteria defined; • High level prioritisation; • Baseline of current costs identified or methods agreed; • Benefits identified and estimated; • Benefits realisation process proposed; • Key Issues and risks requiring further investigation ; • Business process redesign opportunities identified and recommended; • Architectural principles and standards to be applied; • Recommendations for re-use, buy, build, lease or share opportunities; • Key business resources needed to deliver the project; and • Document endorsed by General Manager with recommendation for ICT to either proceed to Phase 1 Business Case or to be deferred/ cancelled.
3	Phase 1 Business Case	• Business Justification with capital and operating expenditure endorsements/approvals;

Step	Description	Outcomes Required for Next Step
		• Project scope; • High Level solution design; • Estimated phase 2 costs; • Solution selection; • Vendor selection; • Identify operating vs. capital substitution opportunities; • Evaluate Total Cost of Ownership; and • Estimate of phase 2 NPV.
4	Phase 2 Business Case	• Business Justification with capital and operating expenditure endorsements/approvals; • Project scope; • Full project costing estimates; • Solution implementation; • Establish business benefits identification and tracking process; and • Calculation of project NPV.

Table 57: Governance Phases

As a result of the lease transaction, the ICT investment process was reviewed to include the assessment of criticality of the capital investment due to the likelihood that the new owner would set a new strategic direction for the organisation thus impacting the ICT investment priorities. As a result, a new step was introduced. The ICT Project Initiative Committee and PIF process was created, whereby all projects in the capital program and all new requests for ICT projects were reviewed as the first gate in the governance process.

Prior to the prioritisation of ICT initiatives, each initiative is subject to the Project Initiation Form (PIF) process. This process is an initial screening process and provides a sense check to ensure the initiatives are realistic and likely to deliver benefits to the business. Following this process, individual ICT initiatives are then subject to demand management reviews with the business in the first instance and the use of a framework that categorises projects based on their business value measured against three key areas:

- Risk - the mitigation of significant risks to meeting business as usual and standard control services requirements and the mitigation of significant risk to meeting mandatory and regulatory requirements;
- Total of cost ownership (TCO) – measures the direct and indirect costs of a project to determine the most favourable outcome; and
- Enablement - enabling the organisation to meet corporate objectives.

ICT prioritised projects to ensure that the most critical and material projects were put forward to the Executive and to ensure an efficient and prudent review and approval process. During the first 10 months of the PIF process being active (Jan 17 to Oct 17), the ICT Project Initiative Committee received 109 PIF requests which were categorised as follows:

- 10 projects approved through to the Case for Change phase to continue planning and feasibility analysis;

- 11 projects approved through to the Phase 1 Business Case stage due to their critical and strategic nature;
- 58 projects were approved to the Business Justification Form (BJF) process as they were under $50,000 in value;
- Five projects were deferred until the following financial year due to strategic and financial priorities;
- 16 projects were rejected and not endorsed; and
- Nine projects were completed by leveraging ICT operations processes and resources.

Future investment guidelines will be reviewed annually and criteria aligned to the strategic direction and organisational priorities.

Financial Governance

Throughout the Phase 1 and Phase 2 Business Case stages, Endeavour Energy applies its financial governance process depending on the total value of the Capex investment. The following table summarises the Capex investment brackets and the required governance delegation and approvals:

$ Investment	*Business Sponsor(s)*
< $50,000	• *Approved by ICT Branch Manager*
$50,000 - $500,000	• *Endorsed by ICT Project Management Committee* • *Approved by General Manager ICT*
$500,000 - $5m	• *Endorsed by ICT Project Management Committee, General Manager ICT and Investment Governance Committee.* • *Approved by Chief Operating Officer*
$5m - $10m	• *Endorsed by ICT Project Management Committee, General Manager ICT, Investment Governance Committee and Chief Operating Officer* • *Approved by Chief Executive Officer*
> $10m	• *Endorsed by ICT Project Management Committee, General Manager ICT, Investment Governance Committee; Chief Operating Officer and Chief Executive Officer* • *Approved by the Board*

Table 58: Investment Delegations

Endeavour Energy aims to prudently manage the capital investment needed to deliver outcomes for the business by employing the following four guidelines:

- Leveraging Existing Technology – Identify opportunities for consolidation of systems and processes by using business architecture models that leverages existing technology;
- Linking Technology and Process by leveraging the inherent functionality of software and combining good business process design principles to lower transactions costs, improve data quality, effectively store data and provide more information to the business;

- Operating vs. Capital substitution – each investment opportunity is evaluated through assessment of ongoing operating costs required to continue with the "status-quo" or the potential for purchase of services in preference to capital investment; and
- Total Cost of Ownership Solution Selection – The selection of a solution is critical to the cost of the project and ongoing support costs for Endeavour Energy and leveraging technology to achieve business outcomes. A total cost of ownership framework has been developed to allow the solution selection to consider both capital and operating costs and to identify where it is beneficial to favour a capital funded option over operating funded option or vice versa.

5. Performance Management

The measurement and evaluation of project success and delivery is key to ensuring that expenditure has been effectively invested and benefits and savings can be realised and repeated.

Measurement

The effectiveness of ICT expenditure is measured by benefits realisation at a project level. All projects are required to include expected benefits and associated measurements at time of a Phase 2 business case. On completion of the project the business is required to report on the actual benefits realised, as defined in the Business Case. The business benefits realisation review may be completed up to 12 months after the implementation of the ICT solution on the basis that some benefits will require significant change management to achieve, or an agreed period to measure the impact of the change.

Benchmarking

Benchmarking is used to assess the performance of ICT service delivery and expenditure in both capital and operational costs to drive efficiencies and to measure the effectiveness of investment in software, hardware and tools to support service delivery.

As part of our prudent approach to developing the 2019-24 non-network ICT Investment Plan, KPMG were engaged to provide a number of non-network and corporate ICT Capex benchmarks. The results of this benchmarking analysis are used throughout this submission and show that Endeavour Energy generally has under-invested in relation to other DNSP's in non-network ICT during the current regulatory period.

Risk Management

An annual review of the Risk Management Plan, Endeavour Energy looks to assess previously identified risks to ensure they are still appropriate. For example, as part of the 2017-18 review and refresh, a risk relating to the "Breach of data/information integrity and/or security (e.g. following a cyber-security intrusion event)" was revised to have its residual risk rating increased from Medium to High as a result of increased likelihood based on industry incident trends.

6. Forecasting Methodology

ICT expenditure is forecast using a combination of a top-down approach based on historical expenditure for maintaining current IT systems and a bottom-up forecast for new projects based on a demonstrated business need and in accordance with the ICT Investment Plan. Trending expenditure from previous periods and benchmarking against other comparable DNSP's is also used to inform ICT forecasts.

Framework

At each stage within the planning cycle, initiatives put forward for consideration are evaluated based on their contribution to business objectives and corporate themes.

This process is repeated, becoming more granular as initiatives progress through the planning cycle from the five year rolling plan to the annual budgeting cycle and finally when a Business Case is put forward as part of the governance process for investment prioritisation and approval.

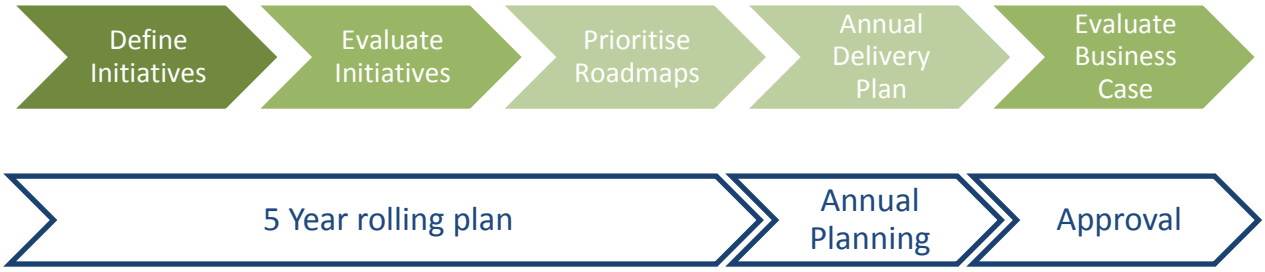


Figure 13: ICT Forecasting Timeline

Program Cost Estimation Methodology

The program estimates developed for the five year regulatory period have been obtained using a standard cost model to ensure consistency in project estimation and costing.

The model determines costs by the examining the following factors:

- Type of project;
- Complexity of project;
- Number of vendors;
- Number of Interfaces;
- Transition costs;
- Change Management costs;
- Duration of project (no of weeks effort);
- Standard Project Management cost – Cost per day for a project manager (PM), with the daily rate of the PM increasing as the complexity of the program increases (to reflect a more experienced PM); and
- Multiplier for project phase – Allocation of number of PM days per week multiplied by complexity of project.

A number of estimation assumptions have been made in developing the Totex project cost model for each of the above factors including integration costs, business change management and transition.

APPENDIX B

II. NER Objective and Criteria Alignment

Maintain Core Systems

The following table demonstrate the alignment of Endeavour Energy's Maintain Core Systems ICT Program to the NER Capital Expenditure Objects and Criteria.

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure is considered necessary to achieve:***	
6.5.7(a)(1) meet or manage the expected demand for standard control services over that period.	• Not applicable
6.5.7(a)(2) comply with all applicable regulatory obligations or requirements associated with the provision of standard control services.	• Under the revised Electricity Supply Act, Endeavour Energy is required to meet and maintain ISO 55001:2014 compliance. The technical upgrade of systems will assist in efficiently meeting this requirement.
6.5.7(a)(3) to the extent that there is no applicable regulatory obligation or requirement in relation to: (i) the quality, reliability or security of supply of standard control services; or (ii) the reliability or security of the distribution system through the supply of standard control services, to the relevant extent: (iii) maintain the quality, reliability and security of supply of standard control services; and (iv) maintain the reliability and security of the distribution system through the supply of standard control services.	• The technical currency program aims to mitigate the technology risk (e.g. risk of failure due to failing software or malicious attack exploiting potential vulnerabilities) associated with the ageing application environment (e.g. ERP solution is not technically current and on expensive extended support arrangements and network billing solution was implemented in 2000 and is currently under bespoke support arrangements). • A consolidated and rationalised application landscape will allow for more efficient data driven decision making within the business when maintaining the reliability and security of the network.
6.5.7(a)(4) maintain the safety of the distribution system through the supply of standard control services	• Enable Endeavour Energy's network business to make data driven informed decisions when considering the on-going network asset maintenance and proactive safety programs.

Mapping to 'Capital expenditure criteria' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure reasonably reflects each of the following:***	
6.5.7(c)(1) the efficient costs of achieving the capital expenditure objectives.	• All Endeavour Energy ICT programs follow a strict governance process which takes into account a number of efficient factors including options analysis,

Mapping to 'Capital expenditure criteria' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure reasonably reflects each of the following:***	
	total cost of ownership, and consideration of capital vs operating expenditures.
6.5.7(c)(2) the costs that a prudent operator would require to achieve the capital expenditure objectives.	• Obtained external advice for the development feasibility studies to ensure the solution is fit-for-purpose and value-for-money; • Leverage internal and external benchmarking to understand Endeavour Energy's overall non-network ICT investments when compared to industry peers; • Where feasible and pragmatic, leveraged external vendor quotes to assist in estimating potential Capex implications; and • Use of market rates for standardised resource costs in forecasting methodology.
6.5.7(c)(3) a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.	• Use of a forecasting model ensures consistent application of assumptions and calculations across all projects. Market tested standard rates are used for external resources within the model. • Obtained external advice when developing implementation roadmaps to ensure programs are achievable; and • Continued leverage of outsourcing model to ensure flexible resourcing profiles are available to deliver Capex investments as planned.

Maintaining Security Standards

The following tables demonstrate the alignment of Endeavour Energy's Maintaining Security Standards ICT Program aligns to the NER Capital Expenditure Objects and Criteria.

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure is considered necessary to achieve:***	
6.5.7(a)(1) meet or manage the expected demand for standard control services over that period.	• Not applicable
6.5.7(a)(2) comply with all applicable regulatory obligations or requirements associated with the provision of standard control services.	• Changes to the Electricity Supply Act require Endeavour Energy to maintain a level of ICT Security at a higher standard than previous regulatory periods. Prudent investments are required to ensure these standards are met; and • Endeavour Energy is responsible for the management and operation of Critical Infrastructure (as per the Federal Government definitions). There are a number of guidelines and requirements Endeavour Energy (in particular ICT Security) is required to meet in order to protect these assets for customers.

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure is considered necessary to achieve:***	
6.5.7(a)(3) to the extent that there is no applicable regulatory obligation or requirement in relation to: (i) the quality, reliability or security of supply of standard control services; or (ii) the reliability or security of the distribution system through the supply of standard control services, to the relevant extent: (iii) maintain the quality, reliability and security of supply of standard control services; and (iv) maintain the reliability and security of the distribution system through the supply of standard control services.	• Given Endeavour Energy's position as a Critical Infrastructure provider, it is likely to be a target from Cyber Warfare point of view as demonstrated in the ACSC 2017 Threat Report published by Cert Australia. Endeavour Energy is required to invest in capability to protect its ICT and infrastructure assets; and • Industry trends show an increase in cyber-security related incidents across all industries. Endeavour Energy requires prudent investments to ensure it is able to maintain its capability to provide a safe, reliable and secure network.
6.5.7(a)(4) maintain the safety of the distribution system through the supply of standard control services.	• Investments to ensure a hardened ICT security perimeter will assist in maintaining the resiliency of Endeavour Energy's network ensuring control of the network is not compromised.

Mapping to 'Capital expenditure criteria' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure reasonably reflects each of the following:***	
6.5.7(c)(1) the efficient costs of achieving the capital expenditure objectives.	• All Endeavour Energy ICT programs follow a strict governance process which takes into account a number of efficient factors including options analysis, total cost of ownership and consideration of capital vs operating expenditures.
6.5.7(c)(2) the costs that a prudent operator would require to achieve the capital expenditure objectives.	• External advice was sought to develop a roadmap on how to best maintain compliance requirements (Hacklabs and CQR).
6.5.7(c)(3) a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.	• Use of a forecasting model ensures consistent application of assumptions and calculations across all projects. Market tested standard rates are used for external resources within the model. • Where available, leverage Recommended Retail Pricing (RRP) for hardware and software.

Sustain Reliability of ICT Services

The following tables demonstrate the alignment of Endeavour Energy's Sustain Reliability of ICT Services program to the NER Capital Expenditure Objects and Criteria.

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure is considered necessary to achieve:***	
6.5.7(a)(1) meet or manage the expected demand for standard control services over that period.	• A scalable and flexible infrastructure and telecommunications platform will ensure the business is able to better respond to consumer expectations and enable the business to meet forecast capacity increases while more effectively managing the network in the long term interests of consumers.
6.5.7(a)(2) comply with all applicable regulatory obligations or requirements associated with the provision of standard control services.	• Changes to the Electricity Supply Act require Endeavour Energy to maintain a level of ICT Security at a higher standard than previous regulatory periods. A key component of infrastructure security is maintaining operating systems and ensuring the continued supportability of infrastructure assets. Prudent infrastructure investment is required to ensure technical currency and regulatory obligations are met; • Technically current ICT infrastructure assets will support Endeavour Energy's compliance with ISO 55001:2014 and ISO 27001:2013 requirements under the network operator licence through the provision of contemporary solutions that can meet productivity and reporting requirements; and • The proposed expenditure for this program seeks to deliver secure and compliant ICT infrastructure to support the business to meet electricity supply requirements and regulatory compliance across all areas of the business;
6.5.7(a)(3) to the extent that there is no applicable regulatory obligation or requirement in relation to: (i) the quality, reliability or security of supply of standard control services; or (ii) the reliability or security of the distribution system through the supply of standard control services, to the relevant extent: (iii) maintain the quality, reliability and security of supply of standard control services; and (iv) maintain the reliability and security of the distribution system through the supply of standard control services.	• The proposed expenditure for this program seeks to deliver a reliable and sustainable ICT infrastructure platform to support critical user applications and functions across the business. This will ensure the business has reliable access to the data, tools and systems required to support reliable electricity supply; • Ensuring continuity of infrastructure support arrangements will minimise the risk of business disruption and maintain our ability to supply high quality and reliable ICT and network services; and • Introducing infrastructure cloud services will enable more agility and efficiency in responding to new customer, regulatory and business requirements.
6.5.7(a)(4) maintain the safety of the distribution system through the supply of standard control services.	• Investments to ensure technical currency of ICT network and telecommunications infrastructure will assist in maintaining the resiliency of Endeavour Energy's network and unsolicited access to core

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) *The forecasted capital expenditure is considered necessary to achieve:*	
	network assets.

Mapping to 'Capital expenditure criteria' (Chapter 6, National Electricity Rules) *The forecasted capital expenditure reasonably reflects each of the following:*	
6.5.7(c)(1) the efficient costs of achieving the capital expenditure objectives.	• All Endeavour Energy ICT programs follow a strict governance process which takes into account a number of efficient factors including options analysis, total cost of ownership and consideration of capital vs operating expenditures.
6.5.7(c)(2) the costs that a prudent operator would require to achieve the capital expenditure objectives.	• Infrastructure refresh strategies and related expenditure levels, are based on vendor recommended life cycles, align with industry refresh cycles, are designed to ensure acceptable levels of risk and reliability are maintained and are required to meet current capacity and performance requirements from the business.
6.5.7(c)(3) a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.	• Use of a forecasting model across all projects ensures consistent application of assumptions and calculations. Market tested standard rates are used for external resources within the model; and • Where available, leverage Recommended Retail Pricing (RRP) for hardware and software.

Engage the Customer and Enable Network Service Efficiency

The following tables demonstrate the alignment of Endeavour Energy's Sustain Reliability of ICT Services program to the NER Capital Expenditure Objects and Criteria.

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) *The forecasted capital expenditure is considered necessary to achieve:*	
6.5.7(a)(1) meet or manage the expected demand for standard control services over that period.	• A scalable and user friendly customer portal will streamline communication, collaboration and interaction and ensure the business is able to better respond to customer expectations while enabling the business to more effectively manage the network in the long term interests of consumers; and • Demand for standard control services in Western Sydney is widely expected to increase over the next AER period as a result of population growth and increasing economic investment. This program will provide the capability to mitigate additional network pressure and deliver a robust solution capable of coping with a larger number of customer interactions while ensuring acceptable service and compliance levels are maintained.
6.5.7(a)(2) comply with all applicable regulatory obligations or requirements associated with the provision of standard	• Technically current data capture, integration, storage and analysis tools will assist Endeavour Energy's compliance with ISO 55001:2014 asset management

Mapping to the relevant 'Capital expenditure objective(s)' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure is considered necessary to achieve:***	
control services;	conditions as required under the Network Operator Licence. • The proposed expenditure within this portfolio will streamline customer interaction and notification processes thereby ensuring compliance with the National Energy Retail Law and associated regulatory obligations and enhancing interactions with vulnerable customers.
6.5.7(a)(3) to the extent that there is no applicable regulatory obligation or requirement in relation to: (i) the quality, reliability or security of supply of standard control services; or (ii) the reliability or security of the distribution system through the supply of standard control services, to the relevant extent: (iii) maintain the quality, reliability and security of supply of standard control services; and (iv) maintain the reliability and security of the distribution system through the supply of standard control services.	• The proposed expenditure for this program will ensure the business has reliable access to the data, tools and systems required to support reliable electricity supply while exceeding customer service expectations; • Investment to solidify and expand analytics capabilities will enable Endeavour Energy to provide higher quality, secure, and reliable information to the business and customers. This will provide a base from which to make the most effective decisions to improve the overall quality, reliability and security of network services; and • Effective customer interaction through robust customer management and information solutions will improve the quality of standard control services by enabling a better understanding of customer needs.
6.5.7(a)(4) maintain the safety of the distribution system through the supply of standard control services	• Continuing the implementation of field force mobility solutions and automation program will leverage existing investments to improve time-on-tools metrics, optimise field maintenance and maintain the safety of the network infrastructure; and • Refreshed customer management solutions and streamlined outage notification processes will enable Endeavour Energy to more quickly and efficiently communicate outage information to customers.

Mapping to 'Capital expenditure criteria' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure reasonably reflects each of the following:***	
6.5.7(c)(1) the efficient costs of achieving the capital expenditure objectives.	• All Endeavour Energy ICT programs follow a strict governance process which takes into account a number of efficient factors including options analysis, total cost of ownership and consideration of capital vs operating expenditures.
6.5.7(c)(2) the costs that a prudent operator would require to achieve the	• Collaboration with external industry bodies and internal customer feedback consultation and directions process was undertaken to determine the

Mapping to 'Capital expenditure criteria' (Chapter 6, National Electricity Rules) ***The forecasted capital expenditure reasonably reflects each of the following:***	
capital expenditure objectives.	priorities for the proposed expenditure within this program.
6.5.7(c)(3) a realistic expectation of the demand forecast and cost inputs required to achieve the capital expenditure objectives.	• Use of a forecasting model ensures consistent application of assumptions and calculations across all projects. Market tested standard rates are used for external resources within the model.

APPENDIX C

III. Abbreviations

Term	Description
ADMS	Advanced Distribution Management System
ADSF	Active Directory Federated Services
AEMO	Australian Energy Market Operator
AER	Australia Energy Regulator
API	Application Programming Interface
ASP	Accredited Service Provider
AV	Anti-Virus
BAU	Business as Usual
BJF	Business Justification Form
Capex	Capital expenditure
CMDB	Configuration Management Database
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DDOS	Distributed Denial of Service
DLP	Data Loss Protection
DNSP	Distribution Network Service Provider
DR	Disaster Recovery
EAM	Enterprise Asset Management
ENA	Energy Networks Australia
ERP	Enterprise Resource Planning
ETL	Extract, Transform, Load
EUC	End User Computing
FY	Financial Year
HIPS	Host Based Intrusion Prevention System
IAM	Identity and Access Management
ICT	Information Communications Technology

Term	Description
IoT	Internet of Things
IT	Information Technology
IVR	Interactive Voice Response
LAN	Local Area Network
MDM	Mobile Device Management
N/A	Not / Applicable
NECF	National Energy Customer Framework
NER	National Electricity Rules
NPS	Network Perimeter Security
NPV	Net Present Value
Opex	Operating Expenditure
OT	Operational Technology
PIAM	Privilege Identity Access Management
PIF	Project Initiation Form
PM	Project Manager
PV	Photovoltaic
ROI	Return On Investment
RRP	Recommended Retail Pricing
SDLC	Software Development Lifecycle
SIEM	Security Information and Event Management
SLA	Service Level Agreement
SMS	Short Messaging Service
SQL	Structured Query Language
TCO	Total Cost of Ownership
Totex	Total Expenditure
WAN	Wide Area Network
WAS	WebSphere Application Server