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Attachment 5: Regulatory Asset Base

5.1 Introduction

The RAB is the total regulatory value of all the assets used to provide the prescribed transmission service. Through the building block approach of revenue regulation, Basslink Pty Ltd will be able to recover the full amount invested in the RAB through the depreciation allowance, as well as an appropriate return on that investment.

To determine the appropriate RAB, Basslink Pty Ltd will follow the process set out in the ACCC and AER's decisions on the regulatory conversion of Murraylink and Directlink. Both these decisions accepted a two-phase process: (1) the application of the Regulatory Test for transmission investment, and (2) the calculation of RAB according to the results of the Regulatory Test.

As such, the first portion of this chapter will cover the Regulatory Test, and the second will cover the determination of the RAB. In this chapter:

- Section 5.2 will cover the precedents set by the Murraylink and Directlink determinations.
- Section 5.3 will draw on the information in Section 1 to synthesise a fit-for-purpose methodology for the calculation of the RAB.
- Sections 5.4 and 5.5 will present our RAB calculations, covering the Depreciated Actual Cost method and the Depreciated Optimised Replacement Cost method, respectively.
- Section 5.6 will present the proposed RAB according to the calculations of the Regulatory Test.
- Section 5.7 will assess the RAB result against the potential efficiencies of alternative capacity levels and under the Recovered Capital Method test.

5.2 Precedent and Rules Regarding Regulatory Conversion

In calculating Basslink Pty Ltd's initial RAB, we have followed the processes used in the precedents for regulatory conversion. The Basslink Transitional Provisions[38] in the Rules (Rule 11.6.20(e)) provide that:

- Basslink's RAB must be determined in accordance with the methodologies, objectives and principles applied in the Murraylink and Directlink conversion decisions;
- where an inconsistency is observed between the approaches in these cases, the decision made in the Directlink conversion is to prevail for the purposes of the Basslink conversion - ithout limiting [11.6.20(e)], the AER"[39] must also "*have regard to the prudent and efficient value of the assets*."[40]

We consider that the process set out in this Proposal—being based on the Murraylink and Directlink precedents—does present the most prudent and efficient RAB for NEM participants. Further, we do not consider there to be any incongruities between the application of this process and the requirements under the Rules or the objectives in the NEO.

[38] The National Electricity Rules, Clause 11.6.20
[39] The National Electricity Rules, Clause 11.6.20(g)
[40] Ibid.

Precedent set by the Murraylink conversion

Murraylink is a 220 MW HVDC interconnector between the Victorian and South Australian grids. The transmission line spans approximately 180 kilometres between Red Cliffs in Victoria and Berri in South Australia. It was designed and built by a private developer who originally planned to operate Murraylink as a Market Network Service Provider (MNSP). However, the developer ultimately applied for regulatory conversion in October 2002—the same month it was commissioned. In October 2003, the ACCC approved its conversion to a prescribed service.

The methodology for calculating Murraylink's opening RAB as a prescribed service was based on the processes and principles applied to proposed new transmission assets at the time of conversion. One of the ACCC's primary concerns was maintaining a consistent approach between the consideration of proposed new investments in prescribed services, and the conversion of existing assets into prescribed services. As such, Murraylink's RAB was set according to the principles of the Regulatory Test for new transmission assets set out in the National Electricity Code (NEC).

For proposed new assets, the Regulatory Test required that the proposal presented the best option for consumers. Specifically, a project would only pass the Regulatory Test if it maximised "the net present value of the market benefit having regard to a number of alternative projects, timings, and market development scenarios."[41] Thus, for a new project to receive approval to be constructed to become a prescribed service:

- Its estimated cost would have to be lower or equal to the gross market benefits created by the project (i.e, it would provide a net market benefit); and
- It would have to be determined to be the best possible option for consumers.

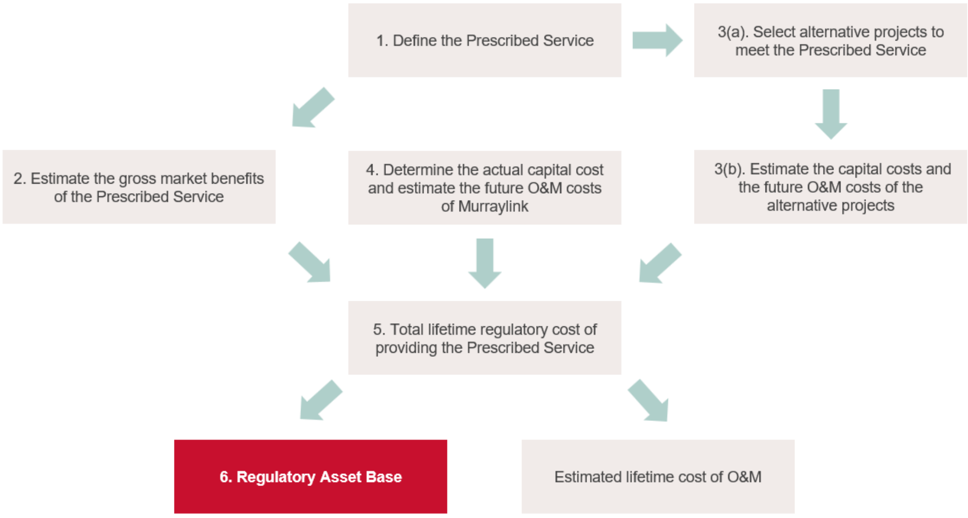
However, Murraylink was already constructed at the time of its application. While the AER was unable to ensure that the actual asset represented a net market benefit and the best possible option, it could regulate the cost to consumers as if the optimal scenario had been achieved. As such, the same process was followed. Several projects (including the already constructed Murraylink) were evaluated and the best possible project was tested to see if it delivered a net market benefit. If the project passed the Regulatory Test, a RAB would be set according to the efficient costs of that project.

Even if the best possible project did not pass the Regulatory Test, it would not make economic sense to simply abandon the existing asset. Instead, the ACCC would set the RAB as equal to the gross market benefits. That way, the asset would be able to operate, and the market would receive benefits commensurate with the amount paid to the asset owner.

To conduct this calculation, the process described below was developed. A flow chart for this process is also shown below.

[41] *Australian Competition and Consumer Commission,* "Decision: Murraylink Transmission Company Application for Conversion and Maximum Allowed Revenue," 1 October 2003.

Figure 5.1: Method for Regulatory Valuation



Step 1: define the prescribed service. The service was defined according to the technical specifications of the interconnector and the forecast operational plan. For Murraylink, the prescribed service was to provide the NEM with:

- Access to a transfer capacity of 220MW between the South Australian and Victorian NEM regions with a high degree of control over transfers;
- The ability to better regulate voltage in Victoria and Tasmania;
- The ability to avoid a total shutdown of the interconnector in the event of a trip in either region;
- Increased transmission capacity specifically to the Riverland region of South Australia and the Malee region of Victoria.

Step 2: estimate the gross market benefits of providing such a service. Murraylink hired independent consultants to estimate the value of the gross market benefits. The process used to determine the gross market benefits is discussed in **Attachment 2** – Net Market Benefits.

Step 3: evaluate possible alternative projects and determine their costs. Possible alternative projects were defined as projects that met the requirements of the prescribed service and had similar net market benefits to Murraylink.[42] Murraylink hired an independent consultant to design and cost six alternatives. These included four alternative technical designs for interconnectors with the same transfer capacity but different technologies and locations, a project to increase generation in the Riverland region, and a demand-side management system. Each alternative project's capex and long term costs of operation were costed by the independent consultant.

Step 4: calculate the actual cost. As Murraylink applied for conversion in the same month it was fully commissioned, the actual capex cost was simply the costs incurred during construction. The independent consultants estimated the present value of the future operating and maintenance costs.

[42] *MURRAYLINK Transmission Company,* "Application for Conversion to a Prescribed Service and a Maximum Allowable Revenue for 2003-2012," 18 October 2002.

Step 5: Determine which option had the lowest cost and test against the Regulatory Test. Of the seven possible options (the actual project and the six alternatives), Murraylink and the ACCC determined that one of the alternative technical designs for an interconnector was the best option. Murraylink and the ACCC found that this option passed the Regulatory Test.

Step 6: Calculate the RAB according to that option. Murraylink then calculated the opening RAB that would have been in place had the best option been constructed. We discuss the methodology for this later in this chapter.

Precedent set by the Directlink conversion

Directlink is a 180MW HVDC interconnector spanning 63 kilometres and connects the New South Wales and Queensland NEM regions. Directlink was commissioned by a private developer in July 2000 and operated as a MNSP until May 2004 when it applied to become a prescribed service. Directlink's application for conversion and the determination of the RAB broadly followed the same process set by the Murraylink conversion.

While the underlying concepts remained largely unchanged, the AER formalised some key methodological descriptions used in the Murraylink proposal. The methodologies put forward by the AER had to account for the fact that Directlink had already been operational for several years. Specifically, the AER introduced two concepts to the regulatory conversion process which are relevant to our application:

- Depreciated Optimised Replacement Cost (**DORC**) — This method is broadly equivalent to the requirement to determine the best project option. According to the standard application of the DORC method, one begins by evaluating the optimal design option for an asset that provides an equivalent service potential to the actual asset. The design option considers modern technologies, processes, and input costs. The calculated cost of this asset is then depreciated such that the remaining asset life of the optimal asset matches that of the actual asset. This method takes into account the previous operation of an asset and protects consumers from paying for outdated equipment designs and construction methods.

  However, the DORC as traditionally conceived is not necessarily equivalent to the requirements of the Regulatory Test. The ACCC considered that the Regulatory Test required consideration of a wider range of alternatives than what is typically considered in a DORC calculation. Specifically, the test required consideration of alternative capacities and alternative solutions to address the identified need, including for example, demand-side management.

  In our application, we consider the methodological basis of the DORC calculation to be the most theoretically robust and widely accepted option for identifying the optimal project design, but also acknowledge the ACCC's reservations. For simplicity, in the remainder of this proposal, we will assume the DORC methodology follows the same process as the standard application, but has the same requirements in selecting alternatives as the Regulatory Test. In undertaking the DORC assessment in this case, several different design and technology options are considered, and the DORC reflects the optimal (lowest cost) option to deliver the relevant service capability.

- Optimal Deprival Value (**ODV**)—was defined as the lesser of the DORC value as we have defined it and the gross market benefit. Where the DORC does not pass the Regulatory Test (i.e., the DORC value is greater than the gross market benefit) the gross market benefit becomes the binding RAB value.

The AER found that no project options considered passed the Regulatory Test and thus set the RAB according to the ODV, that is, the value of the gross market benefit.

5.3 Methodology

In this section, we will distil the concepts and requirements set out in Section 5.2 into a simpler test to determine the RAB value. As we will demonstrate, there are only three calculations needed to determine the appropriate RAB. The Regulatory Test and RAB determination can be simultaneously solved by taking the lesser of:

- Present value of the total gross market benefits, less the net present value of the long-term costs of operation;
- Depreciated Actual Cost method;
- The Depreciated Optimised Replacement Cost method.

We can simplify the processes set out in Section 5.1 from two phases to one phase because of the nature of the Basslink asset. In the precedents discussed above, there is a two-phase process: the optimal project is tested against the Regulatory Test, and then the RAB is derived from the optimal project. This is necessary as the alternative projects may have different long-term costs of operation. When testing the alternatives against each other in the first phase, the differences in the long-term costs of operation may impact the choice of the optimal project and the subsequent test against the net market benefits. The RAB is then determined by removing the long-term costs of operation from the previous values in the second phase.

However, the nature of the Basslink asset means that the long-term costs of operation will be immaterially different between the alternative projects. As discussed further in Section 5.6, there is realistically no other option to fulfil the identified need other than via an undersea cable in much the same way as Basslink is already configured. There is no non-interconnector alternative that would provide the same net market benefits, and the route for interconnectors must be similar to that of the current Basslink asset because of regulatory and environmental constraints. While there are some updates to the underlying technology for the cable, the operating cost of any transmission line in similar circumstances are immaterially different.

As such, we can assume the long-term costs of operation for each alternative project are identical to the costs expected for the actual asset. Thus, long-term costs of operation will no longer determine the rank of possible projects during the Regulatory Test. By subtracting the long-term costs of operation from the gross market benefits and taking the lesser of the three options, we can in effect conduct the Regulatory Test and the RAB determination in a single phase.

The other difference we will apply is the separation of the Depreciated Actual Cost method from the Depreciated Optimised Replacement Cost. In the Murraylink and Directlink precedents, the actual project was included in the comparison and calculation of the Depreciated Optimised Replacement Cost method. In those cases an estimate of efficient cost was required for a relatively new asset, meaning that there was unlikely to be a significant difference between actual and optimised replacement costs. In the case of Basslink, there is more likely to be some divergence between actual cost and optimised replacement cost. For older assets, replacement cost may potentially be lower to the extent that technology improvements have facilitated a lower-cost design, or higher to the extent that input costs have increased.

We consider that taking the lesser of actual cost, optimised replacement cost and gross market benefit is a conservative approach to determining the RAB. It is a somewhat broader assessment than was undertaken in the Directlink and Murraylink determinations – those determinations focusing principally on market benefits and DORC-based estimates of efficient cost for the optimal project. However we have taken this approach to ensure that consumers pay no more than the efficient cost of Basslink or the market benefits that it delivers.

Because of the data and estimation differences between the calculation of the alternative scenarios and the actual cost, we have elected to cover these in separate sections. However, the same fundamental processes will still apply—the cost of the actual project will still be compared to the alternatives, albeit at the same time as being compared to the other RAB calculation methods as well.

5.4 Depreciated Actual Cost Method

The Depreciated Actual Cost (**DAC**) method is a widely used approach in economic regulation for valuing assets. In essence, the DAC method considers what Basslink's RAB would have been if it had been calculated in the AER's RAB roll forward Model from its commissioning. Thus, the DAC considers the actual costs incurred in the construction of Basslink and any further capex and applies the same regulatory principles used for regulated entities to calculate depreciation, inflation and other factors.

Methodology

As per the building block model of regulation described in **Attachment 4** – Revenue and Pricing Methodology, the RAB at the end of any given year (RAB_e) can be calculated in relation to the RAB at the beginning of that year (RAB_b) according to the formula:

$$RAB_e = RAB_b + Capex - Disposals - Depreciation + Inflation\ adjustment$$

To calculate the RAB as at the time of conversion, this formula is iterated for each year from the commissioning of the asset to 1 July 2025. The first RAB_b is the cost of the asset at the time of commissioning, and each subsequent RAB_b is equal to the previous year's RAB_e. The cost of the asset at the time of commissioning includes the total value of construction, construction finance costs (debt and equity), and equity raising costs. For each following year, capex and disposals in each year are taken from historical accounts and the forecast capex plan set out in **Attachment 7** – Capital Expenditure. The details of the material methodological decisions made in calculating the RAB under the DAC method are included below.

Capex

The capex values are adjusted in the year they are incurred to include a half-year WACC to match the timing adjustments in this proposal. This adjustment is standard for similar RAB cases, including recently the AER's determination for ElectraNet's revenue proposal.[43] As Basslink was a commercial service at the time and would have required capital at commercial rates, it is reasonable to consider the appropriate WACC to be a commercial WACC. As such, the half year adjustment is made using the same commercial WACC described in the Section 7.2.

[43] *Australian Energy Regulator*, "Final Decision: ElectraNet Transmission Determination 1 July 2023 to 30 June 2028," 28 April 2023.

Depreciation

As is the requirement by the AER's Post Tax Revenue Model,[44] depreciation is calculated for an asset class—a group of assets with similar features. Assets must be classed so as to increase "the accuracy or administrative convenience of asset calculations."[45] Straight line depreciation is the standard depreciation approach for similar regulated entities and will be employed in this proposal.

The total asset lives and remaining asset lives for each asset category will be determined according to the assessments of accounting asset lives made for each asset within the asset category. We understand that setting asset lives can bring in a certain amount of judgement and could potentially be gamed to the benefit of an asset owner. To avoid any of these issues and to remain as empirical as is possible, we have elected to maintain the initial accounting assessments for each asset. These assessments were made before any plans were developed to convert Basslink to a prescribed service, and as such are free from gaming and likely reflect the assets' lives accurately. More information on this is available in **Attachment 6**.

Inflation

Once the values for the above categories are settled, an inflation adjustment is added to ensure that the asset holder is properly compensated for its investment in real terms. Our inflation methodology is identical as the one set out in the PTRM. That is, annual inflation is applied to the starting WACC, and a half-year inflation is added to any capex from that year.

Available data on assets

As Basslink Pty Ltd has operated for over 17 years as a private business, the record keeping process was like any standard private business—that is to say, not according to the requirements of a regulated asset. In this section, we explain the data available to Basslink Pty Ltd and demonstrate that, where choices were required, the most conservative option was chosen in the interest of consumers.

Historic data is available from the following sources: a fixed asset register, general ledgers, and annual statutory accounts. We also rely on data from the capex plan put forward in **Attachment 7** – Capital Expenditure.

Basslink Pty Ltd maintained a fixed asset register for the purposes of financial reporting and determining its depreciation for tax purposes. For each asset listed in the fixed asset register, most had the following types of data relevant to the calculation of DAC:

- Acquisition date
- Asset accounting category and sub-category—the major categories are: 'Land', 'Easement', 'Interconnector', 'Plant and equipment', 'Spares, Vehicles', 'Leasehold improvements', 'Furniture, Fixtures, and Fittings', 'IT equipment', 'Computers', and 'Software'.
- Asset description
- Asset cost

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[44] *Australian Energy Regulator,* "Final Decision (Amendment): Electricity Transmission Network Services Providers Post-tax Revenue Model Handbook," April 2019.
[45] Ibid.

- Asset accounting life

The asset register also records disposals or revaluations of assets[46]. In this case a separate entry has been created, with a negative asset cost and a description of the disposal or the revaluation.

There are a number of revaluations of assets relating to changes in accounting requirements. For example, since construction, some assets' lives, including the subsea cable, were revalued as part of Basslink Pty Ltd's corporate accounting. Predicting the asset life of a unique asset like Basslink's subsea cable includes significant uncertainty. The original design life of the Interconnector at the date of commissioning in April 2006 was determined to be 40 years however subsequently in April 2012, Basslink Pty Ltd management revised the useful life to be 65 years.

The expected asset life was reassessed for accounting, tax and insurance purposes upon acquisition by APA. APA engaged ValQuip Consulting Pty Ltd (Valquip), a fixed asset valuation specialist, to provide a valuation report of the acquired fixed assets. The valuation adopted a maximum life for assets of 40 years supported by the following:

- The original design life of the Basslink System is 40 years;
- Reference was made to a Hatch Assessment Report (as at January 2020) which outlines that significant capital expenditure would be required in order for the interconnector to achieve a life of 65 years;
- There are currently no undersea HVDC systems in the world that have reached a 65-year life.

Basslink Pty Ltd has consequently chosen to reflect a maximum life for assets of 40-years which is aligned to the original design life and Valquip's 2022 valuation. This reduces the overall costs to consumers as this assumes that more depreciation is already recorded on the asset than under the 65-year scenario and aligns with our decision to use the initial accounting lives to remove any potential gaming of the regulatory submission[47]. Following these principles, we have removed all effects of revaluations.

One key issue with the dataset of the fixed asset register is that the assets acquired during construction are generally grouped into broad categories that are not fit for purpose. For example, the largest asset in the fixed asset register is recorded as 'Basslink Cables, Converter, and Transition Station.' This is clearly not detailed enough for a regulated asset. To correct for this, we used the second key data source: Basslink's general ledgers. We analysed Basslink's general ledgers from during the construction period to identify more specific asset types within these broad categories, their purchase dates and their costs. In doing so, we were able to minimise this issue to a degree where we consider it would have minimal impacts on the final results.

Because this proposal assumes Basslink will become a prescribed service on 1 July 2025, we must also consider the assets which will be purchased between now and that date. This proposal describes in detail the plan for the capex initiatives and costs for between now and FY30 in **Attachment 7** – Capital expenditure.

[46] Within the set of disposals and revaluations we noted some inconsistencies, but only for minor items with asset lives that end before 1 July 2025 and thus don't affect the current DAC valuation.
[47] With the exception of overhead lines. See **Attachment 6**.

Calculated asset values

To the list of recorded assets, we must add construction financing and equity raising costs. These were legitimate costs incurred by Basslink Pty Ltd during the construction of the asset and must be returned to the asset holder to return these costs as part of the efficient return of capital.

To determine these costs, we calculate them according to hypothetical efficient cost rather than any recorded actual costs for two reasons. Firstly, the ownership structure during the construction of Basslink means that the details and data of the construction financing and equity raising costs are unavailable to APA. Secondly, calculating these according to a hypothetical efficient cost ensures that consumers are not charged any inefficient amounts of construction financing or equity raising costs.

The efficient construction financing is calculated by finding the construction profile of the asset and applying to that profile an efficient WACC. As Basslink Pty Ltd was a commercial entity at the time of construction, it is logical to apply a commercial WACC that Basslink Pty Ltd would have faced at that time. The commercial WACC values are the same as are used in the discussion of the Recovered Capital Method in Section 5.6 of this attachment. We generate a construction profile using Basslink's statutory annual reports provided to ASIC in each year of construction, which records the cash capex payments incurred during construction. The construction profile is shown in the table below. In each year, we apply the full WACC rate to the cumulative construction capex at the start of the year and a half-year discounted rate to the new capex being incurred in that year. The total construction financing entered into the RAB is the sum of the construction financing calculations for each year from the commencement of construction to Basslink's commissioning.

Table 5.1 - Construction Profile

Year	FY01	FY02	FY03	FY04	FY05	FY06
Physical asset value added per year	$8m	$17m	$128m	$132m	$335m	$159m
Percentage	**1.0%**	**2.2%**	**16.4%**	**17.0%**	**42.9%**	**20.4%**

Total equity raising costs are calculated by multiplying the efficient amount of equity raised by the efficient cost of raising equity. The efficient amount of equity raised is calculated as the total financing requirement during the construction process, multiplied by the equity portion of the efficient capital structure.[48] For the rate of equity raising costs, we take the equity raising costs rate accepted by the AER in the 2007 Powerlink determination – the closest accepted rate to the commissioning of Basslink.[49]

Determining asset lives and depreciation

Calculating Depreciation

Using asset lives, we calculate depreciation for each category for each year between Basslink's commissioning to FY2025. For each asset category, we disaggregated the total value into a list of annual capex made for that category for each year from Basslink's commissioning to FY25. To do this, we used the data from Basslink's Fixed Asset Register. Next, we calculate an annual

[48] See **Attachment 9**: Forecast Rate of Return
[49] *Australian Energy Regulator*, "Decision: Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12," 14 June 2007.

depreciation value for the capex made in each year using the category's standard asset life. The resulting depreciation schedule for each asset category is summed to arrive at a value for total depreciation for the year, which is subtracted from the starting RAB.

Regulatory inflation

The final step is adding regulatory inflation. The assets of regulated entities are inflated according to CPI to ensure that shareholders receive their full return on and of capital in real terms. For each year, the starting RAB has depreciation removed and is then inflated according to the historical CPI index.

Results

By iterating the DAC calculation formula for each year between Basslink's commissioning to 2025, the resulting RAB is $831 million in July 2025 dollars.

5.5 Depreciated Optimised Replacement Cost

The Depreciated Optimised Replacement Cost (DORC) method calculates the depreciated construction cost of the best alternative to Basslink. The theory is identical to that of the DAC method in that it assesses what the RAB would have been had an asset been regulated from the beginning. However, it considers the RAB of an alternative 'optimised' asset with the same amount of depreciated life as the actual asset.

To calculate the DORC value, we follow the process set by the Murraylink and Directlink precedents, and the rules set under the Regulatory Test process. As discussed in Section 5.2, to align the DORC method with the principles under the Regulatory Test, we will expand the definition of alternatives to align with the definition of alternatives under the NER and the Regulatory Test. Basslink Pty Ltd engaged independent engineering experts, Amplitude Consultants, to estimate the appropriate alternative projects and cost them. Their independent report is attached to this submission.

In this section, we first discuss the selection of appropriate alternative project and assess their relative costs and benefits. We then explain the method for costing the alternatives that are most likely to provide net market benefits greater than the existing Basslink asset. We then present the results of the estimated construction cost of that alternative and depreciate that value to arrive at a final DORC value.

Alternative projects

The selection of alternatives is the most complex and judgement-based part of the DORC calculations. Projects must be deemed sufficiently similar to Basslink in terms of their ability to address service needs. Projects must also include enough diversity to present a material test. There are infinite variations for each possible alternative, but testing alternatives takes resources that may not be proportional to the information gained. We believe that the fully costed alternatives are likely both diverse enough to present a reasonable test and are the alternatives that are most likely to meaningfully impact the resulting DORC value.

Regulatory requirements for alternative projects

We have followed the definitions and requirements for alternative projects set out in the AER's Directlink decisions. As recorded in the AER's draft decision on the Directlink conversion, in applying the Regulatory Test, proponents are required to consider[50]:

> *"'reasonable network and non-network alternatives' that include (but are not limited to) interconnectors generation options, demand-side options, market network service options and options involving other transmission and distribution networks."*

Directlink's application provides a useful schema for considering alternatives. It states that "the alternative projects:

- are to be relevantly substitutable for Directlink but not necessarily equivalent;
- should attempt to address in part some of the existing and emerging local network constraints identified by the TNSPs;
- should make use of commercially available current technology
- are to have real power transfer capabilities consistent with the limitations of the surrounding network infrastructure and are not necessarily the same as Directlink;
- reactive power transfer capability necessary to make each alternative technically feasible;
- use enhanced control schemes to an extent where the benefits exceed the cost of the control scheme and are technically acceptable; and
- shall cost-effectively address environmentally sensitive areas to the minimum extent necessary to gain environment and planning approval."[51]

Non-interconnector alternatives

We consider it highly unlikely that any non-interconnector project would both fulfil the identified and provide similar net market benefits as the existing asset. Addressing the same identified need without building an interconnector would require a significant cost and a package of investments in Victoria and Tasmania including new generation plants, energy storage options, and ancillary services.

To derive similar benefits to Tasmanian grid reliability as is currently provided by Basslink, an investment in a commensurate amount of firm generation capacity would likely be required. While Tasmania has already a significant amount of firm capacity from hydro plants, this is dependent on hydrological conditions. In the event of a drought, alternative firm capacity would be required. Moreover, Tasmania would lose the opportunity to make a significant amount of revenue on the considerable excess variable renewable generation in its grid if it is not able to send that to the other NEM states.

[50] *Australian Energy Regulator,* "Directlink Joint Venture Application for Conversion and Revenue Cap – Draft Decision," 8 November 2005. p. 36.
[51] *Directlink Joint Venture,* "Application for Conversion to a Prescribed Service and a Maximum Allowable Revenue for 2005-2014," 6 May 2004.

To achieve the same low per kWh costs of electricity in Victoria as is currently being provided by Tasmanian generators across Basslink, new renewable generation and associated firming storage would likely be required. This would come at a large capital cost. Basslink also provides a significant amount of frequency control services, especially in Victoria. Without Basslink, new plants and ancillary services would have to be commissioned.

Our initial calculations found even when only considering the provision of a similar amount of firm renewable capacity for both states, costs were more than double the actual cost of the interconnector. This doesn't include any of the other important benefits provided by Basslink. Considering this initial result, we consider the development of a full package of non-interconnector investments is highly unlikely to be the best option and the cost of providing a full costing of this package would not be commensurate with this probability.

Route

We consider the route taken by Basslink to be the only applicable route to consider, both because of construction constraints and how regulatory precedent has been set.

Previously, the ACCC determined that the transmission constraints of specific areas containing connection points should be considered as part of the identified need. In its Murraylink determination, the ACCC held that the proponent need not consider alternatives that did not provide both interregional power flows and transmission capacity to the Riverland and Malee regions in which it operated. Similarly, all Directlink alternatives had to simultaneously connect New South Wales and Queensland and provide benefits for the Gold Coast and Tweed regions. Basslink's location in the Gippsland region and its central position on the Tasmanian North Coast provide several specific benefits for each region. The connection to the large generation capacity in the Gippsland region allows for more opportunities for these generators to sell electricity when constraints occur on the westward transmission lines. It also allows a direct line to the reliable firm capacity Tasmania benefits from in times of hydrological stress. In the other direction, its position at Georgetown allows for equally direct access to both the renewable generation capacity to the west and the load centres to the east of Tasma. As such, we will only consider alternatives that travel between Basslink's current starting and ending regions.

When developing the plans for Basslink, the route was carefully negotiated and was optimised around several constraints. The project's designers had to take into account the extensive environmental considerations set out by the Victorian, Tasmanian, and Federal governments. These included regulations on passing through residential and agricultural communities, protected areas such as Wilsons Promontory, coastal and sea floor habitats. While we are not ruling out the possibility that alternative routes were available, it is impossible to say today what other routes may have passed these strict tests when it was being planned, or would pass the tests of today. As such, we will assume for simplicity that all alternative interconnectors pass through the same route.

Technology – HVDC

Amplitude conducted an in-depth study of the most recent transmission technology and have detailed them in their attached expert report. A summary of the findings are included below.

<u>Converter stations</u>

Amplitude found that the two current technology options for converter stations were Line Commutated Converters (LLC) and Modular Multi-level Voltage Source Converters (MMC VSC). LLCs are an older technology and provide some benefits over MMC VSC, but it is vulnerable to low system strengths and cannot provide voltage control on its own. As such, it requires the construction of synchronous converters on either end of the line. While LCC technology is cheaper than MMC VSC station on its own, the requirement for synchronous condensers means that that MMC VSC technology is expected to be the cheapest alternative overall. Amplitude costed both a MMC VSC option and a LCC option.

Cable technology

Amplitude found that the two current technology options for the HVDC cable were Mass Impregnated cables (MI) and polymeric cables. The difference between these two types is the insulating medium between the metallic core and the protective shielding. Polymeric cables are cheaper, faster to install, can operate at higher temperatures, and pose less of an environmental risk than MI cables. One drawback is that polymeric cables cannot operate with LLC converter stations. However, considering MMC VSC technology is the preferred option anyway, we will consider polymeric cables to be the best option and will be included in our alternative.

Amplitude has estimated the physical capabilities of the cable cores to calculate the minimum cost option that would satisfy the parameters on capacity and flexibility. A discussion of the processes used are included in Amplitude’s report. In summary, Amplitude considers a 800 mm^2 Aluminium core to be suitable as the modern alternative technology.

HVDC system configurations

A number of different cable and converter configurations are possible over a HVDC transmission line. The table below shows the pros and cons of each option. Diagrams of the system configurations are available in Amplitude's expert report.

Configuration	Pros	Cons
Asymmetric monopole	• Lowest cost	• No redundancy built into the system
Bipole with metallic return	• Minimum of 50% redundancy • Minimal current in the metallic return during balanced operation	• More expensive than a Monopole system
Symmetric monopole	• Smaller cables required for the same voltage levels, reducing costs • Can use more standard converter technologies.	• No redundancy built into the system
Double symmetric monopole	• Smaller cables required for the same voltage levels, reducing costs • Can use more standard converter technologies. • Minimum of 50% redundancy	• Requires double the number of cables as the symmetric monopole, increasing cost
Rigid bipole	• Minimum of 50% redundancy in the event of a converter fault • No metallic or earth return required	• No redundancy in the event of a cable fault • More costly than the monopole options

On balance, Amplitude considered the symmetric monopole option to be the most cost effective and appropriate configuration to meet the needs of the prescribed service and has proceeded to cost this option as the alternative option.

Technology - HVAC

Amplitude also costed an option for a HVAC cable at a capacity of 500MW. Amplitude noted that a submarine HVAC cable would have lower functionality than a HVDC cable. A HVDC cable is able to provide directional power transfer control, a feature not provided by HVAC. HVAC will also have higher power losses than an HVDC system over this distance of submarine cable.

Furthermore, the complexity and cost of a HVAC system is likely to far exceed that of a HVDC system. The HVAC system that Amplitude decided would be most appropriate includes the need for four separate HVAC cable circuits. Additionally, an HVAC system would require an offshore platform housing a reactive compensation equipment built at the interconnector's midpoint in the Bass Strait. This additional infrastructure adds significant cost as well as complexity and risk to the project.

Costing approach

Amplitude used a number of different costing approaches depending on the availability of cost data. Most costings were estimated by analysing publicly available Engineer, Procure, and Construct (EPC) contracts for similar components on different projects. For each component, Amplitude gathered data from a multitude of EPC contracts, adjusted the costs according to the capacities of the EPC contract. Amplitude then converted these to Australian dollars where relevant and inflated each cost to present day using an appropriate inflator, and then took an average of the available options.

Inflators were chosen that were most relevant to the component in question. For example, many HVDC components are designed and manufactured in Europe. As such, the components generally manufactured in Europe have inflation according to Eurostat's inflation indexes for "Manufacture of electric motors, generators transformers, and electricity distribution and control apparatus" or "Manufacture of other electronic and electric wires and cables". Australian construction wages were set according the Wage Price Index set by the Australian Bureau of Statistics.

Apart from EPC costs, there are a number of other costs involved in building an interconnector. Below we list the categories added to the EPC costs and their calculation process:

- Land costs—are taken from Basslink's recorded land costs, and inflated according to CPI.
- Easement and environmental damage mitigation costs—is calculated by Amplitude according to the most recent recorded Australian easement and environmental damage mitigation costs for transmission projects.
- Risk adjustments—Amplitude determined the appropriate risk adjustment multipliers according to published AEMO cost database for each asset type.[52]
- Non-interconnector PPE—is taken from Basslink's recorded capex during construction costs, and inflated according to CPI. This includes on-site office and shed construction, IT equipment, and equipment spares.
- Interest during construction—is calculated as for the DAC method, using the EPC costings and the additional asset categories above. The work-in-progress assets are multiplied by the efficient WACC in each year to determine an interest during construction value. We have assumed the construction profile is the same as calculated in the DAC method, as the construction characteristics modelled by Amplitude are similar to that of the actual Basslink construction characteristics.
- Equity raising costs—are calculated as for the DAC method, using the EPC costings and the additional asset categories above. The amount of equity needed to be raised is calculated by multiplying the efficient equity-to-asset ratio by the total asset value for each alternative scenario. Then, that equity is multiplied by the efficient equity raising cost rate as per the DAC method.

[52] *Australian Electricity Market Operator,* "AEMO Cost Estimation Tool," 28 April 2023.

Alternative Project Cost Results

A summary of the results for the total replacement cost of the optimal alternative is shown in the table below.

Table 5.2 - Total replacement cost of optimal alternative

Scenario	EPC only	Total
HVDC MMC VSC	$1,581 million	$1,701 million
HVDC LLC	$1,672 million	$1,795 million
HVAC	$5,025 million	$5,259 million
Basslink actual	$1,355 million	$1,467 million

** All values are in July 2023 dollars*

As is clear from these results, the actual Basslink asset was constructed for more than $200 million less than the current replacement cost of optimised alternatives, in real terms. The increase in cost of similar assets is driven by the steep inflation of the materials required to build it and the labour required to manufacture and install it.

Depreciating the ORC Results

Once the ORC results are calculated, we must depreciate all depreciable assets in the alternative options to match the current depreciation of the Basslink asset.

To do so, we must assume asset lives for the asset in the alternative options and depreciate the assets accordingly. We have aligned the specific asset categories calculated by Amplitude with the asset categories set out in **Attachment 6** – Asset Classes, Asset Lives and Depreciation. We consider there to not be any significant changes in the assumed regulatory asset lives of much of the standard electrical equipment required for any of the alternative options. Moreover, assuming an increased average asset lives for the alternative options would increase the overall DORC RAB and thus, in the interest of maintaining a conservative stance, we have elected to keep the asset lives as per our DAC calculation.

Using these asset lives, we calculate a percentage of their useful lives already depreciated. Between the commissioning in April 2006 and the proposed conversion in July 2025, there will have been 230 months, or 19.2 years. For a 40-year total asset life, this leaves 250 months remaining, or 52.1% of the full asset life. By multiplying this percentage by the cost of the depreciable assets, we determine the depreciated value of the alternative assets for each asset category.

Lastly, we inflate all July 2023 values by our CPI inflation forecast to arrive at a value of assets as of July 2025.

The results from the DORC calculations are shown in the table below.

Table 5.3 - DORC calculation results

Scenario	DORC in 2025 dollars
HVDC MMC VSC	$1,079 million
HVDC LLC	$1,138 million
HVAC	$3,331 million
DORC valuation	**$1,079 million**

5.6 Results

According to the Murraylink and Directlink precedents, and in accordance with the transitional provisions, Basslink's RAB is to be determined as the lesser of gross market benefits and the efficient cost of the optimal project required to deliver those benefits. Arguably, this could be satisfied by simply comparing gross market benefits to a DORC value for the optimally designed asset. However in this proposal Basslink Pty Ltd has taken a conservative approach by also considering a DAC value for the existing asset.

Thus, the proposed RAB value is the lesser of:

- Present value of the total gross market benefits, less the net present value of Basslink's long-term costs of operation;
- The RAB as calculated under the Depreciated Actual Cost method;
- The RAB as calculated under the Depreciated Optimised Replacement Cost method.

The following table presents the results of each methodology:

Table 5.4 - RAB methodology results

Method	Result
Market benefits less long-term costs of operation – Step change/single stage scenario	$3,748 million
Market benefits less long-term costs of operation – Progressive change/single stage scenario	$4,190 million
Market benefits less long-term costs of operation – Hydrogen Superpower/single stage scenario	$3,102 million
DAC	$831 million
DORC	$1,079 million
Proposed RAB	**$831 million**

As the lowest RAB is calculated under the DAC method, we propose that Basslink's RAB be set as $831 million.

5.7 Further calculations for information

In addition to completing the calculations as allowed by the Rules,[53] Basslink Pty Ltd has conducted additional calculations for information relating to other approaches to calculating Regulatory Asset Bases for stakeholder information.

We have conducted two calculations: a market benefits calculation for lower asset capacities (Section 7.1), and a Recovered Capital calculation (Section 7.2).

Net market benefits of lower capacity assets.

The framework for determining the RAB (following the Murraylink and Directlink precedents) requires an assessment of the costs and market benefits of options capable of delivering an equivalent service potential to the existing asset. The existing assets provides a capacity of approximately 500MW, and if regulatory conversion occurs, the prescribed service will reflect this service capability. Accordingly, the analysis of market benefits and costs outlined above reflects this capability.

For stakeholder information, we have also considered the market benefits and costs associated with lower capacity links. This does not form part of the RAB assessment. However it demonstrates that not only does the existing Basslink deliver a net market benefit, it also delivers a *greater* market benefit than hypothetical lower capacity options.

While our capacity analysis does not form part of the legally applicable Regulatory Test, we have calculated the net market benefits of different transfer capacities for stakeholder information.

In our comparison, we have assessed the net market benefits of the lowest cost asset options for different transfer capacities. The lowest cost option for the 500MW version of the asset is the actual asset calculated using the DAC methodology, as shown in Section 6. We have chosen to test the net market benefits of systems at 350MW and 150MW of capacity. We consider testing these capacities provides an appropriate balance between assessing a spread of capacity values, and the significant cost and time required to run the analysis of net market benefits for each capacity scenario.

Costs

We asked Amplitude to forecast the cost for an interconnector in the same route as Basslink, but at the alternative transfer capacities. Amplitude costed VSC-HVDC interconnector options as they were far more likely to provide higher net market benefits than HVAC or LCC-HVDC options.

Amplitude assessed the construction cost using the same process as for the DORC valuation method for the 500MW alternative (see Section 5.2). We then applied the same calculations to convert Amplitude's construction cost forecast to a DORC value as for the 500MW alternative (see Section 5.2). Their results are shown in the table below.

[53] The National Electricity Rules, Clause 11.6.20

Table 5.5F - Construction cost forecast DORC valuation

	Construction cost in 2023 dollars		DORC valuation in 2025 dollars
	EPC only	Total	Total
HVDC – 350 MW	$1,260 million	$1,369 million	$868 million
HVDC – 150 MW	$855 million	$950 million	$603 million
DAC method	**$1,137 million**	**$1,401 million**	**$831 million**

Despite a reduction in capacity of 30% in the 350MW scenario and 70% in the 150MW scenario, the total DORC construction costs only decline 20% and 45% respectively. This is due to the fact that the construction of an interconnector will incur some costs that are largely fixed no matter the capacity of the interconnector. This includes costs such as land, easements, and cable laying campaigns.

Net market benefits

We then compared the costs against the market benefits of the different interconnection capacities. As discussed in **Attachment 2** – Net market benefits, EY conducted the same market modelling for the 350MW and 150MW levels as it used in the assessment of the market benefits of the 500MW asset. The comparable market benefits for the 350W and 150MW capacities were only assessed under the ISP Step-Change scenario. As such, the comparable market benefits for the actual asset in the table below is also for the Step-Change scenario to maintain a comparison on a like-for-like basis. We have chosen to show the results of the modelling assuming Marinus' commissioning meets the ISP's schedule, but the net market benefits for the DAC method exceed the net market benefits under the alternative capacities regardless of Marinus' timing.

Table 5.6 - Comparable market benefits

	A. Asset valuation	B. Market benefits	(B – A) Net market benefits
HVDC – 350 MW	$869 million	$3,443 million	$1,986 million
HVDC – 150 MW	$603 million	$1,713 million	$521 million
Basslink actual	**$831 million**	**$3,640 million**	**$2,810 million**

** All values are in July 2025 dollars.*

These results show that the 500MW capacity option provides the highest net market benefits. This is logically consistent with the Marinuslink modelling showing net market benefits for the project. If additional transfer capacity above 500MWs provides positive benefits, it must follow that lower transfer capacities are not maximising the market benefits.

Recovered capital test

The second additional calculation we undertook for stakeholder information was a calculation of the RAB under the Recovered Capital method (RCM). The RCM has been used by the AER since 2017 as one of two methods for calculating the asset values of non-scheme gas pipelines.

The RCM focuses on the historical capital recovered by the asset owner and calculates a RAB that ensures that the regulated entity will recover the efficient return of and on capital over the life of the asset. The RCM corrects for historical deviations from efficient recovery by increasing the RAB if the asset owner under-recovered its efficient return, and reduces the RAB if the asset owner over-recovered.

If the RAB as calculated by the RCM is lower than the RAB under the DAC method, the asset owner historically recovered more than the efficient market recovery. If the RAB were then set according to the DAC method, the asset owner would benefit from locking in that over-recovery and this could be considered a windfall gain. Therefore, in this test we are making sure that Basslink has not historically over-recovered from consumers and is not locking in a windfall gain.

We find that the RCM RAB is higher than the DAC method RAB—suggesting Basslink Pty Ltd historically under-recovered compared to the efficient level of recovery. This is consistent with the history of Basslink Pty Ltd as a single asset business that has been placed in administration.

Methodology

To calculate the RC method RAB value, the RAB as per a usual Roll Forward model is calculated as per the DAC calculation. However, this standard RAC in each year includes some Recovery Adjustment Factor (RAF). This factor will adjust the RAB higher or lower depending on if the asset owner over- or under-recovered. The RAF is the difference between the efficient recovery amount and the actual recovery amount. That is:

$$\boldsymbol{RAF = R_e - R_a = W_e - (I_a - O_a - T_a)}$$

Where:

- R_e is the efficient recovery amount.
- R_a is the actual recovered amount.
- W_e is the efficient allowance for a return on capital invested (the WACC allowance) for that period.
- I_a is the income Basslink received for the period
- O_a is the actual operating costs for the period
- T_a is the tax cost incurred by Basslink for the period.

The following sections discuss the elements of this equation in greater detail.

Income

Income is taken from Basslink Pty Ltd's annual record of accounts, with some adjustments made. For the period over which the BSA was active, revenue was generated principally through fees and charges to Hydro Tasmania (HT). This included the facility fees as well as several risk-sharing and incentive mechanisms. Since the dissolution of the BSA, these fees have continued under the BOA, but these will cease once Basslink becomes a prescribed service. Other income categories included interest income, consulting income, and net currency gains. We did not include the revenue generated by Basslink Telecom as that asset will not become part of the prescribed service. We also removed interest income as this is covered by the capital allowances.

Revenue data was collected from Basslink Pty Ltd's record of accounts submitted to ASIC. These accounts span from 1 April 2000 to 30 June 2022.[54] These annual reports detail revenues and costs across over more than 10 categories. We consider the data to be of high quality and at a sufficient level of detail to conduct this calculation.

[54] In 2005, Basslink changed its start of financial year from 1 April to 1 July. We reconstituted all pre-2005 reports using Basslink's general ledger to match the 1 July start of the financial year.

We must also forecast income for the period between the submission of this application and the expected conversion date. Our income forecasts are based on a commercial estimation of Basslink's potential revenues under the BOA. APA's finance team began with the set facility fee and predicted the effects of the risk sharing mechanisms by applying APA's firm-wide medium-term macroeconomic forecasts.

Operating and tax costs

To determine the historical operating and tax costs, we used the data from Basslink Pty Ltd's record of accounts submitted to ASIC. These accounts span from 1 April 2000 to 30 June 2022.[55] These annual reports detail revenues and costs across over 200 categories. We consider the data to be of high quality and at a sufficient level of detail to conduct this calculation.

However, we removed a number of cost categories from Basslink's recorded opex statements to align it with the principles of the RCM:

- Costs associated with Basslink Telecom—as this asset will not become part of the prescribed service. We applied the same approach to differentiate these costs as is discussed in **Attachment 8** – Forecast Operating Expenditure.
- Finance expenses, loan forgiveness, and currency hedging costs—as these are all explicitly or implicitly part of the overall cost of debt and are thus covered by the capital allowances.
- Depreciation—as this does not apply to regulatory operating costs.

We also note that over the period Basslink Pty Ltd has been part of the APA Group, some operating costs have been and will continue to be incurred at a divisional or corporate level. These include the costs such as insurance, engineering, and management overheads. The allocation of these costs are conducted according to Clause 6a.19.4 of the NER.

We also forecast the operating costs of Basslink Pty Ltd between the submission of this proposal and the proposed conversion date. These were conducted differently depending on whether they were employee costs or other costs. For employee costs, we scaled these according the number of employees it forecast to require over the next two years to deliver the same service levels. This included a forecast of staff directly related to Basslink, but also a portion of overhead staff costs to be allocated according to APA's cost allocation methodology.

For all other costs, the FY2024 values are determined according to APA's internal budget for Basslink and overhead costs. The budget levels were determined across over 20 cost categories by discussing with relevant technical experts what their expectations are across the company. These are the same figures used in APA's financial forecasts and are used to inform shareholders. Accordingly, a significant amount of effort is put into making sure these values are detailed and as accurate as possible. The FY2025 costs are determined by inflating the FY2024 budget values by APA's corporate CPI forecast.

Return on capital

The efficient return on capital is calculated by multiplying the asset base with the efficient weighted average cost of capital (WACC), as per the DAC method.

[55] In 2005, Basslink changed its start of financial year from 1 April to 1 July. We reconstituted all pre-2005 reports using Basslink's general ledger to match the 1 July start of the financial year.

Since Basslink has operated on a commercial basis from its inception and will continue to do so until it becomes a regulated NSP, it is appropriate to consider the applicable WACC to be that of an efficient commercial entity. We maintain consistency by using the same methodology for calculating WACC for past years as we do for our forward-looking WACC allowance, but we apply commercial debt and equity rates to the formula. While we consider a commercial WACC to be most appropriate, APA's initial modelling suggests that the findings of this test do not change materially if a regulated WACC is applied. In this calculation, capital expenditure generates a half-year return in the year it's incurred.

In order to estimate the return on capital for RCM calculations, it's necessary to assume a specific level of debt and equity capitalization for the funding of new assets. This is not derived from the statutory financial statements, even in the case of a single asset service provider. Instead, we assume an efficient capital structure as assumed in the assessment of the WACC calculations.[56] While we consider capex to be funded in line with the efficient capital structure, it's worth noting that the capital structure can change under this approach. In cases where the RCM asset valuation indicates a revenue shortfall, we model this shortfall to be covered by additional contributions from equity holders rather than additional borrowing. This approach aligns with the well-accepted principle that lenders won't finance losses. In any given year, the combined amounts of debt and equity should sum up to the running total opening capital base calculated up to that point under the RCM, plus the current year's capital expenditure.

Return on debt

A market interest rate was determined by an expert firm in the financial services sector, reflecting the opportunities for a business such as the service provider to raise capital. This analysis allowed a market return on debt to be estimated, having regard to the observed spread above a well-reported swap rate and a premium applied for smaller size and single-asset businesses. The expert firm has calculated a cost of debt for all years included in the RCM analysis.

Return on equity

The return on equity has been estimated using the Capital Asset Pricing Model (CAPM):

$$Re = Rf + \beta (Rm - Rf)$$

Where:

- Re is the Return on equity in the relevant year;
- Rf is the Risk Free Rate in the relevant year;
- β is Beta, a measure of the risk of the asset relative to the market; and
- (Rm-Rf) is the "Market Risk Premium".

The data set used to estimate the Rf component for historical years is that developed by Brailsford, Handley and Maheswaran (2012)[57] as updated to the reporting date.

The service provider adopts a beta value of 1.0, reflecting the risks the service provider faces in providing services as a single-asset unregulated business, subject to the market and the market of its customers.

[56] As discussed in **Attachment 9** – Rate of Return, this is assessed as a 60% debt, 40% equity split.
[57] Tim Brailsford, John C. Handley, and Krishnan Maheswaran. (2012) "The historical equity risk premium in Australia: Post-GFC and 128 years of data" Accounting and Finance, 52 (1), 237-247

A market risk premium of 6.5% has been applied in the Capital Asset Pricing Model as described above. This is consistent with the standard market accepted risk premium over the reporting period.

The calculated return on equity is applied to the "running total" opening RCM capital base multiplied by the equity ratio (as discussed under "capital structure" above).

Net tax liabilities

In order to estimate a net tax liability, we have adopted a post-tax approach with net tax liabilities modelled explicitly, by undertaking an abbreviated tax calculation:

1. starting with revenue as reported above;
2. less operating expenditure as reported above;
3. interest expense was taken to match that used in the Return on Capital calculation as discussed above;
4. tax depreciation was calculated based on accumulated capital expenditure as reported above, with tax depreciation calculated on a straight line basis over a 20 year life, commencing in the year after expenditure; and
5. tax liability was calculated as this taxable income, multiplied by the prevailing tax rate for the relevant year. Where tax losses are generated through this calculation, they are accumulated and preserved, and used to offset against future net tax liabilities as they arise.

Results

The RAB under the RCM is $2,488 million. As this is higher than the DAC method valuation, this means that Basslink failed to meet its historical operating costs and provide an appropriate return on capital to investors. This aligns with the fact that Basslink Pty Ltd historically faced solvency issues and has previously been under administration.

Method	
RCM	$2,488 million
DAC method	**$831 million**