always powering ahead

September 15, 2023

Attachment 7: Capital Expenditure

7.1 Summary

Capital expenditure (capex) covers the investments needed to ensure that Basslink can continue to operate safely, securely, and reliably.

Basslink Pty Ltd's investment requirements reflect the unique role it plays in the Australian energy system, being the only subsea HVDC interconnector in operation.

While Basslink shares similar technologies with other infrastructure (such as overhead lines) it has several special components. These include 290km of subsea cable, converter stations which use thyristor valves to convert electricity from alternating current (AC) to direct current (DC), and the control and protection system, a sophisticated super-computer, which ensures the safe, reliable, and seamless integration between the Tasmanian and Victorian electricity grids.

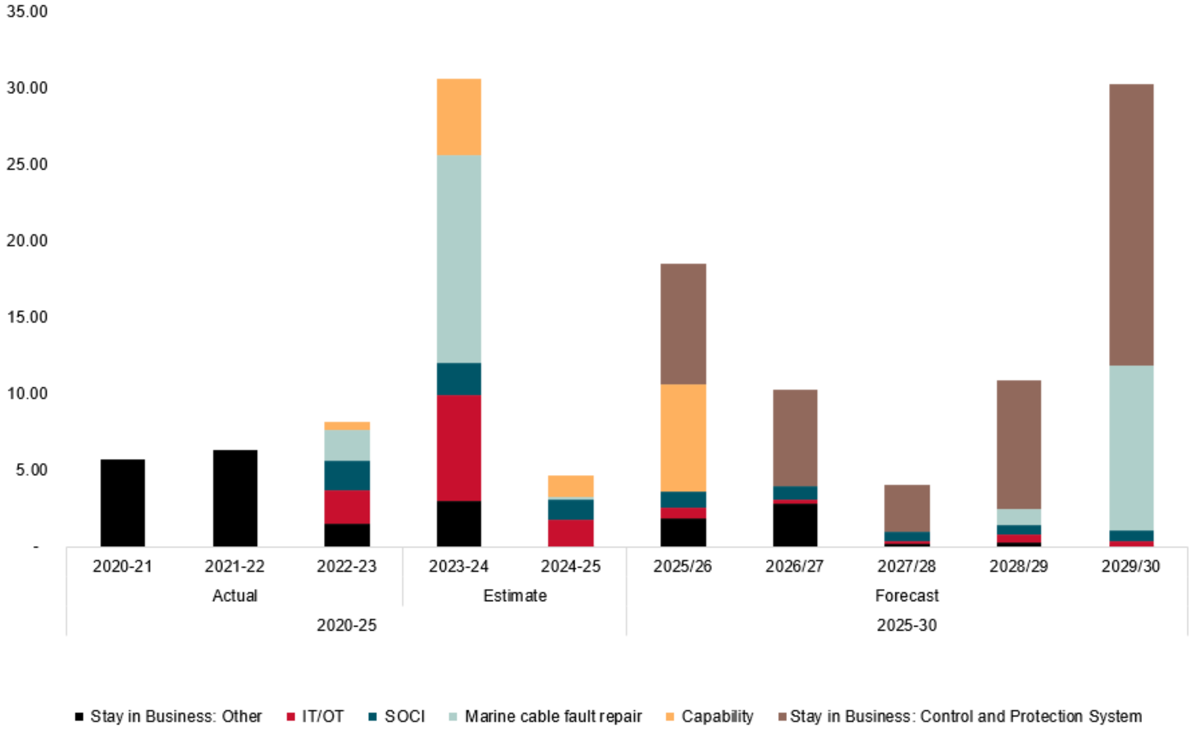
Basslink is a critical element of the Australian energy system. It is currently the only link between Tasmania and Victoria. Basslink has a vital role in protecting Tasmania against the risk of drought related energy shortages while providing Victoria with secure renewable energy at peak times.

Basslink's operating context guides our investment decisions. In terms of reliability, this means ensuring capacity at times of peak demand as well as the ability to recover from faults to prevent Tasmania from being 'islanded' from the national electricity market for an extended period. Basslink's cable outage in 2015/16 combined with low rainfall led to one of the most significant energy security challenges in Tasmania's history. This is consistent with feedback from consumers where 84% were supportive, in principle, of greater energy reliability for the future.

Basslink was first commissioned in 2006 and will soon reach 20 years of age. Consistent with Good Electricity Industry Practice, a replacement of the Control and Protection System (which generally have an economic life of 15-20 years) will be required over the course of the 2025-30 regulatory period.

As shown in Figure 7.1, this investment results in a lumpy expenditure profile (typical of transmission assets).

Figure 7.1: Actual and forecast capital Expenditure ($FY25)[66]



In addition to replacing the Control and Protection System, ongoing capex is required to:

- prepare equipment for cable repair vessels
- meet the requirements of the Security of Critical Infrastructure Act 2018 (the SoCI Act),
- refresh Information Technology and Operational Technology Systems (IT/OT) and
- replace or refurbish key components as they reach end of life (Stay in Business – discussed further below).

We are also forecasting a capability project to increase the ambient temperature limits which apply to Basslink. Increasing these limits will ensure that Basslink can maintain transfer capacity on hot days when the electricity system is under the greatest pressure.

[66] Note we have not split out capex incurred prior to APA's acquisition of Basslink.

Table 7.1 below shows that:

- excluding the Control and Protection System replacement, forecast capex for the 2025-30 regulatory period is $29.9 million. This is 54% lower than the $53.3 million estimated to be incurred over the preceding 5 years.
- Including the Control and Protection System replacement, forecast capex for 2025-30 is $74.1 million.

Table 7.1 – Capex by category 2020-25 and 2025-30 ($2024/25)

Category	2020-25	2025-30
Stay in business	16.6	49.4
Control and Protection System	0.0	44.2
Other	16.6	5.2
Marine cable repair vessel	15.7	11.8
SOCI	5.4	3.8
IT/OT	10.9	2.1
Capability	7.0	7.0
Total	**53.3**	**74.1**

Further supporting information can be found at:

- **Attachment 7.1** Lifecycle Management Plan
- **Attachment 7.2** to **7.6** Business cases

1. Key Assumptions

Basslink will be converted to a TNSP on 1 July 2025.

No increase in the maximum capacity of the Basslink Interconnectors is being undertaken in the period 1 July 2025 to 30 June 2030.

The forecasts are based on current legislative and regulatory obligations and that those obligations will not materially change prior to 30 June 2030.

7.2 Asset Planning and Execution

Operational Requirements

Basslink's operational requirements are set out in the Basslink Operations Agreement (BOA) between Basslink Pty Ltd and the Tasmanian Government. This differs from most other energy assets which typically have obligations set out in regulation, legislation, or licences. The BOA requires compliance with an adjusted meaning of Good Electricity Industry Practice:

> *Good Electricity Industry Practice has the meaning given in the NER, provided that where the practice concerns the operation of an interconnection under conditions comparable to Basslink, the reference in the NER definition to a significant proportion of operators shall be taken to be a reference to a significant proportion of operators in OECD nations exercising that degree of skill, diligence, prudence and foresight that reasonably would be expected from an operator of an interconnection under conditions comparable to those applicable to Basslink (taking into account factors such as, but not limited to, the relative size, duty, age and technological status of the relevant interconnection, the thermal limits of the Basslink HVDC cable, the applicable Approvals and Legislative Requirements and the applicable standards (including, but not limited to, ISO 55000, IEC Standards and CIGRE papers)).*

Notably, this definition emphasises the nature of Basslink (being an interconnector), global best practice of interconnector operators and best practice standards. CIGRE is the International Council on Large Electric Systems – a non-profit association promoting collaboration with experts from around the world. The IEC is the International Electrotechnical Commission a not-for-profit membership organisation which publishes international standards.

The BOA also sets out technical performance standards which must be met including:

- Annual availability of at least 97% of trading intervals, this includes both planned and unplanned interruptions.
- A maximum repair time of four months in the event of a cable failure (although this can be extended subject to suitable weather conditions).
- Maximum number of unplanned interruptions of five per annum.
- The ability to accommodate short circuits within the Tasmanian and Victorian power systems, to the extent and manner required by Connection Agreements.

These technical performance standards are contractual obligations, which are equivalent to the regulatory obligations that applied to other energy assets at the time the BOA was entered into. Non-compliance with the BOA can lead to penalties including cessation of operations and transfer of Basslink to the Tasmanian Government.

Basslink Pty Ltd's service obligations and performance standards under the BOA are akin to regulatory obligations under the NEL.

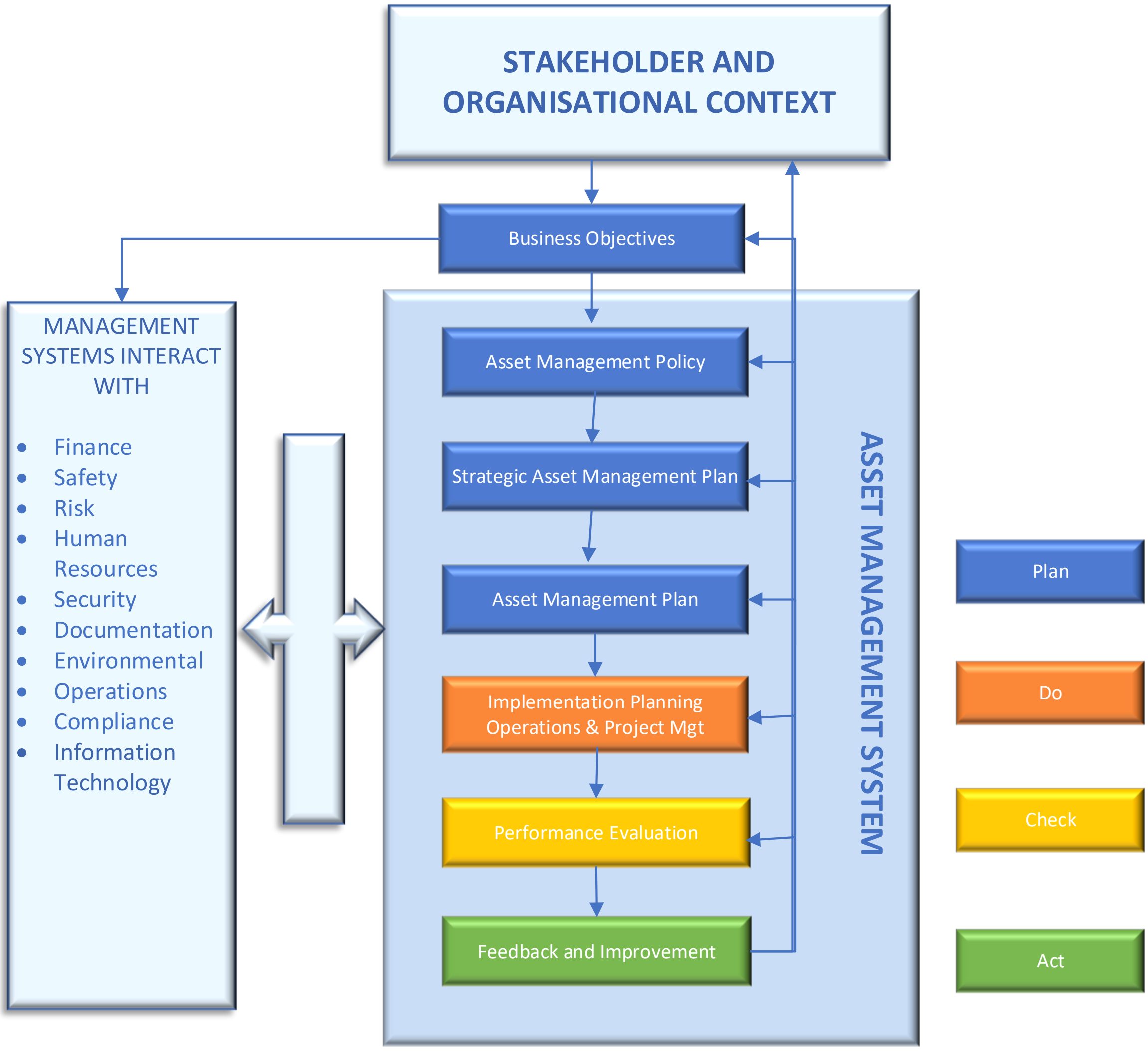
Even if they are not characterised as "regulatory obligations" in a strict sense, they are standards of performance and reliability which Basslink is currently required to meet. Accordingly, any expenditure required to meet those contractual obligations is also necessary to maintain quality, reliability and security of supply.

Asset Management System

The operational requirements set out in the BOA together with other relevant legislative and regulatory obligations flow through Basslink's Asset Management System aligned to ISO55001 (AMS). These requirements form part of the stakeholder and organisational context and flow through the AMS as shown in

Figure 7.2.

Figure 7.2 Basslink's Asset Management System



Basslink Pty Ltd's AMS is currently being integrated into APA's AMS. While this will require changes to reflect the change in organisational context, it will not result in any fundamental change to the forecast projects to be undertaken in the period FY26 to FY30. Basslink will continue to be operated in accordance with Good Electricity Industry Practice to achieve the technical performance standards set out in the BOA.

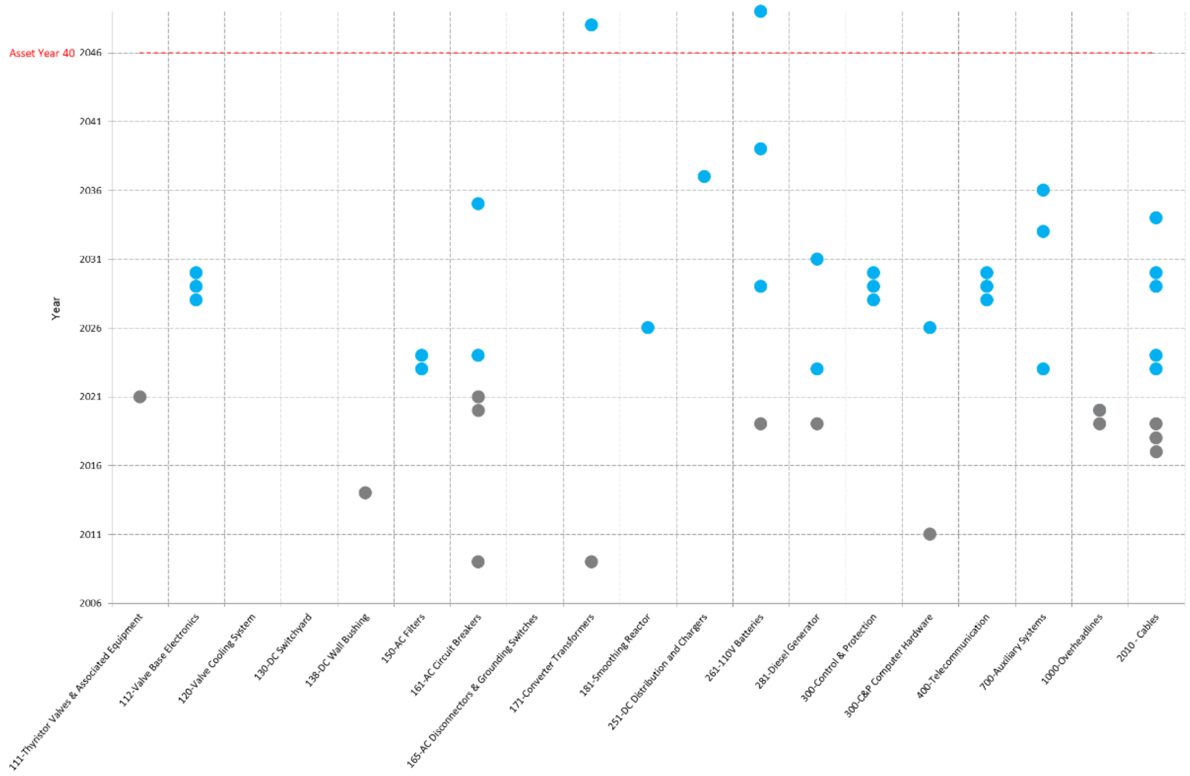
Lifecycle Management Plan

A key artefact of the Asset Management System is the Lifecycle Management Plan (see **Attachment 7.1**). This Plan reflects the ISO 50001 operating principle of 'plan-do-check-act'.

The purpose of the Plan is to identify the optimal investment requirements to maintain ongoing performance in line with the BOA. To do this, the Lifecycle Management Plan applies a systematic sub-system by sub-system approach which:

- Considers the individual components and equipment which makes up each individual sub-system, recent replacement/refurbishment, historical performance and failure rates, design life, manufacturer recommendations, CIGRE recommendations and performance and experience from other operators.
- Adopts a risk-based approach to identify the consequence of failure (including the risk of a trip) and the control measures in place.

Figure 7.3 Lifecycle Management Plan forecast capex by sub-system



Note: Blue dots represent forecast capex, grey historic capex.

This approach is consistent with *Good Electricity Industry Practice* (as set out in the BOA) and the approach taken or recommended by other interconnector operators in the OECD. For instance, CIGRE recommends the following approach is adopted when considering the life extension of a converter station:[67]

1. Review the past performance of major HVDC equipment and systems.
2. Identify the future performance issues with ageing of special HVDC components.
3. Determine economic life of various components for making replacement and extension decisions.
4. Consider the usable life of a refurbishment (15 – 20 years) relative to a greenfield solution (35 to 40 years).

CIGRE considers that this assessment needs to take into account replacement costs and the importance of equipment and components, including age, technology, service experience, future performance, individual failure rates.

The optimal investment requirements identified in the lifecycle Management Plan form the basis for forecast capex over the 2025-30 regulatory period.

Stay in Business

Stay in Business capex relates to ongoing investment, typically to refresh key systems and components, to ensure that Basslink can continue to operate safely, reliably and efficiently. As a result, we consider our proposed capex for each of the proposed Stay in Business projects is required in order to achieve the capital expenditure objectives:

- to meet or manage the expected demand (NER, clause 6A.6.7(a)(1)) as required to ensure the ongoing reliable operation of the interconnector;
- maintain the quality, reliability, and security of supply of transmission services and the reliability and security of the transmission system (NER clause 6A.6.7(a)(3)); and
- to maintain the safety of the transmission systems through the supply of prescribed transmission services (NER clause 6A.6.7(a)(4).

This capex is essentially required to maintain service quality, reliability and security of supply, in line with Basslink Pty Ltd's existing obligations under the BOA (including the obligation to comply with Good Electricity Industry Practice). As noted above, Basslink Pty Ltd's service obligations and performance standards under the BOA are akin to regulatory obligations under the NEL. However even if they are not characterised as "regulatory obligations" in a strict sense, they are standards of performance and reliability which Basslink is currently required to meet. Accordingly, any expenditure required to meet those contractual obligations is also necessary to maintain quality, reliability and security of supply.

Control and Protection System

While many of Basslink's main components and sub-systems, such as the subsea cable and thyristor values, are designed to operate for 40 years or more, the Control and Protection System is designed to be replaced earlier.

As with all computer systems, the technology underpinning the hardware and software of the control and protection system will be obsolete well before some of the other components with longer lives.

[67] CIGRE 2006, *Guidelines for life extension of existing HVDC Systems*, p.7

This obsolescence occurs as improvements in technology, design, hardware, and software, as well as changes in system requirements (such as cybersecurity), lead vendors to withdraw supporcease spare parts production in favour of new replacement products and platforms.

Table 7.2 – Forecast control and protection system capex (Real $2024/25)

	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Capital Expenditure	7.9	6.4	3.1	8.5	18.4	44.2

Operating an obsolete Control and Protection System beyond its design life escalates the risk of component failure, brings challenges around spare part availability, and risks prolonged outages. Accordingly, replacement between 15 to 20 years is recommended by the manufacturer (Siemens), CIGRÉ (the International Council on Large Electric Systems) and is consistent with global benchmark replacement timeframes.

However, given the materiality of this project and the difficulty in quantifying the risk cost (most control and protection systems are replaced in advance of failure given their criticality to electricity grids around the world), we sought customers views on whether we should replace the system in the 2025-30 period or delay to the 2030-35 period.

Most customers – between 68% and 77% depending on customer location – told us through multiple channels that they supported replacement of the system in 2025-30 to avoid the potential negative impacts of a Basslink failure. About 25% considered that we should wait to ensure access to newer technology while a smaller proportion supported delaying investment due to current cost-of-living pressures. Further details on our customer engagement program are provided in **Attachment 3.**

In terms of the optimal timing of the project we also considered:

- How to balance maximising the economic value of the existing and subsequent control systems against the benefits of delaying a replacement to the beginning of a new product life cycle.
- Increasing market pressures from an upcoming bow-wave of control and protection system replacements and new HVDC projects – and the risks this would have in terms of price and availability.
- The reliability risk incurred in running the Control and Protection System beyond its design life.

Given these factors, we identified that replacing the Control and Protection System by 2030 (rather than 2025 or 2035) is the preferred approach as it:

1. is consistent with *Good Electricity Industry Practice* as required by the BOA and NER.
2. is consistent with majority consumer preferences to replace system in the 2025-30 period to reduce reliability risks.
3. enables the transition to the next generation of control and protection systems (also consistent with feedback from consumers).
4. reduces the difference in economic life between first and second control and protection system.
5. has the lowest cost when reliability risks are taken into account.

We consider the Control and Protection System project is required to achieve the capital expenditure objectives. Further details are provided in the Control and Protection System Business Case (**Attachment 7.2**).

Other Stay in Business projects

Aside from the Control and Protection System, other Stay in Business projects include Physical Security, DC smoothing reactor refurbishment, spares and minor capital works on plant and equipment.[68]

Table 7.3 – Forecast stay in business (other) capex (Real $2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Physical Security and Natural Hazards	1.7	1.7	-	-	-	3.5
Reactor DC Refurbishment	-	0.8	-	-	-	0.8
Spares	0.1	0.2	0.1	0.3	-	0.7
Minor Plant and Equipment	0.1	0.1	0.1	0.1	0.1	0.3
Total	**1.9**	**2.8**	**0.2**	**0.3**	**0.1**	**5.2**

Physical security

Unauthorised and undetected access to Basslink sites increase the risk of major operational capability disruptions and loss of supply, injuries and/or fatalities to personnel, damage to property/assets, theft or compromise of assets, sensitive information or systems.

- Over the 2025-30 period, Basslink Pty Ltd will address several of these site-specific security risks[69] through:
  - Remediating site fencing by energising existing wire mesh fencing to prevent it being breached using wire cutters. In 2019 offenders were able to gain access and enter a maintenance storage facility at Basslink's Georgetown converter station.
  - Installing electronic access systems (EACS).
  - Upgrading closed-circuit television (CCTV) facilities.

The forecast capital expenditure for these projects over the five-year period is $3.50m. It is required to achieve the capital expenditure objectives – in particular the objective to main the safety of the transmission system through the supply of prescribed transmission services (Rule 6A.6.7(a)(4)).

Additional information is provided in **Attachment 7.4**.

DC Smoothing reactor refurbishment

The AC to DC conversion process creates “ripples” or fluctuations in DC voltage which interferes with the smooth transmission of power and can potentially cause damage to electrical equipment.

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[68] Required to achieve the capital expenditure objectives to comply with all applicable regulatory obligations or requirements (Rule 6A.6.7(a)(2)), specifically the requirement to comply with Good Electricity Industry Practice as defined in the BOA.

[69] This expenditure is required to achieve the capital expenditure objectives to comply with all applicable regulatory obligations or requirements (Rule 6A.6.7(a)(2)) specifically, the requirement to comply with Good Electricity Industry Practice as defined in the BOA, as well as to maintain the security of the transmission system.

Smoothing reactors in the DC circuit reduces these voltage fluctuations by using their inductive properties to resist sudden changes in current.

DC smoothing reactors:

- Reduce the probability of valve commutation failures.
- Prevent discontinuous current at low power levels.
- Allow the valves to remain in full control for a fault on the line side of the reactor.
- Reduce front of wave DC line surge, and
- Reduce the DC harmonic voltages seen by the DC filters.[70]

As a result, DC smoothing reactors prevent damage to equipment, ensure the smooth transfer of power to consumers and help ensure Basslink's reliability is within the technical performance standards set out in the BOA.

Basslink has air core DC reactors installed at both Loy Yang and George Town converter stations and spares adjacent to the in-service units located on site.

Figure 7.4 Basslink's smoothing reactors

DC smoothing reactors have a design life of between 35-40 years. However, known problems include:

- UV radiation and moisture leading to insulation failure and corrosion of the winding.
- Failure of the grout between the metal flange and porcelain of the support insulators.

- [70] CIGRE 2016, Guidelines for life extension of existing HVDC systems, p.20

- Deterioration of the outer coating.

To reduce the risk of these issues causing an unplanned outage refurbishment is typically undertaken before end of life. This involves mechanically and electrically testing the support insulators and coatings.

While failure is rare, it would lead to an outage of at least 48 hours (assuming all resources in place to put the spare in service). The market impacts could be significant, depending on when the outage occurs.

Basslink's DC smoothing reactors are enclosed in a fiberglass sound shield to reduce noise but also provides protection from UV rays. To minimise the risk of an in-service failure, costs and the overall number of outages, Basslink's lifecycle management plan includes two yearly inspections (consistent with manufacturer recommendations) and a refurbishment at the 20-year mark in 2026.

Delaying the refurbishment was considered but discounted as it risks an unplanned outage.

The forecast total cost for this work is $0.8m and involves simultaneously refurbishing the spare reactors at both Loy Yang and George Town, swapping the in-service and spare reactors and then refurbishing the previously in-service reactors. [71]

Spares

Overtime components fail due to wear and age. To ensure ongoing performance and reliability ongoing refurbishment and procurement of key components is required, especially given that many components have long-lead times to procure. Basslink Pty Ltd's maintenance plan identifies the key activities required including and beyond the 2025-30 period for each component.

[71] This expenditure is required to achieve the capital expenditure objectives, in particular the objective at Rule 6A.6.7(a)(3).

Table 7.4 – Lifecycle plan spares and refurbishment activities

Category	Component	Function and activity
Auxiliary Systems	Uninterruptible Power Supply (UPS) system and batteries and fans.	The UPS is an 110V emergency battery backup system used to provide emergency power to the control and protection system in the event of an outage or disruption to the main power supply. Over time the batteries become depleted or degraded and require replacement at 10 yearly intervals.
Valve Cooling	Pump and fan refurbishment	Valve cooling is the system which circulates deionised water from the thyristor valves to the external heat exchangers. The pump and fans require three yearly refurbishments.
Converter transformer	On-load tap changer refurbishment	The converter transformer (at each converter station) transforms the voltage of the 500kv or 220kv AC busbar to the required voltage. Refurbishment is required at 100,000 operations (about 7 years).
AC Filters / DC Filters	Spare Capacitors	AC and DC filters select and dump the non-sinusoidal components to ground, reducing harmonics. The capacitors have a limited life dependant on temperature and ripple magnitude. We expect two sets of additional spares as we approach 20 years since commissioning.

The basis for the cost forecast is set out in Table 7.5.

Table 7.5 – Forecast spares capex ($2024/25)

Category	Item	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Auxiliary Systems	Uninterruptible Power Supply (UPS) system and batteries and fans.	0.05	-	-	-	-	0.05
Valve Cooling	Pump and fan refurbishment	0.01	-	-	0.01	-	0.02
Converter transformer	On-load tap changer refurbishment	-	-	0.12	-	-	0.12
AC /DC Filters	Spare Capacitors	-	0.24	-	0.24	-	0.48
Total		**0.06**	**0.24**	**0.12**	**0.25**	**-**	**0.68**

Minor capital works

In addition to the planned activities, occasional unplanned capex is required. Examples range from replacement air-conditioners, replacement of failed sensors or uninterruptible power supply communication cards. It also includes replacing equipment (such as thermal imaging cameras and thyristor testers etc.). To forecast minor capital works we have taken the 4-year average of $50,000 ($2024-25) and rolled it forward over the 2025-30 period.

Repair vessel equipment

There is an ongoing risk of an outage caused by a cable failure caused by an electrical fault or mechanical damage caused by shipping anchors. For example, on 21 December 2015 a cable fault occurred which took until 13 June 2016 to restore.

To reduce the duration of any outage and ensure a rapid repair response, we contract with a cable repair vessel (or their agent) to ensure availability when a repair is required. As part of this we also need to procure vessel specific equipment to ensure that the vessel can perform the cut, cap and join/fuse procedures on our submarine cables. The equipment is prepared in advanced to lower costs and to reduce repair times. A project is currently underway to prepare equipment for the CS Lodbrog at a cost of $10.7 million ($2024/25).

Cable repair vessels are specialist vessels with specialist crews. There are only a limited number in the world and even fewer which are suitable. Further, given the much smaller number of cables in the South Pacific (relative to Europe and Asia) there are substantially less repair vessels operating in our region.

To ensure availability and reduce costs we participate in the South Pacific Marine Maintenance Agreement (SPMMA). This is a collective contract between 33 cable systems and a cable repair vessel. We contribute less than 1% of the total cost of the contract.

All other cable systems party to the contract are fibre optic cable systems. Submarine power cables are significantly different. While fibre cables are generally about 20mm in diameter, Basslink's submarine cables are 120 mm in diameter. As a result, we need to procure vessel specific equipment which fits the requirements of our heavier and larger cables.

Cable repair vessels are bespoke and have varying size and layout and configuration. Cable repair equipment needs to be custom designed to fit each vessel. General differences between each vessel include the cable route (requiring new or adjusted chutes and quadrants), whether the cable troughs are built into the deck (the latter requiring raised cable highways) and the location of storage and unmoveable parts of the vessels structure.

Figure 7.5 - A cable chute being fitted to the Ill De Rae

Because they are not electricity transmission businesses, other members of the SPMMA do not need to procure such extensive specialised equipment for each vessel.

The usual contract length under the SPMMA is 5 years with an option for a one or two year extension. Towards the end of each contract the SPMMA commences a new procurement process for the next period. Recently, as a result of this procurement process, we have seen the vessels change each contract. For the 2008 to 2017 period, it was the Ill De Rae, from 2017-23 the Reliance and from March 2023 it will be the CS Lodbrog.

Given this history we consider it highly likely that a different vessel will be required at the end of the current contract. While we will be able to reuse and refurbish some equipment, we will need to custom design new equipment to fit the new vessel. We are forecasting $11.8 million for new equipment.

We note that while changing vessels each contracting period is not ideal for Basslink, the cost of the new specialist equipment each period is more than offset by the savings and advantage from being part of the SPMMA.

As outlined in **Attachment 8**, we intend on contracting a response vessel to accelerate recovery times through faster response and concurrent operations across two vessels. This vessel will be able to cut and cap but will not have the capability to undertake join/fusing procedures. The capex for the equipment for the response vessel ($5.0M) will be incurred over the 2020-25 period. We have not included any forecast capex in the 2025-30 period for the response vessel.

Marine repair vessel equipment capex is required to facilitate compliance with the obligation in the BOA which includes a maximum repair time of four months in the event of a cable failure.[72] It will also enable a quicker response and recovery, providing value to customers, especially in times of higher load. Accordingly, we consider this expenditure is required to achieve the capital expenditure objectives, in particular the objective in Rule 6A.6.7(a)(3).

Table 7.6 – Forecast repair vessel equipment capex ($2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Subsea Cable Repair Strategy				1.0	10.8	11.8

Security of Critical Infrastructure

APA's enterprise-wide Protected Security program is driven by amendments to the *Security of Critical Infrastructure Act 2018* (the SoCI Act). We engaged a third-party expert (EY) to conduct a gap analysis of our ability to meet the revised SoCI Act obligations, identify uplift needs and assist in the design of an appropriate suite of security controls.

To comply with the SoCI Act, we are:[73]

- Working to achieve a defined maturity level as set out in the Australian Energy Sector Cyber Security Framework (AESCSF).[74]
- Amending personnel and supply chain standards and procedures from a security perspective, including the introduction of an AusCheck screening process for new and ongoing critical workers, employees or contractors, and supplier security risk assessments.
- Identifying and remediating material risks.

The SoCI program commenced in 2022-23 and will continue over the 2020-25 period. Forecast capex over the 2025-30 period ($3.8 million) to achieve compliance with our SoCI obligations is less than what is expected to be incurred over the 2020-25 period ($5.4 million).

These costs reflect our enterprise-wide approach where Basslink Pty Ltd is now accessing APA's specialist expertise and economies of scale. These benefits have translated into lower costs than what would otherwise be incurred in adopting a standalone solution (such as would be required prior to Basslink Pty Ltd's integration into the wider APA Group).

Additional information is provided in **Attachment 7.5**.

[72] This can be extended subject to suitable weather conditions.
[73] And achieve capex objective Rule 6A.6.7(a)(2).
[74] The AESCSF is the standard to be applied across the electricity and gas sectors to manage cyber security hazards.

Table 7.7 – Forecast Security of Critical Infrastructure capex ($2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Cyber Security	0.91	0.87	0.55	0.55	0.55	3.43
Program Management and Material Risk	0.04	-	-	-	-	0.04
Enterprise Security Governance	0.03	-	0.07	0.07	0.07	0.25
Supply Chain Security	0.03	-	-	-	-	0.03
Total	**1.02**	**0.87**	**0.62**	**0.62**	**0.62**	**3.76**

IT/OT

APA's enterprise-wide Information Technology (IT) portfolio enables core business information, communication, and operational technology to respond in an effective way to the energy sector shift to decarbonisation, decentralisation, and digitisation as well as protect APA against cyber security threats (separate to the SoCI program).

Information, communications, and operational technology is necessary to support everyday business functions and technical operations of assets. The shift to digitisation is playing a greater role in more aspects of the day-to-day operations in energy.

Table 7.8 – Forecast IT/OT capex ($2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30	Total
IT/OT	0.7	0.3	0.2	0.5	0.4	2.1

Forecast IT/OT ($2.1 million) is lower than IT/OT incurred over the 2020-25 period ($10.9 million). Investment over the 2020-25 period was focussed on investments to integrate Basslink into APA's Information, Communication and Operational Technology environment where this would result in cost effective benefits to Basslink through improvements to the ongoing reliability, safety and security of services. Further details are provided in **Attachment 7.6**.

This expenditure is required to facilitate the ongoing quality, reliability and security of supply of Basslink (consistent with capital expenditure objective in Rule 6A.6.7(3)(iii)).

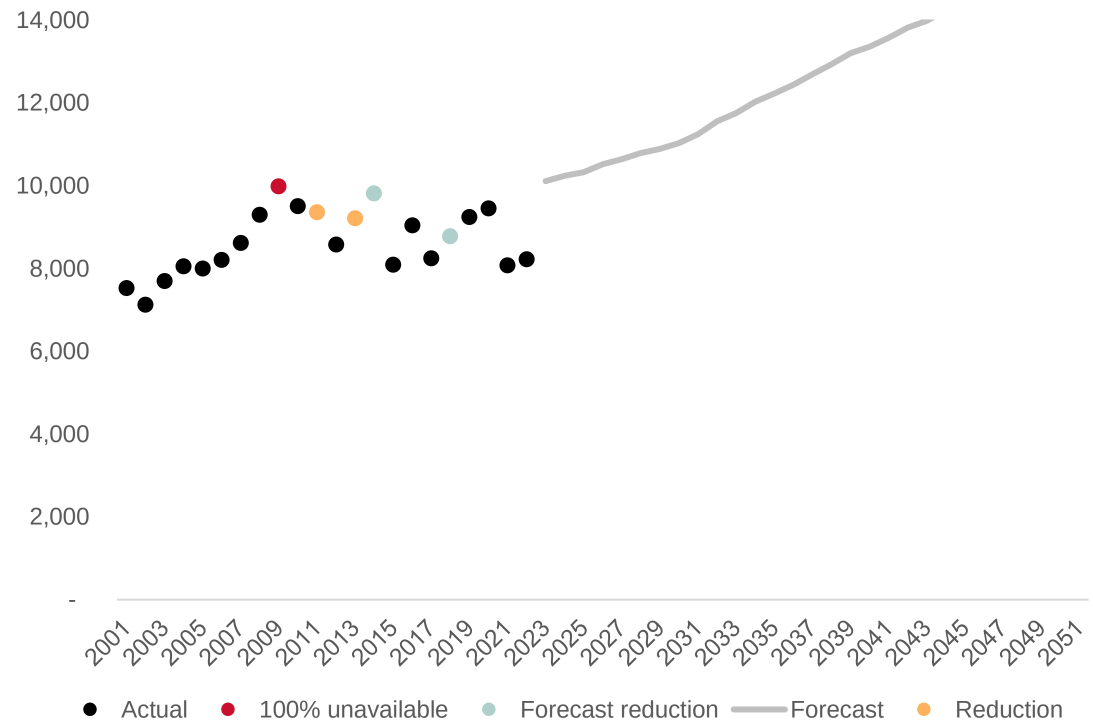
Capability (Ambient Temperature Project)

Peak demand in mainland NEM regions typically occur at the end of a hot summer day as buildings are actively cooled by air conditioners and distributed PV generation is low. However, these conditions also reduce or limit Basslink's capacity to transfer energy from Tasmania (which generally has spare generation capacity) to Victoria on peak demand days. This is because Basslink is rated to operate at a maximum ambient temperature of 30°C and 40°C at George Town and Loy Yang. If the ambient temperature exceeds these thresholds the control and protection system automatically reduces or blocks power transfer.

While there has only been a small number of ambient temperature limit events, they have arisen at key moments. In 7 out of 10 of the top Victorian peak demand days since Basslink was commissioned an ambient temperature event occurred. In the top 2 demand days Basslink was unavailable for several crucial hours. This included on 29 January 2009 when we saw record Victoria demand and the interruption of 420 MW of load across Victorian and South Australia. On other peak demand days, the Basslink transfer capacity was reduced or forecast to be unavailable.

Figure Figure 7.6 presents Victorian maximum demand since Basslink's commissioning together with forecast maximum demand (10% POE) from the 2022 Electricity Statement of Opportunities (ESOO). The coloured dots represent when the peak day coincided with an ambient temperature limit event either when Basslink was 100% unavailable (red dots), transfer capacity was reduced (yellow dots) or was forecast to be unavailable but was available on the day (light blue dots).

Figure 7.6 Vic Maximum demand - actual and POE (10%) forecast (Central scenario)



We are proposing to undertake a project to increase these ambient temperature limits to avoid or reduce the transfer limitations which occur when the electricity system is under greatest pressure. This has the potential to reduce wholesale electricity prices (and in turn retail bills) as well as the risk of supply interruptions.[75]

Table 7.9 – Forecast Capability capex ($2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Ambient Temperature Project	7.0	-	-	-	-	7.0

We are currently assessing the feasibility of this project (which will inform our cost estimate) and are engaging with key stakeholders, including AEMO, Hydro Tasmania and the Tasmanian Government,

75 Achieving the capital expenditure objective to meet or to maintain the quality, reliability, and security of supply of transmission services as well as the transmission system consistent with Rule 6A.6.7(a)(3)(iii) and 6A.6.7(a)(3)(iv).

on the benefits of this project. The results of this work and consultation will feed into an updated business case which we will provide to the AER.

We also note that as the focus of this project is to improve the capability of the transmission system at times it is most needed. Accordingly, it would also be suitable to be included as part of the Network Capability Component of the Transmission Service Target Performance Incentive Scheme (STPIS) rather than forecast capex. We look forward to engaging the AER and other stakeholders on this project.

Additional information is provided in **Attachment 7.3**.

7.3 Capex by year

Table 7.10 – Capex by category over the 2025-30 regulatory period (Real $2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30
Stay in Business	9.7	9.2	3.2	8.8	18.5
Control and Protection System	7.9	6.4	3.1	8.5	18.4
Other Stay in Business projects	1.9	2.8	0.2	0.3	0.1
Marine cable repair vessel	0.0	0.0	0.0	1.0	10.8
SOCI	1.0	0.9	0.6	0.6	0.6
IT/OT	0.7	0.3	0.2	0.5	0.4
Capability	7.0	0.0	0.0	0.0	0.0
Total	**18.5**	**10.3**	**4.1**	**10.9**	**30.3**

Table 7.11 – Capex by asset class the 2025-30 regulatory period (Real $2024/25)

Category	2025-26	2026-27	2027-28	2028-29	2029-30
AC filters	-	-	-	-	-
AC switchyard	-	-	-	-	-
Auxiliary systems	-	-	-	-	-
Cable	-	-	-	1.0	10.8
Control System	7.9	6.4	3.1	8.5	18.4
Converter transformer	-	-	-	-	-
DC Filter	-	-	-	-	-
DC Switchyard	-	-	-	-	-
Easement	-	-	-	-	-
Freehold land	-	-	-	-	-
Measuring devices	-	-	-	-	-
Motor vehicles	-	-	-	-	-
Other	1.6	1.2	0.9	1.2	1.0
Overhead lines	-	-	-	-	-
Smoothing reactor	-	0.8	-	-	-
Station power supply	-	-	-	-	-
Switchyard components	7.1	0.2	0.1	0.3	-
Valve cooling	-	-	-	-	-
Valve hall	-	-	-	-	-
Building installation	1.7	1.7	-	-	-
In-house software	0.2	-	-	-	-
Total	**18.5**	**10.3**	**4.1**	**10.9**	**30.3**