ICT Business case: Recurrent - IT Infrastructure Refresh

2025-2030 Regulatory Proposal

Supporting document [5.12.7]

January 2024

SA Power Networks

Empowering South Australia

Contents

Glossary

Acronym / term	Definition
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
ATO	Australian Tax Office
BAU	Business as usual
Capex	Capital expenditure
DER	Distributed energy resources
EDP	Enterprise data platform
ICT	Information and communication technology
IT	Information technology
MS	Microsoft
NER	National Electricity Rules
NPV	Net present value
ODP	Operational data platform
Opex	Operating expenditure
OT	Operational technology
PaaS	Platform as a service
RCP	Regulatory control period
SA	South Australia
SaaS	Software as a service
SAP / SAP HANA	An enterprise resource planning solution
SAP HANA	A database management and storage system
SQL	Structured query language [for relational databases]
Totex	Total expenditure

About this document

Purpose

The purpose of this document is to provide the business case and justification for the ongoing recurrent refresh for SA Power Networks' Information Technology (**IT**) infrastructure for the 2025–30 Regulatory Control Period (**RCP**).

Expenditure category

- Non-network ICT Capex: Recurrent
- Non-network ICT Opex: Change – capex/opex trade-off
- Non-network ICT Opex: Step Change

Related documents

Table 1: Related documents

Title	Author	Version / date
5.12.1 - IT Investment Plan 2025-30	SA Power Networks	Jan 2024
Digital and Data Strategy	SA Power Networks	Jan 2024
IT Asset Management Plan	SA Power Networks	Jan 2024
5.12.4 - IT Applications Refresh Business Case	SA Power Networks	Jan 2024

1. Executive summary

This business case details the justification for the recurrent IT expenditure required to ensure that our IT infrastructure and associated systems and services are maintained and secure with the current acceptable levels of risk. Our IT infrastructure underpins the delivery of all IT services and is critical to our ability to maintain and operate the electricity network.

During the 2020–25 RCP, we commenced our journey to cloud-hosted services – a journey we planned to undertake over multiple RCPs. We have successfully implemented the required networks and security controls to enable secure connectivity to cloud services. We have also implemented management systems and services to effectively monitor and manage these far more dynamic cloud-based services. The increase in new hardware and systems offset the reduction in server hardware during the period. In the 2025–30 RCP, we will continue our journey to cloud-based services, making prudent, opportunistic, system-by-system decisions when applications are required to be upgraded, refactored or replaced.

The use of IT systems and data collection has grown significantly in response to the strategic requirements to manage a more dynamic grid and enable more data-driven decision-making. This in turn has increased demand for storage and compute power. This growth is also being driven by current business as usual (**BAU**) smart-meter rollout rates in South Australia, which are currently growing at around 20% per year and are forecast to continue at this pace through the next RCP.

In the past, we would have responded to this increase in demand for data storage and compute capacity by using capex to purchase physical hardware assets that would support that additional capacity. While we will continue to replace the hardware in our data centres that has reached end of life, where it is needed to support systems which are not cloud-hosted, the total recurrent infrastructure capex spend for 2025–2030 will be reduced from the current period. This is because the systems we forecast capacity growth with are now cloud-based and will instead require an ongoing yearly uplift in our opex.

This business case recommends a 'business-as-usual' approach to maintaining our existing services. The **2025–30 RCP forecast of $42.9 million** recurrent expenditure for the program includes **$34.1 million in recurrent capex and $8.8 million of recurrent opex**.[1] $1.8 million of the requested opex is related to capex-opex shift, as we move more systems to the cloud, $1.6 million is related to the increased capacity required for the forecast expansion required by BAU smart meter data and analytics, and $5.3 million is related to BAU growth of data storage and compute for our other systems.

Compared to both the current period, and the 2010-15 RCP, the forecast non-growth-related total investment represents a slight reduction in our IT investment.

Other options considered were:

- **Current five-year expenditure 2020–25 (Base case):** while this option does manage some risk, as it is a similar level of capex investment to the preferred option, it does not provide sufficient expenditure to support the forecast growth rates in data storage and compute capacity. This makes it a riskier option.
- **Transition faster to the cloud:** this option describes transitioning faster to cloud services, with a view to achieving a minimal data-centre footprint in the 2025–30 period. While this level of investment does manage risk, it results in material cost increases without delivering significant additional benefits.

The preferred option was selected because it:

- maintains our existing systems and services at the current acceptable levels of risk;

[1] Unless otherwise specified, all financial figures in this business case are in real June 2022 dollars.

- secures our IT infrastructure through the appropriate levels of updates and patching;
- supports the increasing volumes of data to be stored and used for compute, driven by both the demand for quality, integrated data to enable improved network asset related decision-making, forecasting and planning, and regulated changes such as Five-Minute meter reads; and
- is a reasonable level of expenditure, based on historical spend.

Table 2: Options assessment summary, ($m June 2022 real)[2]

	2025–2030 costs			10-year estimates		Residual risk rating
Option	**Capex**	**Opex**	**Total**	**Risk avoidance benefits**	**NPV**	
Option 1 – Current five-year expenditure 2020–25 (Base case)	36.5[3]	-	36.5	N/A	-61.9	**High**
Option 2 – Business as usual (Preferred)	34.1	8.8	42.9	N/A	-78.6	**Low**
Option 3 – Transition faster to cloud	43.2	15.8	59.1	N/A	-109.5	**Low**

[2] Note: Totals presented in tables throughout this document may not exactly match the sums of individual figures due to rounding.

2. Background

SA Power Networks staff perform their work across a large, geographically dispersed area, covering 180,000 square kilometres across 458 sites, including 15 metropolitan offices, 21 regional depots and over 400 substations (see Figure1).

Figure 1: **SA Power Networks State Distribution**

SA Power Network's IT infrastructure is critical to ensuring our staff can be connected to our networks, systems and data efficiently, reliably and securely, irrespective of whether they are working in a metro office, regional depot or remotely, such as when office staff work from home, contractors from a worksite or field crew from their vehicle or a customer's location.

Hosting services

IT applications, compute, IT network core and storage are hosted in two private data centres and two Azure Cloud environments, and, if Software as a Service (**SaaS**), then they are hosted by an external service provider. Because there are different types of hosting, the data storage and compute capacity consumed depends on which of these hosting options are utilised:

- Those hosted in our data centres consume data storage and compute capacity from the physical servers and storage assets located in those data centres.
- Those hosted in cloud environments consume data storage and compute capacity from those environments.

Network connectivity and supporting services

These infrastructure components provide network connectivity to the hosting services, supporting management and platform capabilities on top of the hosting services, and support resiliency of our IT infrastructure.

Business-critical services provided by our IT infrastructure enable us to:

- distribute and regulate power across the network;
- meet all regulatory obligations and requirements (including those imposed by, among others, the Australian Energy Regulator (**AER**) and Australian Tax Office (**ATO**);
- monitor and analyse network performance in real-time, and identify/correct network faults;
- maintain the network and supporting assets;
- provide a safe working environment for employees and contractors;
- connect and disconnect customers;
- bill customers and retailers;
- manage and supervise staff and contractors;
- pay staff, contractors, and suppliers; and
- maintain back-up systems and data storage.

To perform its function, our IT infrastructure needs to be fit for purpose, secure, and reliable. As IT infrastructure components age, their reliability and performance declines, with potential consequences of higher maintenance costs, additional support staff, increased downtime, and increased vulnerability to cyber-attacks. This impacts on our ability to respond to customers, maintain our network and deliver energy services.

In addition to the risk of failure or poor performance, cyber security breaches and information loss can occur when infrastructure components, or their associated platform software, are not capable of handling the latest security requirements, or cannot be patched or updated to the latest operating system or software/firmware versions.

2.1 The scope of this business case

2.1.1 In-scope

This business case covers all relevant expenditure to ensure our IT infrastructure environment is current, secure and supportable.

2.1.1.1 Hosting services

This includes costs for:

- hardware refresh, capacity upgrades and security upgrades to IT network core and server and storage hardware;
- capacity upgrades for storage/back-up/compute (where not transitioned to the cloud);
- application load balancer infrastructure refresh and updates to the backbone IT network assets as part of our hosting solutions;
- network firewalls; and

- monitoring tools for availability, capacity, and performance.

Additionally, for our cloud technologies, it includes incremental growth[4] opex for:

- application and data capacity growth; and
- smart-meter BAU capacity growth[5].

2.1.1.2 Network connectivity and supporting services infrastructure

This program includes:

- Refresh, updates, and capacity upgrades for IT network assets that provide connectivity to our hosting services, eg,:
  - Switches and routers in depots, offices, remote sites etc.
  - Wi-Fi networks and wireless access points
- Updates and upgrades to platform software, including the following server operating systems:
  - Windows
  - Unix/Linux
- Virtual desktop infrastructure components and management software Database Management Systems:
  - Oracle
  - Structured Query Language (**SQL**) Server
  - SAP HANA
- Middleware and services:
  - Microsoft (**MS**) Active Directory
  - Back-up media agents and Tape libraries/Tape media
- Infrastructure management components, ie, monitoring tools for availability, capacity, and performance

2.1.2 Out of Scope

The following are explicitly out of scope of this business case:

- Expenditure relating to the operational technology (**OT**) and telecommunications infrastructure network
- Opex support costs for infrastructure assets and internal support costs
- Opex licensing costs for platform software
- Capex relating to upgrades of existing IT applications not listed as 'In Scope' above[6]

[4] Previously this growth would have been embedded in the costs of the hardware replacement which would have been sized based on these expected capacity growth trajectories. With the move to Cloud hosting this is now an opex based cost, charged monthly, and increments each year based on growth factors (eg increase in the number of smart meters) but is partially offset by our data management processes such as archiving.

[5] The Australian Energy Market Commission (**AEMC**) is proposing an accelerated smart-meter rollout during the next RCP. Additional IT capacity growth costs will be required for that rollout and these are included in a separated compliance business case.

[6] These upgrades will be performed through application upgrade activities as covered by our IT Applications Business Case - 5.12.4 SAPN 2025-30 Reset ICT Business Case RECURRENT- IT Applications Refresh.

- IT infrastructure for enabling new business initiatives – these costs are covered within estimates for projects that deliver such capability
- Costs associated with large compliance changes or new or expanded capabilities

2.2 Our performance to date

During the 2020–25 RCP, we commenced our journey to cloud-hosted services – a journey we planned to undertake over multiple RCPs. We have successfully implemented the required networks and security controls to enable secure connectivity to cloud services. We have also implemented management systems and services to effectively monitor and manage these far more dynamic cloud-based services. The need for additional monitoring and management tools has, however, effectively offset the cost-based benefits of these transitions during the period, such as the reduction in server hardware.

Table 3 summarises the key changes that have been, or will be, undertaken during the 2020–25 RCP.

Table 3: Changes during the 2020–25 RCP

Infrastructure service area	2020–2025 RCP changes
Hosting services	• Redesigned our data centre and networks topology to facilitate secure, efficient and scalable access to cloud technologies to enable the move to cloud services. • Improved firewall availability and scalability to improve security and resiliency of IT services. • Moved 30% of our data-centre-hosted applications from on-premise data centres to the cloud.
Network connectivity and supporting services infrastructure	• Implemented a 'wide area network' solution that enables more flexible options for redundancy to each depot location, rather than having only one option for each depot location. • Introduced a centralised management tool to perform more efficient bulk configuration changes to routers from a single location. • Retired our Citrix virtual desktop platform. • Implemented monitoring and automation tools to help us proactively manage and monitor our cloud service consumption to ensure it is efficient and effective.

Further, the COVID-19 pandemic work restrictions resulted in our whole office-based staff being required to work full-time from home for a significant period. While restrictions have now eased, our office-based workforce, whether working from metropolitan offices or regional depots, has since adopted a 'hybrid' operating model, with staff working from a combination of home and office. This approach is consistent with that taken in other businesses nationally and around the world. It reduces operational risks by ensuring most staff are able to continue to conduct their work with minimal interruption in the event that restrictions again become necessary.

The hybrid working model has increased the need for a secure, robust and reliable non-data-centre client communications network that enables our employees and contractors to reliably, securely and efficiently interact with our software and systems from wherever they are working.
These covid-driven changes required a significant amount of increased investment in the equipment that supported these capabilities, across all of our sites, particularly those in remote and regional areas, as can be seen in Figure 2.

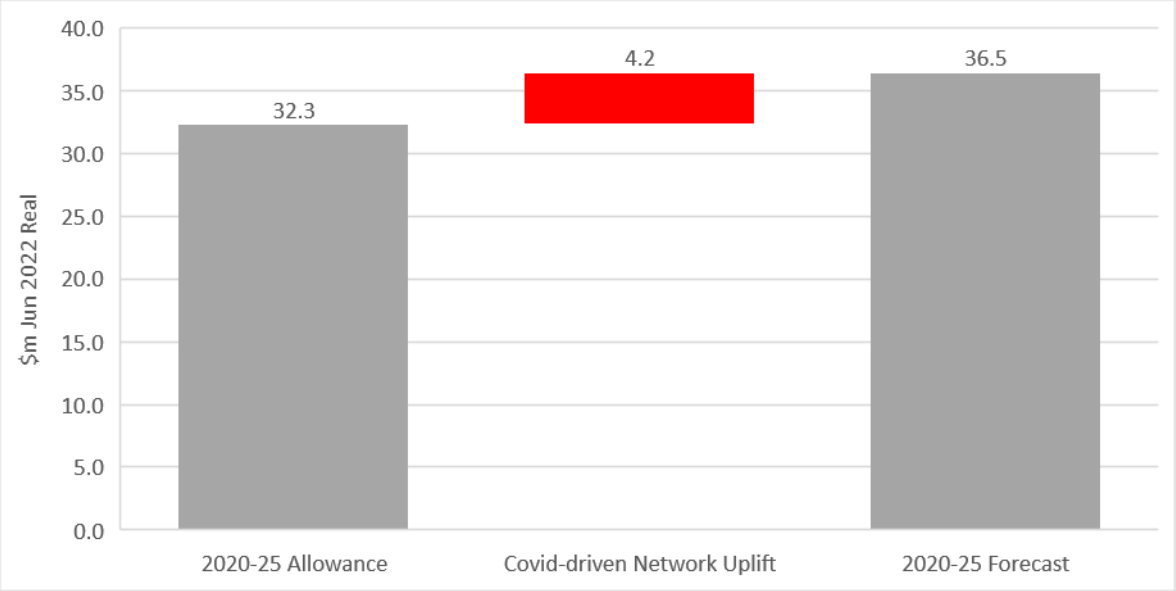

Figure 2: 2020–25 Forecast IT infrastructure refresh investment vs regulatory allowance

2.3 Drivers for change

2.3.1 Opex drivers for change

The use of cloud-based hosting is changing the profile of our recurrent IT expenditure. In the past, the hosting consumption costs related to our use of data storage and compute capacity were spent 'up front' as capex when we purchased those physical hardware assets for our data centres' hardware[7]. However, where systems are cloud hosted, this storage and compute capacity is charged monthly to opex and will grow incrementally each year, based on growth factors relating to those hosted systems, e.g., the increase in the number of smart meters[8], but partially offset by our data management processes, such as archiving.

In addition, the use of IT systems and data has also grown significantly during the 2020–25 RCP in response to the strategic requirements to manage a more dynamic grid and enable more data-driven decision-making. This has driven increased demand for storage and computing power to enable these increasing volumes of high quality, integrated data to enable improved network-asset-related decision-making, forecasting and planning, and includes increasing amounts of unstructured data such as images and photographs of asset faults for analysis. This BAU growth is forecast to continue.

In the 2025–30 RCP, we will continue to move services to the cloud, opportunistically and prudently considering whether to move each system as it comes up for upgrade or replacement. The decision to migrate will be based on whether an application:

- is only available cloud based (ie, where the vendor no longer provides non-cloud-based options), or
- is able to move cost-effectively to the cloud (either platform as a service (**PaaS**) or SaaS).

Hence, there will continue to be a need for us to invest in managing and maintaining those systems that are essential for cost-effective monitoring and management of our growing stable of dynamic cloud-based services.

[7] That is, when physical data centre assets, eg servers and storage assets, are purchased/replaced, they are selected (sized) based on the forecast maximum consumption capacity that would be required during their lifetime.
[8] Current BAU smart-meter rollout rates in South Australia are growing at around 20% per year and we expect this to increase for the foreseeable future. This increase in smart meter numbers not only increases the number of streams of data (ie five-minute meter reads) to be stored as raw data, but also the amount of storage, capacity and compute required by the associated analytics and billing systems whose storage and compute capacity must also be scaled up to process that data.

However, where cloud-based isn't a viable and sustainable option, we will continue to use the traditional data centre model.

2.3.2 Capex drivers for change

After moving 30% of our data-centre-hosted applications from on-premise data centres to the cloud, we paused the transition process in order to consider the impacts, in order to determine the most prudent future direction for our cloud strategy. While doing this, we took advantage of the opportunity to extend the life of our key data centre assets, extending support contracts until product end of life. We did this to ensure we focused on the most appropriate future hosting options for applications across the remainder of the current RCP, to ensure we only replaced equipment after due consideration to whether we would continue to need it in the 2025–30 RCP.

This pause also enabled us to focus on the investment necessary to support the covid-driven uplift of the non-data-centre client communications network. This ensured that our employees and contractors were able to continue to interact with our software and systems reliably, securely and efficiently from wherever they were working in order to minimise impacts on both customers and day to day operations. This work was critical to our ability to maintain our existing services and levels of risk.

As a result of the above, much of our key data centre hardware refresh now falls due at the start of the 2025–30 RCP.

2.3.3 2025-30 Forecast and drivers for change compared to historic spend

In summary, Table 4 shows the impact of these drivers on the forecast Capex for the 2025-30 RCP and contextualises it to historical spend. In 2015-2020 the Capex spend was $45.1 million. While the forecast Capex for 2020-25 is $36.5 million, if that figure was taken as the basis for Capex spend in 2025-30, and adjusted for driving factors, the resulting request is $42.9 million which is a 4.9% reduction from the 2015-20 Actuals.

Table 4: Comparison of Forecast IT Total investment to historic spend

Category	Estimate ($m Jun 2022 Real)
2015-20 Actuals	**45.1**
2020-25 Forecast	**36.5**
BAU smart meter growth (opex)	+1.6
BAU growth (excluding smart meters) (opex)	+5.3
Transition to Cloud (opex)	+1.8
Reduction in hardware due to transition to Cloud (capex)	-2.4
2025-30 Forecast Total investment	**42.9**

2.4 Industry practice

Table 5 displays the industry practice to refresh hardware assets and compares it to SA Power Networks refresh cycles.
While recent regulatory submissions with details available for a comparable infrastructure refresh program are limited, public information does exist for Ausgrid and Essential Energy. Business cases submitted for these businesses describe development of expenditure forecasts using a similar approach to SA Power Networks.

Ausgrid and Essential Energy have specified average useful lives during which key devices are to be refreshed. As shown in Table 5, SA Power Networks' lives for the chosen option are consistent with those used by these other businesses for all categories.

Table 5: SA Power Networks vs comparable entity refresh rates

Asset class	SA Power Networks lives	Ausgrid[9], Essential[10] Energy	ATO depreciation 'useful life'[11]
Servers – Physical	5–7 *(based on risk assessment)*	5, 5	4
Storage hardware	5–7 *(in line with vendor support agreements)*	5, 5	4
Physical cabling	Based on risk assessment	n/a, n/a	?
Network switches	7 *(in line with vendor support agreements)*	5, 7	5
Routers	7 *(in line with vendor support agreements)*	5, 5	5
Infrastructure software	Annual patches *(based on risk assessments)* Major updates in line with vendor support arrangements and justified via internal business cases	4 *(upgrades to maintain ability to patch/device compatibility)*, n/a	n/a
Security hardware/software	Based on risk assessment	n/a, 5	n/a

[9] Ausgrid – Att. 5.9.e – ICT & infrastructure program – 31 Jan 2023 – Public, Appendix 3, page 31.
[10] Essential Energy ICT Business Plan – Jan23, Table 1, page 12.
[11] TR 2022/1 – Income tax: effective life of depreciating assets (applicable from 1 July 2022) C (Published on 29 June 2022) | Legal database (ato.gov.au).

3. The identified need

The underlying driver for investment action described by this business case is the ongoing requirement to manage and maintain our existing service levels while mitigating the risks of failure, degraded performance, or cyber incidents due to the use of IT infrastructure components (whether physical or cloud-based) beyond their useful life ie:

- IT infrastructure components fail, or their performance is degraded, due to assets not being kept current, secure, and supported, or otherwise reaching end of life;
- IT Infrastructure components become insecure or unsupported by the vendor, resulting in increased vulnerability to cyber-attacks; or
- IT Infrastructure component performance is significantly degraded due to provision of insufficient capacity to support required storage, network bandwidth or computing capacity.

Consequences of these risks include the potential for increased frequency and duration of network outages for customers. Our IT infrastructure underpins the delivery of all IT services and is critical to both our ability to maintain and operate the electricity network and our ability to manage secure access to customer, organisation, and network data.

In considering potential responses to this driver, we weighed up service level outcomes, balanced against price outcomes, and considered our regulatory requirements under the National Electricity Rules (NER), National Electricity Law and jurisdictional regulations. As a result of these considerations, the identified need for our IT Infrastructure refresh program is as follows:

a. To respond to customers' concerns[12], identified through our consumer and stakeholder engagement process, regarding their explicit service level recommendations that we:
   - maintain reliability service performance – driven by a desire to not see outages; and
   - maintain safety service performance – driven by a desire to not see deterioration in the safety risk posed by the network.
b. To ensure that our services can continue to be delivered for the lowest possible long-term cost – through prudent, systematic, and timely refresh of assets suffering breakage or degradation in performance. This includes the consideration of risk profiling per our IT Asset Management Plan, forecasts of capacity growth, and may include extending useful life beyond recommended refresh cycles, where prudent and appropriate to do so.

[12] This is pursuant to Clause 6.5.7(c)(5A) of the NER, which requires regard to be had to the extent to which forecast expenditure seeks to address the concerns of distribution service end users identified by the distributor's engagement process.

4. Comparison of options

4.1 The options considered

Three options have been considered for the refresh of infrastructure, as summarised in Table 6.

Table 6: Summary of options considered

Option	Description
Option 1 – Base case – Current five-year expenditure 2020–25	This option describes a situation where the level of investment is the same as the 2020–25 period: • We maintain our current approaches to risk-based investment when refreshing our recurrent infrastructure. • Infrastructure hardware is replaced in accordance with risk profiling per our IT Asset Management Plan. • This option does not provide sufficient total investment to support the forecast growth rates in data storage and computing power.
Option 2 – Business as usual	• We maintain our current approaches to risk-based investment in refresh of our recurrent infrastructure. • Infrastructure hardware is replaced in accordance with risk profiling as per our IT Asset Management Plan. • Applications are migrated to the cloud when greater value can be obtained or achieved than from our traditional hosting model. This could be cost, increased flexibility/scalability or greater capability/functionality than what is available via our data centres. • However, a capex-opex shift is provided to cater for the costs associated with managing the compute and storage for systems as we continue to move to the cloud. • An opex increase is provided to support the forecast growth in capacity required to support our cloud-based systems, compute and storage.
Option 3 – Transition faster to the Cloud	• We transition faster to cloud services, with a view to achieving a minimal data-centre footprint in the 2025–30 period. • While this level of investment does manage some risk, it results in material cost increases without delivering significant additional benefits.

4.2 Options investigated but deemed non-credible

Do nothing

The risk exposure associated with not patching, performing critical upgrades on our infrastructure, or reviewing our monitoring tools is rated as Extreme, and therefore this option is deemed as being non-credible.

- **For IT hosting services:** this would mean no further investment in data centres or cloud technologies. There would also be no replacement of ageing IT infrastructure needed to meet demand and maintain standards, increasing security and availability risk.
- **For our network connectivity and supporting infrastructure:** this would mean systems will not be patched, upgraded or supported according to the release schedules provided by vendors. In addition to not performing any critical patching or upgrades, we will fail to keep our infrastructure secure and risk the loss of business productivity, resulting in high consequence cost.

4.3 Analysis summary and recommended option

4.3.1 Options assessment results

Table 7: Costs, benefits and risks of alternative options relative to the base case over the 10-year period ($m Jun 2022 real).

	10-year program/project costs			2025–30 program costs			10-year benefits [13]	10-year NPV[14]	Overall risk rating	Ranking
Option	**Capex**	**Opex**	**Total**	**Capex**	**Opex**	**Total**				
Option 1 – Current five-year expenditure 2020–25 (Base case)	74.6	-	74.6	36.5	-	36.5	N/A	-61.9	**High**	3
Option 2 – Business as usual (Preferred)	70.0	26.2	96.2	34.1	8.8	42.9	N/A	-78.6	**Low**	1
Option 3 – Transition faster to cloud	81.2	52.9	134.1	43.2	15.8	59.1	N/A	-109.5	**Low**	2

The following key assumptions are consistent under all options:

- Infrastructure hardware will be replaced in accordance with risk profiling as per our IT Asset Management Plan.
- Our key data centre assets have been extended as long as possible, to end of life, and must be refreshed at the start of next RCP period.
- Labour assumptions are based on historic project actuals.
- There will be increasing volumes of data to be stored and used for compute, driven by both the demand for quality, integrated data to enable improved network-asset-related decision-making, forecasting and planning, and for regulated changes, such as the Five-minute meter reads.
- Forecast growth is based on a combination of historic trends and predicted future use.

4.3.2 Recommended option

Option 2 – Business as usual

This is the preferred option as:

- we maintain our existing levels of service and risk in a prudent manner;
- we maintain our current approaches to risk-based investment in the refresh of our recurrent infrastructure;
- our infrastructure hardware is replaced in accordance with acceptable risk profiling;
- our IT infrastructure is secured through appropriate levels of updates and patching;

[13] Represents the total capital and operating benefits, including any quantified risk reduction/management benefits, over the 5-year cash flow period from 1 July 2025 to 30 June 2030 expected across the organisation as a result of implementing the proposed option.
[14] Net present value (NPV) of the proposal over 10-year cash flow period from 1 July 2025 to 30 June 2035, based on discount rate of 4.05%.

- we migrate applications to the cloud prudently;
- a capex-opex shift is provided to cater for the forecast growth in capacity that is required to support our cloud-based systems' compute and storage to enable improved network-asset-related decision-making, forecasting and planning, and cater for regulated changes, such as the Five-minute meter reads; and
- it has a reasonable level of expenditure based on historic spend.

The 2025–30 RCP forecast of **$42.9 million** recurrent expenditure for Option 2 includes **$34.1 million in recurrent capex and $8.8 million of recurrent opex**. $1.8 million of the requested opex is related to capex-opex shift as we move more systems to the cloud, $1.6 million is related to the increased capacity required for the forecast expansion required by BAU smart meter data and analytics, and $5.3 million is related to BAU growth of data storage and compute for our other systems. Compared to the current period, the forecast non-growth-related total investment represents a slight reduction in our IT investment.

Appendix A provides the links to the cost and benefit models for each option. Appendix B details the opex step-change request for the preferred option. Appendix C provides the detailed risk analysis for each option.

4.4 Scenario and sensitivity

The key sensitivity between the options are:

- the rate of transition to cloud services; and
- the capacity to support the forecast rate of growth in capacity to support cloud-based systems, compute and storage

4.5 Option 1 – Current five-year expenditure 2020–25 (Base case)

4.5.1 Description

This option maintains our current approaches to risk-based investment in refreshing our recurrent infrastructure. Infrastructure hardware is replaced in accordance with risk profiling as per our IT Asset Management Plan.

This option does not provide sufficient total investment to support the forecast growth rates in data storage and computing power.

4.5.2 Costs

The forecast for Option 1 has been prepared based on our current five-year expenditure 2020–25. A more detailed breakdown of costs subset is provided in the associated costing spreadsheet listed in Appendix A. Total costs for this option are provided in Table 8.

Table 8: Option 1 – Costs by cost type ($m June 2022 real)

Cost type	2025–26	2026–27	2027–28	2028–29	2029–30	Total 2025–30	2030–31	2031–32	2032–33	2033–34	2034–35	Total 2025–35
Capex	9.9	6.3	3.9	10.1	6.3	**36.5**	15.0	3.0	3.8	9.3	7.1	**74.6**
Opex	0.0	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.0	0.0	0.0	**0.0**
Total	**9.9**	**6.3**	**3.9**	**10.1**	**6.3**	**36.5**	**15.0**	**3.0**	**3.8**	**9.3**	**7.1**	**74.6**

4.5.3 Risks

Table 9: Risk assessment summary

Risk consequence category	Current risk level[15]	Risk cost[16]
Network – Failure to transport electricity from source to load	High	
Customer – Failure to deliver on customer expectations	High	
Safety – Harm to worker, contractor or member of the public.	Medium	
Governance – Non-compliance with regulatory obligations	High	
Technology – Disruption of access to, or use of, systems	High	
Performance and growth – Financial impact	High	
Overall risk level	High	

The distribution of capex to opex in this option does not reflect the predicted expenditure profile forecast, which makes it a risky option. In particular, this option does not provide sufficient total investment to support the forecast growth rates in data storage and computing power.

4.5.4 Quantified benefits

There are no tangible quantifiable benefits associated with this option.

4.5.5 Unquantified benefits

- Customers not exposed to significant ongoing impacts.
- It maintains the efficient delivery of energy services and manages the risks of IT infrastructure failure.
- Risks related to IT Infrastructure are reduced to acceptable levels through a prudent, risk-based approach to replacing and/or upgrading our IT infrastructure assets, based on useful life.
- Reasonable level of expenditure, based on historical spend.

4.6 Option 2 – Business as usual

4.6.1 Description

Option 2 is similar to Option 1, where the current approach to replacing and/or upgrading our IT infrastructure assets, based on useful life, is maintained. However, in addition to that, a capex-opex shift is provided to cater for the forecast growth in capacity that is required to support our cloud-based systems, compute and storage.

In this option:

- We maintain our current approaches to risk-based investment in refreshing our recurrent infrastructure.
- Infrastructure hardware is replaced in accordance with risk profiling as per our IT Asset Management Plan.

[15] The level of risk post current controls (i.e. after considering what we currently do to mitigate the risk). Refer to Appendix C – risk assessment for details.

[16] Estimated cost of consequence(s) to SA Power Networks or its customers in an event this risk eventuates over the NPV analysis period.

- Applications are migrated to the cloud when greater value can be obtained or achieved than from our traditional hosting model. This could be cost, increased flexibility/scalability or greater capability/functionality than what is available via our data centres.
- An opex increase is provided to support the forecast growth in capacity required to support our cloud-based systems, compute and storage.

4.6.2 Costs

The forecast for Option 2 has been prepared on a bottom-up basis through a combination of labour and material assumptions based on historic project actuals, initial high-level quotes or past history. Forecast growth is based on a combination of historic trends and modelling of predicted future need. A more detailed breakdown of costs subset is provided in the associated costing spreadsheet listed in Appendix A. Total costs for this option are provided in Table 10.

Table 10: Option 2 – Costs by cost type ($m Jun 2022 real)

Cost type	2025–26	2026–27	2027–28	2028–29	2029–30	Total 2025–30	2030–31	2031–32	2032–33	2033–34	2034–35	Total 2025–35
Capex	9.4	5.1	4.3	8.5	6.8	**34.1**	13.2	3.2	4.1	7.6	7.7	**70.0**
Opex	0.7	1.1	1.8	2.4	2.8	**8.8**	2.9	3.2	3.5	3.8	4.1	**26.2**
Total	**10.2**	**6.3**	**6.0**	**10.8**	**9.6**	**42.9**	**16.2**	**6.4**	**7.6**	**11.4**	**11.8**	**96.2**

4.6.3 Risks

Table 11: Risk assessment summary

Risk consequence category	Current risk level[17] (Option 1)	Residual risk level[18] (Option 2)	Risk cost[19]
Network – Failure to transport electricity from source to load	High	Low	
Customer – Failure to deliver on customer expectations	High	Low	
Safety – Harm to worker, contractor or member of the public.	Medium	Low	
Governance – Non-compliance with regulatory obligations	High	Low	
Technology – Disruption of access to, or use of, systems	High	Low	
Performance and growth – Financial impact	High	Low	
Overall risk level	High	Low	

4.6.4 Quantified benefits

There are no tangible quantifiable benefits associated with this option.

4.6.5 Unquantified benefits

- Customers not exposed to significant ongoing impacts.

[17] The level of risk post current controls (ie after considering what we currently do to mitigate the risk). Refer to Appendix C – Risk assessment for details.
[18] The future level of risk once treatments proposed in this option have been implemented. Refer to Appendix C – Risk assessment for details.
[19] Estimated cost of consequence(s) to SA Power Networks or its customers in an event this risk eventuates over the NPV analysis period.

- Maintains the efficient delivery of energy services and manages the risks of IT infrastructure failure.
- Risks related to IT infrastructure are reduced to acceptable levels through a prudent, risk-based approach to replacing and/or upgrading our IT infrastructure assets, based on useful life.
- A capex to opex shift increase is provided to support the forecast growth in capacity required to support our cloud-based systems, compute and storage.
- Reasonable level of expenditure based on historical spend and predicted growth rates.

4.7 Option 3 – Transition faster to cloud

4.7.1 Description

Option 3 enables SA Power Networks to transition faster to cloud services, with a view to achieving a minimal data-centre footprint in the period 2025–30.

While this level of investment does manage some risk, it results in material cost increases without delivering significant additional benefits.

4.7.2 Costs

The forecast for Option 3 has been prepared on a bottom-up basis through a combination of labour and material assumptions based on historic project actuals, initial high-level quotes or past history. Forecast growth is based on a combination of historic trends and modelling of predicted future need. A more detailed breakdown of costs subset is provided in the associated costing spreadsheet listed in Appendix A. Total costs for this option are provided in Table 12.

Table 12: Option 3 – Costs by cost type ($m June 2022 real)

Cost type	2025–26	2026–27	2027–28	2028–29	2029–30	Total 2025 – 30	2030–31	2031–32	2032–33	2033–34	2034–35	Total 2025–35
Capex	11.7	12.0	4.3	8.5	6.8	**43.2**	10.4	9.8	3.9	6.4	7.4	**81.2**
Opex	0.7	2.1	3.8	4.4	4.8	**15.8**	5.4	6.7	8.0	8.3	8.6	**52.9**
Total	**12.4**	**14.1**	**8.0**	**12.8**	**11.7**	**59.1**	**15.8**	**16.5**	**11.9**	**14.7**	**16.1**	**134.1**

4.7.3 Risks

Table 13: Option 3 Risk assessment summary

Risk consequence category	Current risk level[20] (Option 1)	Residual risk level[21] (Option 3)	Risk cost[22]
Network – Failure to transport electricity from source to load	High	Low	
Customer – Failure to deliver on customer expectations	High	Low	
Safety – Harm to worker, contractor or member of the public.	Medium	Low	
Governance – Non-compliance with regulatory obligations	High	Low	
Technology – Disruption of access to, or use of, systems	High	Low	
Performance and growth – Financial impact	High	Low	
Overall risk level	High	Low	

4.7.4 Quantified benefits

There are no tangible quantifiable benefits associated with this option.

4.7.5 Unquantified benefits

The benefits associated with Option 3 are similar to those described above for Option 2. However, this option results in additional investment over and above what it is considered an efficient network operator that was acting prudently would incur.

[20] The level of risk post current controls (ie after considering what we currently do to mitigate the risk). Refer to Appendix C – Risk assessment for details.
[21] The future level of risk once treatments proposed in this option have been implemented. Refer to Appendix C – Risk assessment for details.
[22] Estimated cost of consequence(s) to SA Power Networks or its customers in an event this risk eventuates over the NPV analysis period.

5. Deliverability of recommended options

The proposed investment level is consistent on average with what we have been delivering over the last five years and is around 5% less than what was delivered in the 2015-2020 RCP. Therefore, we do not foresee any issues with deliverability.

Due to extending the lives of our key data-centre assets for as long as possible, much of this data centre hardware refresh now falls due at the start of next RCP, which creates a peak of activity at that time. While this coincides with some other large programs of work, given the maturity of our infrastructure capability, we believe this activity can be both:

- effectively spread out across the first two years of the period, and
- effectively managed around other IT and business-led initiatives.

Additionally:

- A significant proportion of the costs of these activities is in the physical hardware to be refreshed.
- We have performed these types of activities a number of times over the last 20 years.
- We have already moved some systems to the cloud, which reduces the number of systems that may potentially be impacted by these activities.

As a result, we believe that any interruptions or risks to those activities, arising from these data centre refresh activities, will be minimal.

6. Alignment to customer expectations

Customers expect that we will maintain our existing levels of service and risk. This investment meets those requirements in a cost-effective manner. Maintained and fit-for-purpose devices enable SA Power Networks to achieve this by ensuring our workforce can access data, respond to jobs, and manage the network to expectations, and can do this within specified key performance requirements.

7. Alignment with our vision and strategy

Our Digital & Data Strategy outlines the long-term strategic direction for ICT. The focus of the strategy is on the provision of efficient and reliable core systems, and a range of digitisation that ensures our workforce has appropriate skills for the technology implemented. A high-level view of our Digital & Data Strategy is depicted in Figure 3.

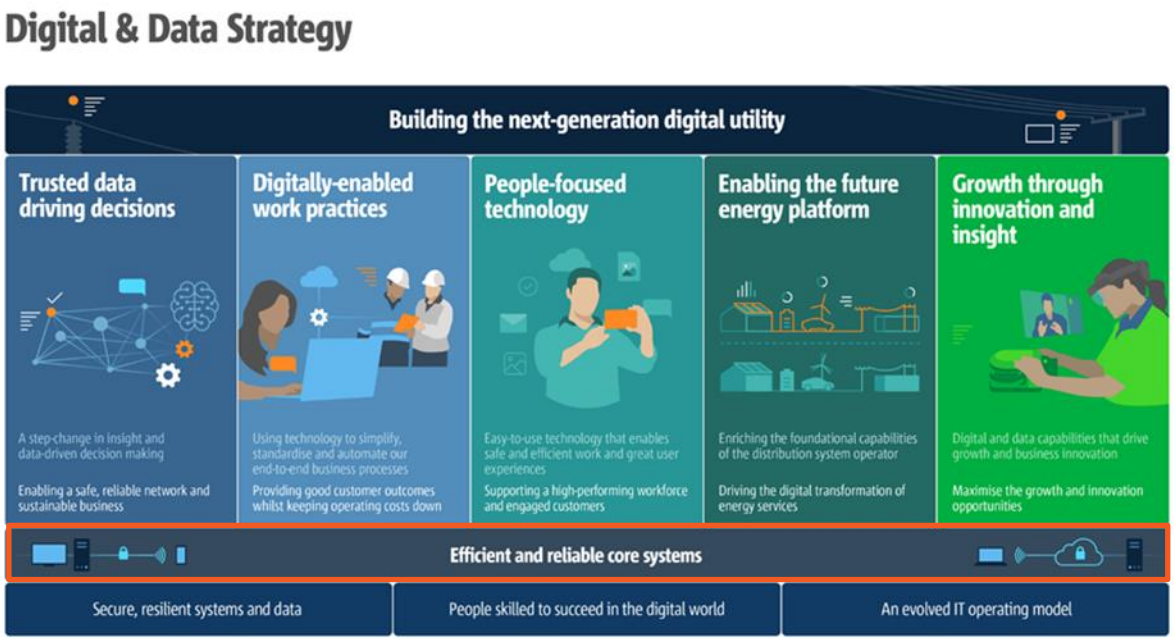

Figure 3: Digital & Data Strategy

The importance of the strategic role that infrastructure has in the ongoing delivery of network and customer-service services is highlighted by:

- the need for efficient and reliable core systems underpins our other strategic deliverables;
- the role of infrastructure is to provide stable, reliable connectivity, platform and hosting systems that can be scaled to meet the demands of our business and customers; and
- the continuing transition to cloud-hosted services supports the efficient, flexible, and scalable delivery of these services.

The funding requested in this document is to enable our IT infrastructure environment to be sustainably managed and secured as part of our '*Efficient and reliable core systems*'.

8. Reasonableness of cost and benefit estimates

The cost estimates forecast in this business case preferred option of $42.9 million recurrent expenditure for the program includes $34.1 million in recurrent capex and $8.8 million in recurrent opex. The forecast capex estimates are based on detailed, line by line costings which have been compared with actuals and are comparative to the previous RCP. $1.8 million of the recurrent opex is related to capex opex shift as we move more systems to the cloud, $1.6 million is related to forecast growth in data storage and compute associated with smart meter billing and analytics, and $5.3 million is related to increased capacity required for the forecast growth in BAU data storage and compute across our other systems[23].

[23] The Opex step-change justification can be viewed in Appendix B

9. Reasonableness of input assumptions

The following input assumptions apply:

- Labour assumptions are based on historic project actuals.
- Material assumptions are based on initial high-level quotes or past history.
- Forecast growth is based on a combination of historic trends and modelling of predicted future need.

A. Appendix A – Cost models

2025 - 30 Reset - Project-Program_Infrastructure Recurrent_2025 to 2030 period expenditure.xlsm

2025 - 30 Reset - Project-Program_Infrastructure Recurrent_Business As Usual_Preferred.xlsm

2025 - 30 Reset - Project-Program_Infrastructure Recurrent_Transition Faster to Cloud.xlsm

B. Appendix B – Opex step-change justification

Table 14: Opex Step Changes ($m June 2022)

Category	Step change	2025–26	2026–27	2027–28	2028–29	2029–30	Total 2025–30
Step-change: Substitution	Capex to opex shift associated with growth in BAU data storage and compute (excluding smart-meter billing and analytics)	0.3	0.5	1.1	1.6	1.9	5.3
Step-change: Substitution	Capex to opex shift associated with growth in cloud data consumption for smart-meter analytics and billing data storage and compute (normal growth)	0.3	0.4	0.3	0.3	0.3	1.6
Step-change: Substitution	Capex to opex shift associated with continued cloud transition	0.1	0.2	0.4	0.5	0.6	1.8
	Total opex step changes	**0.7**	**1.1**	**1.8**	**2.4**	**2.8**	**8.8**

Capex–opex substitution – Growth in BAU data, storage and compute (excluding smart-meter analytics and billing)

Topic	Detail
Background	The use of IT systems and data has also grown significantly in response to the strategic requirements to manage a more dynamic grid and enable more data-driven decision-making. This, in turn, has increased demand for storage and computing power across our BAU systems which would previously have been met by using capex to purchase physical hardware assets that would support that additional capacity (excluding smart-meters and associated analytics and billing).
Request	An opex increase of $5.3 million to support growth associated with cloud data consumption, storage and compute ($m Jun 2022 Real).

Capex–opex substitution – Growth in smart-meter analytics and billing

Topic	Detail
Background	The growth in current BAU smart-meter rollout rates in South Australia is currently around 20% per year and we expect this to continue for the foreseeable future. This growth in rollout rates is forecast to increase the amount of data, storage and compute associated with smart-meters, and our associated analytics and billing systems.
Request	An opex increase of $1.6 million to support growth associated with cloud data consumption, storage and compute ($m Jun 2022 real).

Capex–opex substitution – Continued cloud transition

Topic	Detail
Background	During the 2020–25 RCP, we commenced our journey to cloud-hosting services – a journey we planned to undertake over multiple RCPs. We have implemented the required networks and security to connect securely to cloud services, as well as implementing management systems and services to cost-effectively monitor and manage these far more dynamic cloud-based services. The increase in new effectively offset the reduction in server hardware during the period.
Request	An opex step change of $1.8 million as substitution for a similar value of capex ($m Jun 2022 real).

C. Appendix C – Risk assessment

				Current risk (Option 0 – Do nothing)			Residual risk (Option 1 – Current five-year expenditure 2020–25 (Base case))			Residual risk (Option 2 – Business as usual)			Residual risk (Option 3 – Transition faster to cloud)		
ID	**Risk scenario**	**Consequence description**	**Consequence category**	**Consequence**	**Likelihood**	**Risk level**	**Consequence**	**Likelihood**	**Risk level**	**Consequence**	**Likelihood**	**Risk level**	**Consequence**	**Likelihood**	**Risk level**
1	IT infrastructure components fail, or their performance is degraded, due to assets not being kept current, secure, and supported, or otherwise reaching end of life.	Business loses capability to manage electricity network, resulting in increased outages of increased duration. Customers are impacted by increased/ lengthier outages.	**Network** – Failure to transport electricity from source to load	3	5	High (8)	3	2	Low (5)	3	2	Low (5)	3	2	Low (5)
			Customer – Failure to deliver on customer expectations	3	5	High (8)	3	2	Low (5)	3	2	Low (5)	3	2	Low (5)
		Injuries or fatalities could result from business being unable to manage: • critical or life-support customers • switching activities.	**Safety** – Harm to worker, contractor or member of the public.	3	3	Medium (6)	3	2	Low (5)	3	2	Low (5)	3	2	Low (5)
			Governance – Non-compliance with regulatory obligations	3	5	High (8)	3	2	Low (5)	3	2	Low (5)	3	2	Low (5)
			Performance and growth – Financial impact	3	5	High (8)	3	2	Low (5)	3	2	Low (5)	2	2	Low (5)

		Inability of our people to use IT systems effectively to service our customers, eg,: • receive/respond to customer outage reports or other queries • connect and disconnect customers • bill customers.	**Customer** – Failure to deliver on customer expectations	3	4	**High (7)**	2	2	**Low (4)**	2	2	**Low (4)**	2	2	**Low (4)**
			Performance and growth – Financial impact	4	4	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**	3	2	**Low (5)**
		Reduced ability for individuals or workgroups to achieve operational objectives and commitments. Higher levels of IT opex consumed in managing/resolving these failures/issues.	**Performance and growth** – Financial impact	3	5	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**	3	2	**Low (5)**
		Inability to operate in accordance with regulatory obligations.	**Governance** – Non-Compliance with regulatory obligations	4	5	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**	3	2	**Low (5)**

2	Infrastructure components become insecure or unsupported by the vendor, resulting in increased vulnerability to cyber-attacks.	Cyber attackers obtain information regarding critical infrastructure and can interfere with network and asset operations and control.	**Technology** – Disruption of access to, or use of, systems	4	5	**Extreme (9)**	4	1	**Low (5)**	4	1	**Low (5)**	4	1	**Low (5)**
		Organisational and customer private data and network security being compromised. These breach events lead to a combination of significant litigation/punitive damages, legal costs and major loss of management time.	**Governance** – Non-compliance with regulatory obligations	4	5	**Extreme (9)**	4	1	**Low (5)**	4	1	**Low (5)**	4	1	**Low (5)**
			Customer – Failure to deliver on customer expectations	4	5	**Extreme (9)**	4	1	**Low (5)**	4	1	**Low (5)**	4	1	**Low (5)**
			Performance and growth – Financial impact	3	4	**High (8)**	3	1	**Low (4)**	3	1	**Low (4)**	3	1	**Low (4)**
3	Costs of cloud data, compute and storage exceed available funding.	Higher levels of IT opex consumed due to forecast growth reducing funding available for other activities.	**Performance and growth** – Financial impact	3	5	**High (8)**	3	5	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**

4	IT system performance is degraded, due to insufficient available data storage and compute capacity in supporting infrastructure.	Business loses capability to manage electricity network, resulting in increased outages of increased duration. Customers are impacted by increased/ lengthier outages.	**Network** – Failure to transport electricity from source to load	3	5	**High (8)**	4	4	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**
			Customer – Failure to deliver on customer expectations	3	5	**High (8)**	3	5	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**
		Injuries or fatalities could result from business being unable to manage: • critical or life-support customers • switching activities.	**Safety** – Harm to worker, contractor or member of the public.	3	3	**Medium (6)**	4	5	**Medium (6)**	3	2	**Low (5)**	3	2	**Low (5)**
			Governance – Non-compliance with regulatory obligations	3	5	**High (8)**	4	4	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**

			Performance and growth – Financial impact	3	5	**High (8)**	3	5	**High (8)**	3	2	**Low (5)**	2	2	**Low (5)**
		Inability of our people to use IT systems effectively to service our customers, eg,: • receive/respond to customer outage reports or other queries • connect and disconnect customers • bill customers.	**Customer** – Failure to deliver on customer expectations	3	4	**High (7)**	4	5	**High (7)**	2	2	**Low (4)**	2	2	**Low (4)**
			Performance and growth – Financial impact	4	4	**High (8)**	4	4	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**
		Reduced ability for individuals or workgroups to achieve operational objectives and commitments. Higher levels of IT opex consumed in	**Performance and growth** – Financial impact	3	5	**High (8)**	3	5	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**

		managing/resolving these failures/issues.													
		Inability to operate in accordance with regulatory obligations.	**Governance** – Non-Compliance with regulatory obligations	4	5	**High (8)**	4	5	**High (8)**	3	2	**Low (5)**	3	2	**Low (5)**
			Overall risk level[24]			**Extreme**			**High**			**Low**			**Low**

[24] For each option, the overall risk level is the highest of the individual risk levels.