

HOUSTONKEMP
Economists

Capital expenditure incentives applying to Humelink

A report for Transgrid

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1. Introduction and key findings

Transgrid is submitting its contingent project application (CPA) for the build (Stage 2) of the Humelink Project (CPA2). Humelink is a proposed large transmission network upgrade connecting the Sydney load with the Snowy Mountains Hydroelectric Scheme and Project EnergyConnect in South-West NSW.

One of the elements of the Australian Energy Regulator's (AER) decision for Humelink CPA 2 will be whether to apply the Capital Expenditure Sharing Scheme (CESS) without variation or alternatively to:

- not apply the CESS to Humelink; or
- apply the CESS to Humelink with a different sharing rate.

Transgrid has asked HoustonKemp to analyse potential options for not applying the AER's current CESS to the Humelink Project.

This report is structured as follows:

- section 2 – provides a brief description of the context for this assignment, specifically, it sets out further details of the Humelink Project as well outlines the AER's statements on the factors it will consider in its decision on whether or not to apply the CESS without variation;
- section 3 – outlines the factors the AER will consider when deciding whether to alter the CESS applying to the Humelink Project;
- section 4 – sets out the incentives that would apply if the CESS were to apply without variation;
- section 5 – considers the following two options for varying the AER capital expenditure incentives framework applying to Humelink:
 - > excluding forecast and actual Humelink capital expenditure from the CESS, and so apply the financial incentives of the underlying building block framework; and
 - > adjusting the CESS sharing ratio to zero for Humelink capital expenditure.

The remainder of the section outlines other factors that may affect Transgrid's incentives to efficiently deliver the Humelink Project.

1.1 Key findings

The AER has indicated that it will assess on a case-by-case basis whether, or how, the CESS should be applied to large transmission projects. The factors the AER has indicated that it will consider in deciding whether and how to apply the CESS to a large transmission contingent project are:¹

- the Transmission Network Service Provider's (TNSP's) proposal in relation to the capital expenditure for the project and the application of the CESS;
- benefits to consumers of the project being exempt from, or subject to a variation of, the CESS;
- the size of the project;
- the degree of capital expenditure forecasting risk; and
- stakeholder views.

Transgrid has estimated that the Humelink Project's capital investment would be approximately \$4.88 billion (in 2023 dollar terms).² The forecast capital expenditure this project represents is over three and half times

¹ AER, *Review of incentives schemes for networks*, Final decision, April 2023, p 22.

² Transgrid, Humelink CPA 2, September 2023.

the amount Transgrid is expecting to spend over the 2023-28 period on capital expenditure for projects not included in the Integrated System Plan (ISP).³ The size of the Humelink Project means that modest over/underspends on the Humelink Project are equivalent to substantial over/underspends on Transgrid's non-ISP capex.

This is illustrated in section 4, which shows that if the CESS were to apply to Humelink, then a 5 per cent cost overrun on the project is equivalent to Transgrid overspending its forecast non-ISP capex by 23 per cent. This highlights that the size of the Humelink Project limits the ability for risks in this project to be mitigated through diversification within Transgrid's portfolio of non-ISP projects. Consequently, the inability of the intrinsic risks of the Humelink project to be mitigated through diversification means that this project will increase Transgrid's overall risk. This increase in risk could be moderated by lessening the strength of the incentive framework.

Section 4 also highlights that under the CESS Transgrid bears 30 per cent of the cost of any overspend under the CESS, the impact on equity owners would be magnified since the overspend costs would be borne entirely by equity owners. Debt owners are always paid in full, and so equity owners would lose 75.0 per cent of their contributed equity.

A modification to the current capex incentive arrangements for Humelink would be appropriate due to the asymmetric cost risks for the Humelink Project. That arising from:

- a relatively high degree of uncertainties on the scope of the Humelink Project, where a significant proportion of the costs of the project are unknown at the time of the CPA;
- unanticipated real increases in the cost of building Humelink, which are not passed onto the build contractors and so borne by Transgrid, either because contractors were unwilling to bear that risk or because the cost of passing on risk is regarded by Transgrid as uneconomic;
- unforeseen cost pressures linked to the transition to a zero emissions energy system, with the scale of the new transmission investment inevitably makes it difficult to forecast the cost of delivering transmission network projects; and
- the potential for real increases in international prices of key inputs such as steel, copper and aluminium, in line with observations in recent years.

To ensure that there are appropriate signals to invest in the energy transition, these additional construction risks when they arise should be balanced by a reduction in strength of the capex incentive framework. An appropriately calibrated incentive framework benefits consumers by:

- supporting the investment environment for ISP projects, through the tailoring of the capex incentive framework that balances any increases in risk that individual project imposes on a networks and so furthers the objectives achieving the energy transition while simultaneously ensuring a secure, reliable and affordable energy system; and
- a lower incentive framework would mean that the cost paid by consumers would more closely align with the efficient costs of the Humelink Project, rather than rewarding or penalising parties because of uncertainty in the scope of the project when the CPA decision was made.

The case for having a lower capex incentive framework applying to the Humelink project is supported by both the significant size of the Humelink project and the network's capex proposal that calls for the CESS to not apply to the project. The case for modifying the CESS would be further strengthened if stakeholders in the forthcoming public engagement supported Transgrid's position that the Humelink project should be subject to a lower powered capex incentive framework.

³ The AER's final decision included \$1.103.5 billion (real \$2023) in capex over the 2023-28 period on Project EnergyConnect. See AER, *Final decision | Transgrid transmission determination 1 July 2023 to 30 June 2028 | Attachment 5 – Capital expenditure*, April 2023, pp 12-13.

I have also been asked to calculate an indicative estimate of the financial incentives of two possible alterations to the current incentive framework applying to Humelink capex, namely:

- Scenario A – where Humelink capex is excluded from the CESS; and
- Scenario B – where the CESS sharing ratio applying to Humelink capex is set at zero.

The financial incentives under scenario A are in the order of 6.2 per cent on the basis of a uniform over/underspend on Humelink. Further the impact on equity owners would be magnified since debt owners must be paid in full and so the cost of the overspend would be borne entirely by equity owners. I estimate that a uniform overspend on Humelink would result in equity owners losing 15.6 per cent of their contributed equity on the overspend.

Scenario B a zero CESS sharing ratio would allow Transgrid to recover the full economic cost of all Humelink capital expenditure. A zero CESS sharing ratio would provide a CESS payment in the following regulatory period that allows Transgrid to recover the shortfall in (or over recovery of) financing costs in the 2023-28 period arising from actual Humelink expenditure being above or below the capex allowance.

In both these scenarios Transgrid would continue to be subject to the risk of the AER conducting an ex-post review. This risk provides a further significant incentive for Transgrid to minimise capex on Humelink to both:

- reduce the risk the over-spending requirement being met and therefore of an ex-post review being triggered, by ensuring that Transgrid's total capex over the 'review period' is less than that forecast including the contingent projects; and
- ensure that it is able to demonstrate that expenditure was prudent, in the event that an ex post review is triggered, and the relevant review period includes Humelink capex.

Further, I note that if Transgrid must finance its overspend on Humelink using only equity until the overspend is rolled into the asset base would increase the financing costs of the overspend to Transgrid. This would provide a further incentive for Transgrid to minimise any Humelink overspend.

Finally, I outline the governance and assurance framework that Transgrid has implemented to ensure the efficiently delivering of the Humelink Project. This includes the decision by Transgrid to procure and deliver the Humelink project through a form of Incentivised Target Cost (ITC) design and construct contract (D&C contract) which is estimated by Transgrid to save consumers \$237 million compared to a fixed price D&C contract.

A feature of the Humelink ITC D&C contract is that contractors have entered into a gain/pain share arrangement which shares the risks of the reimbursable costs and incentivises the contractor is to minimise these costs.



2. Report context

This section provides a short description of the Humelink Project as well as my understanding of the AER's current views on whether the CESS should apply to large transmission projects.

2.1 Humelink

Humelink is a proposed large transmission network upgrade connecting generators across southern New South Wales (NSW), and electricity imported from Victoria and South Australia, to major population centres. HumeLink facilitates investments in new zero carbon generation in areas with high quality wind and solar resources, increase the transfer capacity between Victoria and NSW and improve wholesale market competition, reducing customers' final electricity bills.

The Humelink Project was identified as a staged actionable project in the Australian Energy Market Operator's (AEMO's) 2022 Integrated System Plan (ISP).⁴

Humelink has the following stages:

- Stage 1 (Part 1) – includes the required early works to determine the project construction costs, identify and manage risks and progress activities on the critical path and undertake engagement to achieve social licence to achieve the target completion date, Stage 1 (Part 2) includes the progression of Long Lead Equipment (LLE) necessary to complete the Humelink Project by the targeted competition date. Noting that Transgrid has progressed this stage through two CPAs, namely CPA1(1) and CPA1(2); and
- Stage 2 – involves the delivery of the Humelink Project.

Transgrid has estimated that Humelink has an expected capital cost of approximately \$4.6 billion (in 2023 dollar terms),⁵ to be incurred over the 2023-28 regulatory period, noting that there was \$0.28 billion (in 2023 dollar terms) of early works expenditure incurred in the 2018-23 period. This represents 65 per cent of Transgrid total 2023-28 capex allowance.⁶

Transgrid is proposing to not apply the CESS to Humelink, and instead rely on the financial incentives implicit to the underlying regulatory framework.

2.2 AER guidance on the application of the CESS to ISP projects

The AER has stated that its default position is to apply the CESS without variation to large transmission projects.⁷ That said, the AER has indicated that it will retain the flexibility to decide on a case-by-case basis whether the CESS should be applied to large contingent transmission projects without variation or alternatively to:⁸

- not apply the CESS to Humelink; or
- apply the CESS to Humelink with a different sharing rate.

The AER has also indicated that it may apply a separate CESS for each contingent project, rather than including the contingent project expenditure in the TNSP's total capex. A separate CESS for the contingent

⁴ AEMC, *2022 Integrated System Plan*, June 2022, p 61.

⁵ Transgrid, *Humelink CPA 2*, September 2023.

⁶ The remaining components of Transgrid's 2023-28 capex allowance is \$1.1 billion (16 per cent of total) on PEC and \$1.3 billion (19 per cent of total) on recurring (business as usual) capex.

⁷ AER, *Review of incentives schemes for networks*, Final decision, April 2023, p 22.

⁸ AER, *Review of incentives schemes for networks*, Final decision, April 2023, p 22.

transmission project would be required where the AER determined that a different CESS sharing rate should be applied to the contingent project.

The factors the AER has stated that it will consider in deciding whether and how to apply the CESS to a large transmission contingent project are:⁹

- the TNSP's proposal in relation to the capital expenditure for the project and the application of the CESS;
- the benefits to consumers of the project being exempt from, or subject to a variation of, the CESS;
- the size of the project;
- the degree of capital expenditure forecasting risk; and
- stakeholder views.

The AER has indicated that it is open to submissions from the TNSP, a DNSP or another interested stakeholder, on options other than applying the CESS without variation.

The AER has maintained this position in its subsequent regulatory decisions, including its determination for Transgrid's 2023-28 regulatory period, stating that:¹⁰

Consistent with the revised CESS guideline, we will consider the merits of any proposed application of the CESS for future large transmissions projects on a case-by-case basis at the time of the contingent project applications to ensure they are in the long-term interests of consumers. Our default position is to apply the CESS and we will be careful in making exclusions.

However, the AER rejected Transgrid's proposal to exclude the application of the CESS to Project EnergyConnect (PEC) and other ISP projects in the 2023-28 period for the following reasons:¹¹

- Transgrid is already partially covered by price increases and inflationary pressures because the CESS calculation adjusts for inflation when determining the applicable forecast capex and actual capex. This ensures the NSP is neither worse off nor better off from fluctuations in inflation. We acknowledge that cost inputs may be below or above inflation levels at points in time.
- The risk of cost overruns is best managed by Transgrid, and any over-spends are best shared with customers, rather than being fully covered by customers. Transgrid's announcement of capex savings of up to \$500 million in procurement, labour and avoided inflation costs across PEC, VNI West, and Humelink exemplifies how the NSP is best placed to manage these risks.
- The proposal appears asymmetric in that Transgrid is proposing to exclude the application of the CESS for projects where there is a possibility of a cost overrun,¹² but is proposing for the CESS to remain in place for the remaining parts of its capex forecast where there is more potential for under-spends.
- It is unclear whether any CESS penalties could have a material adverse impact on cash flow and financeability because Transgrid has not provided analysis supporting its claims. We review a NSPs' revenue proposal every 5 years which allows us to 'reset' and consider the market dynamics and circumstances at the time of future determinations of capex forecasts and CESS.

⁹ AER, *Review of incentives schemes for networks*, Final decision, April 2023, p 22.

¹⁰ AER, *Final decision | Transgrid transmission determination 1 July 2023 to 30 June 2028 | Attachment 9 – Capital expenditure sharing scheme*, April 2023, p 9.

¹¹ AER, *Final decision | Transgrid transmission determination 1 July 2023 to 30 June 2028 | Attachment 9 – Capital expenditure sharing scheme*, April 2023, p 9.

¹² Though, we have not been provided evidence to demonstrate the likelihood of over-spending.

3. Factors identified for the incentives of large ISP projects

The cost forecasting risk associated with large transmission projects is greater than that associated with a TNSP's normal capital investment program. The AER recognised the greater risk of large transmission projects in its Guidance note for non-contestable network projects in NSW, noting that:¹³

- are generally bespoke in nature, which can require the introduction of new technologies, the need to build in new and unfamiliar terrain and the requirement to gain local support for the build;
- are not recurrent spending, resulting in an absence of applicable historical cost benchmarks to assist in forecasting; and
- the scale of the project may also require the TNSP to engage unfamiliar supply chains, contractors and international labour force.

Whilst the AER stated default position is to apply the CESS unaltered, it did recognise that there may be projects where it would be in the long-term interests of consumers to not apply the CESS, or to apply a CESS with an altered sharing ratio. The factors that the AER states that it will consider when deciding whether to alter the CESS are:¹⁴

- the TNSP's proposal in relation to the capital expenditure for the project and the application of the CESS;
- the benefits to consumers of the project being exempt from, or subject to a variation of, the CESS;
- the size of the project;
- the degree of capital expenditure forecasting risk- taking into account, for example, the extent to which the project is already outsourced and subject to contract terms; and
- stakeholder views.

The remainder of this section considers these factors as they apply to Humelink

3.1 Transgrid capital expenditure proposal and the size of the Humelink Project

The Humelink Stage 2 CPA, states that Transgrid does not support the CESS being applied to Humelink. Some of the reasons identified by Transgrid for not applying the CESS include:

- Humelink is the single largest project undertaken by Transgrid involving the design, construction and operation of around 360 kilometres of new transmission lines, a new substation at Wagga Wagga as well as the upgrading of a number of existing substations; and that
- that the build of Humelink was characterised by uncertain and inflationary operating environment, resourcing and supply chain challenges and intense global competition for capital and financeability that give rise to asymmetric risk.

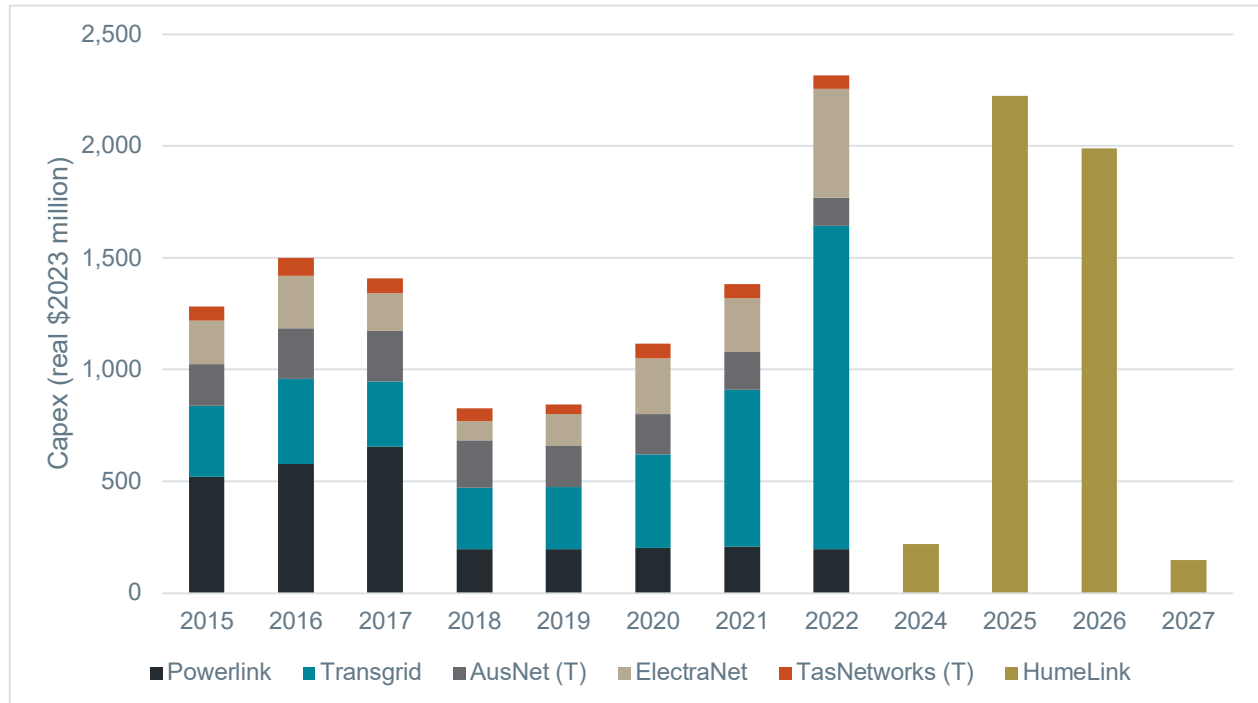
Further, the Humelink project is the single largest project undertaken by Transgrid with a total expected expenditure of \$4.88 billion (real \$2023). This single project is substantially greater than Transgrid's business as usual capital expenditure is \$1.3 billion (real \$2023) over the five years of the 2023-28 regulatory control period.

¹³ See AER, *Incentive schemes for non-contestable network projects in NSW | Guidance Note Draft*, August 2023, pp 10-11.

¹⁴ AER, *Review of incentives schemes for networks*, Final decision, April 2023, p 22.

Figure 3-1 illustrates the relative size of the forecast investment in Humelink compared to the annual forecast capex for all TNSPs since the CESS was introduced.

Figure 3-1: Relative size of Humelink to forecast capex



Source: AER – Electricity – TNSP – Operating Performance data 2006-2022.xls, Transgrid Humelink CPA 2 PTRM and HoustonKemp analysis. Note: Real \$2022 TNSP performance data converted to real \$2023 using the December CPI of 7.83 per cent.

Figure 3-1, shows that the Humelink investment alone will in 2025 and 2026 be greater than the total annual forecast capital expenditure of all TNSP’s, (except for 2022 which included PEC expenditure). Another way to interpret the scale of the expenditure on Humelink is that over the four years of expenditure on Humelink is forecast to be around 4.3 times larger than the average TNSP capex allowance incurred over a four year period.¹⁵

The forecast Humelink capex is also significantly greater than Transgrid’s 2023-28 capex for non-ISP projects, of \$1,332.7m (real \$2023).¹⁶ The quantum of forecast Humelink capex means that:

- 5 per cent over/underspend on Humelink, is equivalent to a 23 per cent over/underspend in Transgrid’s non-ISP capex;¹⁷
- 10 per cent over/underspend on Humelink, is equivalent to a 47 per cent over/underspend in Transgrid’s non-ISP capex;¹⁸ and

¹⁵ Average annual forecast capex (real \$2023) for a TNSP is \$266.7 million over the 2015 to 2022 period which over a four year period is \$1,067 million.

¹⁶ AER, Transgrid 2023-28 – Final Decision – Attachment 5 Capital expenditure, April 2023, p 13, shows that Transgrid’s net capex is \$2,436.2 million which includes \$1,103.5 million in Project EnergyConnect expenditure. This results in Transgrid’s non-Project EnergyConnect capex allowance of \$1,332.7 million over the 2023-28 regulatory control period.

¹⁷ With the application of the CESS a 5 per cent overspend for Humelink results in a \$93.1m financial penalty. To receive a similar financial penalty the Transgrid would need to overspend its non-Project EnergyConnect capex allowance by 23 per cent (ie, \$310.4m divided by \$1,332.7m).

¹⁸ With the application of the CESS a 10 per cent overspend for Humelink results in a \$186.2m financial penalty. To receive a similar financial penalty the Transgrid would need to overspend its non-Project EnergyConnect capex allowance by 47 per cent (ie, \$620.8m divided by \$1,332.7m).

- 15 per cent over/underspend on Humelink, is equivalent to a 70 per cent over/underspend in Transgrid's non-ISP capex.¹⁹

The above example, highlights that the size of the Humelink Project limits the ability for risks in this project to be mitigated through diversification within Transgrid's portfolio of non-ISP projects. In other words, if Humelink costs are 5 per cent higher than forecast, then for these costs to be mitigated by diversification then all non-ISP projects costs need to come out on average 23 per cent lower than forecast.

3.2 Capital expenditure forecasting risk

The AER also indicated that a decision whether or not to apply the CESS unaltered is the degree of forecasting risk associated with the project.

There are a number of reasons why there is a high degree of forecasting risk to the Humelink Project, including:

- a relatively high degree of uncertainties on the scope of the Humelink Project, where a significant proportion of the scope, and so cost, of the project is undetermined at the time of the CPA;
- the surge in construction projects associated with the energy transition;
- an environment of increasing construction costs; and
- increasing international material costs.

These factors increase the forecasting risks associated with Humelink give rise to an asymmetric risk. The asymmetric risk associated with the cost of building Humelink is unsurprising, with a 2014 study finding that 75.1 per cent of the 401 of the large electricity infrastructure projects sampled experienced cost overruns.²⁰ This study also found that the average cost overrun for transmission projects was 8 per cent.²¹ While noting that this study occurred close to 10 years ago, the broad nature of the study demonstrates that large transmission projects are generally more likely to be delivered over budget compared with under budget.

The remainder of this section provides greater detail on these factors that increase forecasting risk.

3.2.1 Project scope risk

Transgrid chose to procure and deliver the Humelink project through a form of Incentivised Target Cost (ITC) design and construct contract (D&C contract). The Project was split into two geographic packages (HumeLink East and West projects) of similar size that will be delivered by two separate delivery contractor that were selected via a competitive tender. The ITC design and construct contracts have been designed with:

- a fixed price, for components that are well defined and have higher cost certainty; and
- a reimbursable pricing with where the costs are shared by both the contractor and Transgrid, for components with scope and cost uncertainty.

Transgrid state that the benefits of this contracting approach allowed it to lower the project costs by \$237 million because contactors were not forced to price the project scope and cost uncertainty into a fixed price D&C contract.

¹⁹ With the application of the CESS a 5 per cent overspend for Humelink results in a \$279.3m financial penalty. To receive a similar financial penalty the Transgrid would need to overspend its non-Project EnergyConnect capex allowance by 70 per cent (ie, \$931.2m divided by \$1,332.7m).

²⁰ Sovacool, B K, Gilbert, A and Nugent, D, *An international comparative assessment of construction cost overruns for electricity infrastructure*, Energy Research & Social Science, 3, 2014, p 153.

²¹ Sovacool, B K, Gilbert, A and Nugent, D, *An international comparative assessment of construction cost overruns for electricity infrastructure*, Energy Research & Social Science, 3, 2014, p 154.

The expected costs of the reimbursable component of the D&C contract are included the 'other construction costs' of the Humelink Project. The estimated cost of project risks for the Humelink Project is \$599.07 million (14 per cent of total capex).

Note a fundamental feature of the ITC D&C contract is that contractors have entered into a gain/pain share arrangement which shares the risks of the reimbursable costs. That is, the contractor is incentivised to minimise reimbursable costs as it receives a share of any cost savings from delivering these costs at lower than expected levels and does not recover all its expenses (and so shares the pain) if reimbursable costs are higher than expected levels.

Material project risks identified from Transgrid's risk register include:

- reimbursable risk costs associated with additional payments that Transgrid may be required to make under the incentive arrangements of the D&C contract, such as unforeseen labour productivity levels, variations in the cost of plant and equipment and cost variation associated with increased tower design maturity;
- inherent risk costs relating to activities for which there is cost uncertainty due to the lack of information at the CPA, such as uncertainty of final biodiversity offset costs, variations in Owner's non-labour costs, uncertainty on future labour costs;
- variation risk costs relating to changes in the scope of the project that may emerge during the delivery phase, such as contractor claims for additional payments from delay to NTP2 or due to inclement weather, increases in costs associated with unanticipated geotechnical conditions of tower footings, and scope variations due to changes of design and construction manuals or requirements; and
- time risk costs relating to the cost borne by Transgrid from events such as, delays in receiving planning approvals, increases in Transgrid Owner's costs due to project extension, and delays caused by being unable to access the Site.

The allowance for 'other construction costs' was calculated using a Monte Carlo probability analysis of all the material risks. In other words, uncertainties in the scope of the project are expected to cost \$599.07 million however the actual efficient costs of the project may be higher or lower depending on how these uncertainties resolve.

The quantum of these risks in both absolute terms as well as a proportion of the total project costs (14 per cent) differentiates the Humelink Project from business as usual transmission investment projects and represents a material increase in forecasting risk.

3.2.2 Surge in new infrastructure projects

The transition to a zero emissions energy system will require a generational growth in Australia's transmission network. AEMO in its ISP 2022 describes the energy transition as:²²

The National Electricity Market (NEM) is supporting a once-in-a-century transformation in the way electricity is generated and consumed in eastern and south-eastern Australia. It will replace legacy assets with low-cost renewables, add energy storage and other new forms of firming capacity, and reconfigure the grid to support two-way energy flow.

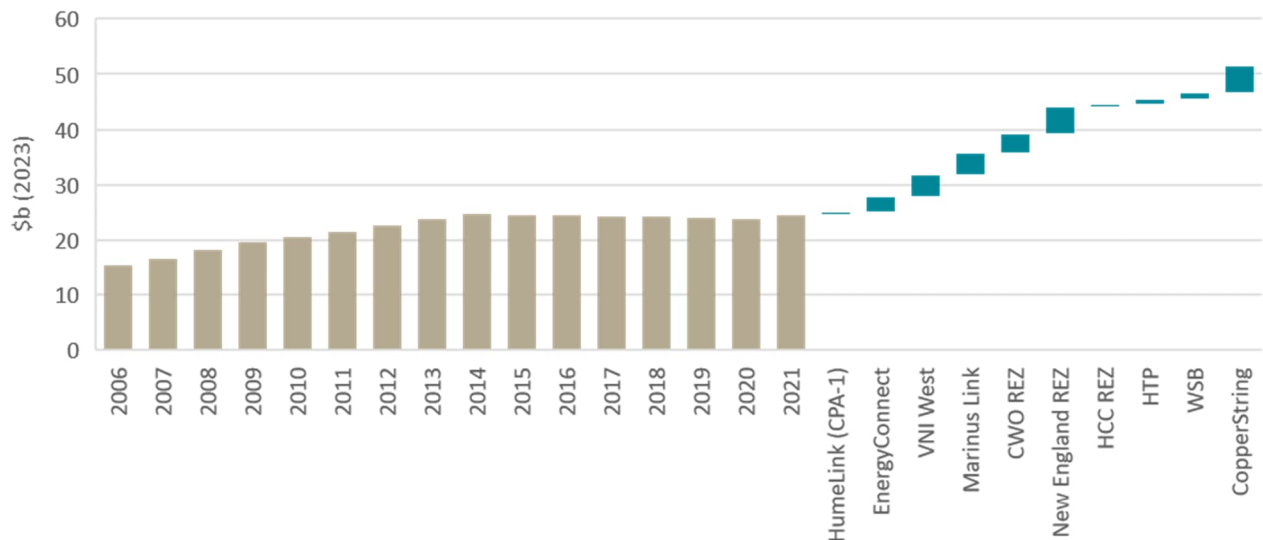
...

The new generation and storage opportunities above constitute the ISP development opportunities of the optimal development path (ODP) to 2050. The ODP also identifies 10,000 km of new transmission to connect these developments and efficiently deliver firmed renewable energy to consumers through the NEM

²² AEMO, 2022 *Integrated System Plan*, June 2022, pp 7 and 12.

Figure 3-2, highlights the quantum of committed transmission projects that will need to be delivered. The effect of these new projects will be to more than double the existing regulatory asset base (RAB) of the TNSPs.

Figure 3-2: Total RAB for TNSPs in the NEM and costs of new committed projects



Source: HoustonKemp analysis; AER, Electricity TNSP Operational performance data - 2006-2021.xlsx, Transgrid, A.1 Humelink – Stage 1 (Part 2) Contingent Project Application, 23 May 2023; AER, Final decision | ElectraNet | Project EnergyConnect Contingent Project, May 2021; AEMO and Transgrid, VNI West Project Assessment Conclusions Report Volume 1: Identifying the preferred option for VNI West, May 2023; TasNetworks, Marinus Link | RIT-T project assessment conclusions report, June 2021; EnergyCo, NSW Network Infrastructure Strategy | Appendix B: Network Infrastructure Options, May 2023; EnergyCo, NSW Network Infrastructure Strategy | A 20-year strategy to transform the NSW electricity network, May 2023; and Powerlink, <https://www.powerlink.com.au/projects/copperstring-2032>, accessed 18 July 2023.

This number and size of committed energy projects as well as requirements for new infrastructure in other sectors has led Infrastructure Partnerships Australia to project that:²³

To deliver [NSW’s infrastructure pipeline], the infrastructure labour force in NSW will be required to grow by 56 per cent by 2024. The growth in labour demand is largely driven by the high volume of energy projects entering the State’s pipeline and a very strong pipeline of hospital projects across NSW and Australia.

The scale of the new investment required will inevitably result in an increase in the cost of delivering transmission network projects. In my opinion this increases the asymmetric risk in relation to cost estimates.

3.2.3 Construction cost increases

Under the AER’s regulatory framework, the forecast construction costs for Humelink are fixed in real terms, with the nominal capex allowance linked to changes in the Consumer Price Index (CPI). However, changes in the costs of constructing Humelink will more likely reflect changes in Producer Price Indexes (PPIs) which measure the change in the prices of products as they leave the place of production or as they enter the production process.

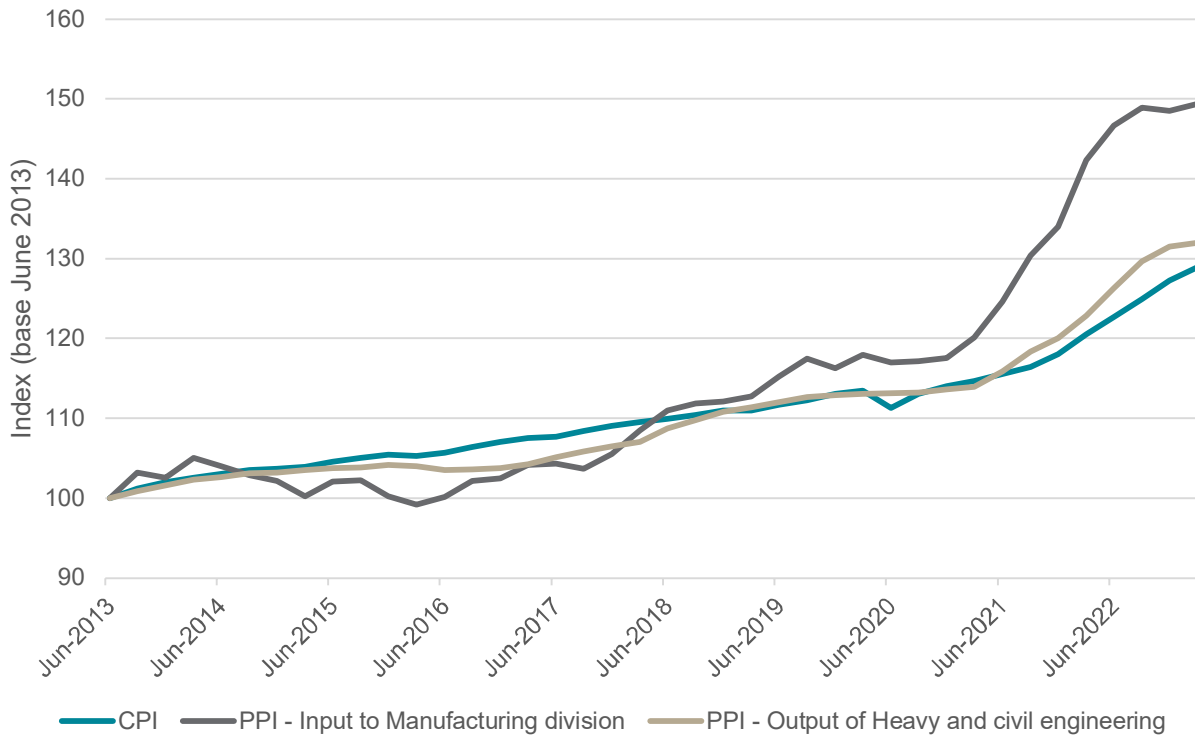
Figure 3-3 shows the change in the CPI and two of the most relevant PPI published by the Australian Bureau of Statistics (ABS) for the construction of Humelink, namely:

- PPI – Input to Manufacturing division; and

²³ Infrastructure Partnerships Australia, *New South Wales Red Book*, | *Infrastructure dynamics*, March 2023, p 6.

- PPI – Output of Heavy and civil engineering.

Figure 3-3: CPI and selected PPIs



Source: HoustonKemp analysis of ABS, 6401.0 Consumer Price Index, Australia, TABLES 1 and 2. CPI: All Groups, Index Numbers and Percentage Changes and 6427.0 Producer Price Indexes, Australia, Table 13. Input to the Manufacturing industries, division and selected industries, index numbers and percentage changes.

Figure 3-3 highlights that in the period between mid-2015 and mid-2021 increases in the selected PPIs closely followed changes in the CPI. However, since mid-2021 increases in the cost of construction in Australia have outpaced changes in the CPI. This recent divergence is particularly evident with the change in the Input to Manufacturing PPI. Figure 3-3 therefore highlights that over the last ten years cost inputs are more likely to be above inflation levels, rather than below average.

To the extent that unanticipated real increases in the cost of building Humelink cannot be passed onto the build contractors, it will result in Transgrid overspending its capex allowance.

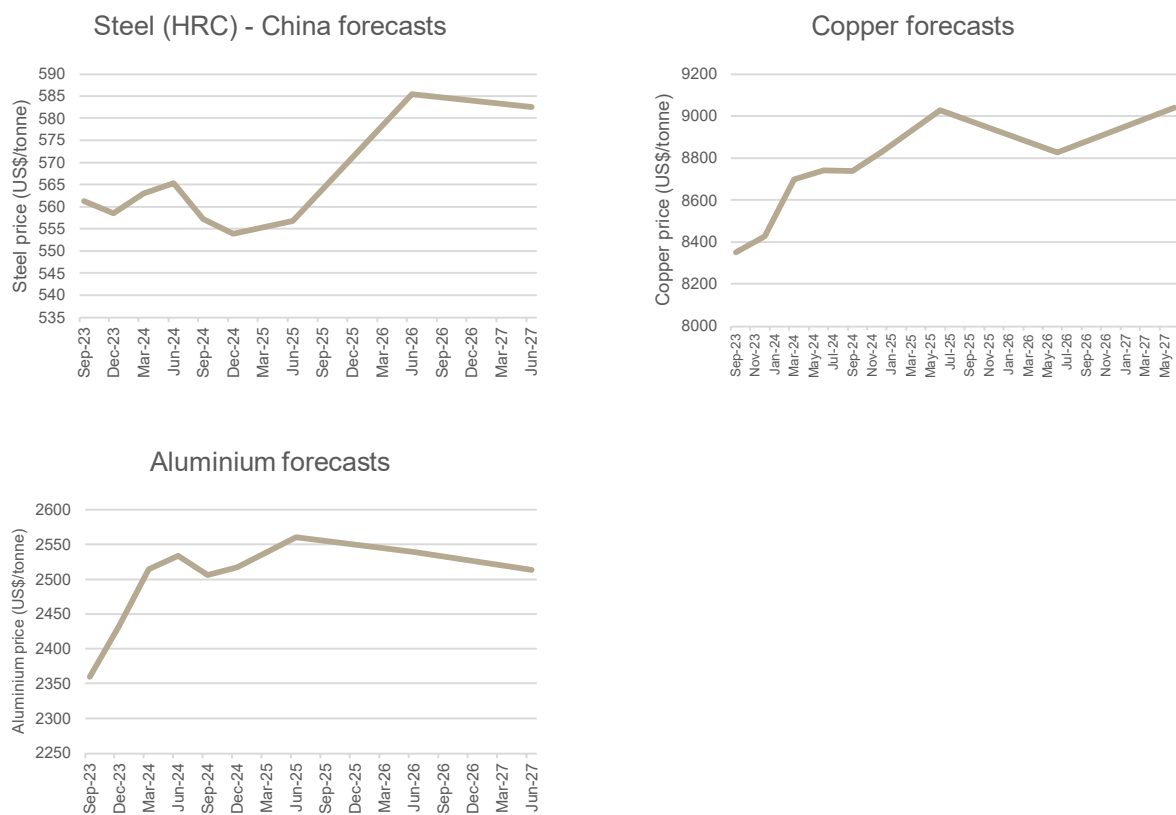
For the reasons set out in section 3.2.2, the material increases in planned transmission projects associated with the ISP mean that there is a material risk for further unanticipated real increases in the costs.

3.2.4 Continued rise in international materials costs

In addition to domestic pressures, the cost of delivering new transmission projects such as Humelink is also linked to international commodity prices for key inputs such as steel, copper and aluminium.

Figure 3-4 below highlights that forecasts for the price of these key inputs to rise in the medium term.

Figure 3-4: Forecasts of steel, copper and aluminium prices – June 2023 forecast



Source: HoustonKemp analysis and Consensus Economics forecasts for June 2023.

These material increases in actual and forecast key international commodity prices suggest that there is an asymmetric risk that future prices will be higher than expected. To the extent that these risks are not borne by the Humelink construction contractors then surprise increase in commodity prices represent an asymmetric risk to Transgrid.

3.3 Benefits to consumers of reduced capex incentives

The Humelink Project is a staged actionable project in the Australian Energy Market Operator's (AEMO's) 2022 Integrated System Plan (ISP) and draft 2024 ISP.²⁴ The ISP is a comprehensive investment plan for the NEM that optimises consumer benefits and identifies transmission projects required for an affordable, secure and reliable energy future, while meeting prescribed emissions trajectories.

HumeLink is the only actionable ISP project that could directly address the risk that not enough dispatchable capacity is available in NSW if there are early coal closures in the period 2026 to 2028. This risk may be realised if a third New South Wales coal-fired power station (including Liddell) retires.²⁵ AEMO states that actionable ISP projects, such as Humelink, should be progressed as urgently as possible.²⁶

²⁴ AEMC, *2022 Integrated System Plan*, June 2022, p 61 and AEMC, *Draft 2024 Integrated System Plan*, 15 January 2024, p. 57.

²⁵ AEMO, *2022 Integrated System Plan*, June 2022, p 68.

²⁶ AEMO, *2022 Integrated System Plan*, June 2022, p 67.

The Draft 2024 ISP estimates that network investments in its optimal development plan will deliver \$17 billion in net market benefits for NEM consumers.²⁷ To realise these consumer benefits will need an investment framework that balances networks' need for investment certainty while providing appropriate financial incentives for the new expenditure to be efficiently.

For the reasons outlined above in section 3.2, the Humelink Project involves higher forecasting risks than business as usual transmission projects arising from:

- a relatively high degree of uncertainties to the scope of the Humelink Project, where a significant proportion of the costs of the project are unknown at the time of the CPA;
- the contemporaneous surge in construction projects associated with the energy transition;
- an environment of increasing construction costs; and
- increasing international material costs.

To ensure that there are appropriate signals to invest in the energy transition, these additional construction risks should be balanced by a reduction in the strength of the capex incentive framework. This would benefit consumers because:

- it supports the investment environment for ISP projects, through the tailoring of the capex incentive framework balances any increases in risk that individual project imposes on a networks; and
- a lower incentive framework would mean that the cost paid by consumers would more closely align with the efficient costs of the Humelink Project, rather than rewarding or penalising parties because of uncertainty in the scope of the project when the CPA decision was made.

3.4 Views of stakeholders

The final factor that the AER states that it will have regard to when considering the incentive framework to apply to large transmission projects, such as Humelink are the views of stakeholders.

We understand that the Transgrid Advisory Council (TAC) has been briefed on reasons why a lower capex incentive framework for Humelink is in the best interest of consumers. Further, Transgrid will soon begin its public consultation on Humelink Project where stakeholders will have the opportunity to express their views on the capex incentive framework.

²⁷ AEMO, 2022 Draft 2024 Integrated System Plan, 15 January 2024, p. 69.

4. Current incentives applying to Humelink

This section assesses the financial incentives on Transgrid in relation to its capital expenditure on Humelink if the CESS were to apply without variation to this expenditure. Specifically, the financial impact of the current CESS where Transgrid is penalised by 30 per cent of any capex overspend or alternatively rewarded with 30 per cent of any capex underspend.

Given the forecast capital cost of Humelink is \$4.9 billion (real 2023), the financial impact of an application of the CESS to any over or underspend on this project would be substantial.

Table 4-1 sets out the financial penalties under the CESS of various constant percentage overspends on Humelink.

Table 4-1: Incentive penalties of constant percentage overspends – CESS unchanged

Overspend (%)	Overspend (\$m FY28 NPV)	CESS penalty (\$m FY28 NPV)	Incentive rate (with CESS)	Incentive rate on equity (with CESS)
5%	\$310.4	\$93.1	30.0%	75.0%
10%	\$620.8	\$186.2	30.0%	75.0%
15%	\$931.2	\$279.3	30.0%	75.0%
20%	\$1,241.5	\$372.5	30.0%	75.0%
50%	\$3,103.9	\$931.2	30.0%	75.0%

Assuming a 5.77 per cent nominal WACC, 2.77 per cent real WACC, an inflation forecast of 2.92 per cent and an assumed gearing ratio of 60 per cent consistent with Transgrid's 2023-28 regulatory determination.

Table 4-1 shows that if the CESS were to apply and if Transgrid overspends on Humelink by a constant 5 per cent it would incur a financial penalty of \$93.1 million in present value terms (in real 30 June 2028 dollar terms), while a constant overspend of 20 per cent would result in a financial penalty of \$372.5 million. Noting that this penalty presumes that Transgrid is able to finance any Humelink overspend with a combination of both debt (60 per cent) and equity (40 per cent), as discussed in section 5.3.2 the penalty would be greater if the overspend must be financed by equity alone.

While Transgrid bears 30 per cent of the cost of any overspend under the CESS, the impact on equity owners would be magnified since the overspend costs would be borne entirely by equity owners. Debt owners are always paid in full, and so equity owners would lose 75.0 per cent of their contributed equity. The high incentive rate on equity arising from the current CESS sharing ratio of 30 per cent means that the firm will be very sensitive to:

- projects where the actual costs may differ substantially from that forecast capex allowance; and
- large projects where the risks in the variation in project costs cannot be diversified within a portfolio of projects.

As discussed in section 3, the characteristics of the Humelink project is significantly greater than Transgrid's total non-ISP capex for the 2023-28 regulatory period. Further, the Humelink project has significantly higher forecasting risk than Transgrid's business as usual capex. Consequently, the application of the CESS unaltered to the Humelink project means that if these risks result in higher than expected costs it can have a material impact on Transgrid's total profitability and financeability.

Example of a 5 per cent constant overspend

- \$310.4 million is the present value (in real 30 June 2028 dollar terms) of the overspend
- \$124.2 million is the equity portion of the overspend (ie, 40% of \$310.4 million)
- \$93.1 million is the present value (in real 30 June 2028 dollar terms) of the financing costs borne by equity owners
- 75.0% is the loss made by equity owners on their portion of the overspend (ie $\$93.1\text{m} \div \124.2m)

The quantum of financial penalties (or rewards) that would possibly be imposed on Transgrid from applying the CESS to Humelink are substantially higher than that experienced by other TNSPs to date, due to the size of the required investment.



5. Impact of altering the financial incentives on Humelink capex

This section assesses the financial implications of the following two potential changes to the incentive framework applying Humelink capex:

- Scenario A – where Humelink capex is excluded from the CESS; and
- Scenario B – where the CESS sharing ratio applying to Humelink capex is set at zero.

The remainder of this section outlines the consequences of a potential ex-post review of Humelink capex, as well as calculating the financial impact of an assumption that Transgrid must finance any Humelink capex with only equity over the 2023-28 regulatory period.

5.1 Scenario A - Excluding Humelink capex from the CESS

The first scenario changes the current capital expenditure incentive framework to exclude Humelink expenditure from the CESS. The exclusion of expenditure from the CESS means that Humelink would only be exposed to the ex-ante financial incentive imposed by the AER's underlying building block framework, although it would continue to be subject to the risks of an ex-post capex review (discussed further below in section 5.3.1).

The financial incentive arises because during the regulatory period, where revenues are based on forecast capex, a network does not earn a real return on any capex above that allowed in the network's capex allowance. It is only at the start of the subsequent regulatory period that the capex overspend is recognised in the RAB and the network begins to earn a return on its actual investment.

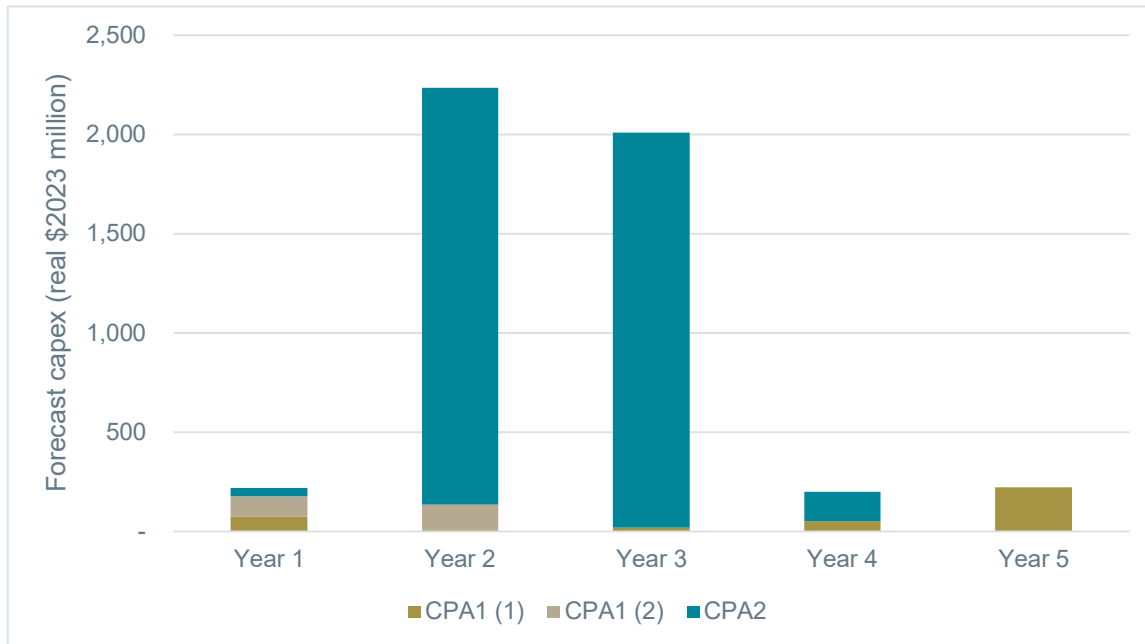
In the absence of the CESS, the capex incentive depends on when in the regulatory period the capex overspend occurs. That is, Transgrid is penalised:²⁸

- 10.1 per cent of the overspend in year 1 of the regulatory period;
- 7.6 per cent of the overspend in year 2 of the regulatory period;
- 5.2 per cent of the overspend in year 3 of the regulatory period;
- 2.6 per cent of the overspend in year 4 of the regulatory period; and
- zero per cent of the overspend in year 5 of the regulatory period.

It follows that the financial penalty of any overspend will depend on when that overspend occurs. Figure 5-1, sets out the expected time profile of capex on Humelink based on Transgrid's CPA2 (with the year within the regulatory period denoted in the brackets).

²⁸ Based on Transgrid's real WACC of 2.77 per cent for the first year of its 2023-28 regulatory period.

Figure 5-1: Time profile of forecast expenditure on Humelink



Source: HoustonKemp analysis

Figure 5-1 highlights that to meet the targeted completion date, expenditure will be incurred in the first four years of Transgrid’s regulatory determination period, with:

- 4.5 per cent expected to be incurred in year 1 of the regulatory period;
- 45.8 per cent expected to be incurred in year 2 of the regulatory period;
- 41.1 per cent expected to be incurred in year 3 of the regulatory period;
- 4.1 per cent expected to be incurred in year 4 of the regulatory period; and
- 4.5 per cent expected to be incurred in year 5 of the regulatory period.

Table 5-1 sets out the financial penalties of a constant percentage overspend on Humelink.

Table 5-1: Scenario A - Incentive penalties of a constant percentage overspend

Overspend (%)	Overspend (\$m FY28 NPV)	Financing cost (\$m FY28 NPV)	Incentive rate (No CESS)	Incentive rate on equity (No CESS)
5%	\$310.4	\$19.3	6.2%	15.6%
10%	\$620.8	\$38.7	6.2%	15.6%
15%	\$931.2	\$58.0	6.2%	15.6%
20%	\$1,241.5	\$77.3	6.2%	15.6%
50%	\$3,103.9	\$193.3	6.2%	15.6%

Assuming a 5.77 per cent nominal WACC, 2.77 per cent real WACC, an inflation forecast of 2.92 per cent and an assumed gearing ratio of 60 per cent consistent with Transgrid’s 2023-28 regulatory determination. Note that incentive rate will vary if the Humelink Project percentage overspend varies each year of the project.

Table 5-1 shows that in the absence of the CESS, if Transgrid overspends on Humelink by a constant 5 per cent it would incur a financial penalty of \$19.3 million in present value terms (in real 30 June 2028 dollar terms), while a constant overspend of 20 per cent would result in financial penalty of \$77.3 million.

Transgrid would bear 6.2 per cent of the costs of a uniform overspend on Humelink. However, the impact on equity owners would be magnified since the overspend costs would be borne entirely by equity owners. Debt owners would be paid in full, with equity owners losing 15.6 per cent of their contributed equity.

Example of a 5 per cent constant overspend

- \$310.4 million is the present value (in real 30 June 2028 dollar terms) of the overspend
- \$124.2 million is the equity portion of the overspend (ie, 40% of \$310.4 million)
- \$19.3 million is the present value (in real 30 June 2028 dollar terms) of the financing costs borne by equity owners
- 15.6% is the loss made by equity owners on their portion of the overspend (ie \$19.3m ÷ \$124.2m)

I note that a removing Humelink capex from the CESS, means that the financial penalty of a constant 5 per cent overspend on the Humelink Project is equivalent to the penalty of an overspend on Transgrid's non-ISP capex (on which the CESS applies) of 5 per cent.²⁹ The lower incentive rate would make it easier for the risks of the Humelink Project to be diversified within Transgrid's portfolio of non-ISP projects.

5.2 Scenario B - CESS with a zero sharing ratio

The second scenario adjusts the current capex incentive framework so that the CESS sharing ratio applying to Humelink expenditure to zero. Under this scenario Transgrid recovers the full economic cost of all Humelink capital expenditure, notwithstanding whether actual Humelink capital expenditure is above or below the capex allowances included the relevant contingent project application decisions.

This scenario would again exclude Humelink capex from Transgrid's general CESS model, which would continue to apply a 30 per cent sharing ratio for non-Humelink capex. Transgrid would submit a separate Humelink CESS model with a zero sharing ratio, which would calculate the amount of CESS payments associated with Humelink capex.

Table 5-2 sets out the financial penalties of a constant percentage overspend on Humelink, when the CESS applies a zero sharing ratio.

²⁹ A CESS penalty of \$19.3 million (NPV \$2028) would require Transgrid to overspend of its non-ISP capex by approximately 5%. In other words, a CESS penalty of \$19.3 million (NPV \$2028) would be generated by an overspend of \$64.4 million (real \$2023) (ie, \$19.3 million divided by 30%), which is approximately 5% of Transgrid's non-ISP capex of \$1,332.7 million (real \$2023).

Table 5-2: Scenario B - Incentive penalties of a constant percentage overspend

Overspend (%)	Overspend (\$m FY28 NPV)	Financing cost (\$m FY28 NPV)	Incentive rate (0% CESS)	NPV of CESS payments (\$m FY28 NPV)
5%	\$310.4	\$0	0%	\$19.3
10%	\$620.8	\$0	0%	\$38.7
15%	\$931.2	\$0	0%	\$58.0
20%	\$1,241.5	\$0	0%	\$77.3
50%	\$3,103.9	\$0	0%	\$193.3

In effect the zero CESS sharing ratio sets the CESS payments in the following regulatory period to recover the financing costs arising because revenues during the regulatory period did not include the real return on any Humelink capex overspend.

I note that under this scenario, if Transgrid is able to finance the overspend with the benchmark mix of equity (40 per cent) and debt (60 per cent) there would be limited ex-ante financial incentives for Transgrid to efficiently minimise its Humelink expenditure. However, Transgrid would continue to be motivated to efficiently deliver the Humelink Project by:

- the possibility of an ex-post review by the AER where Transgrid would bear 100 per cent penalty on any expenditure found to be inefficient (this is discussed in greater detail below in section 5.3.1);
- the operation of the Humelink governance and assurance plan which is designed to ensure the efficient delivery of the Humelink Project (this is discussed in greater detail below in section 5.3.2); and
- if any overspend on Humelink can only be financed with equity then a zero CESS sharing ratio would still impose financial incentives to encourage Transgrid to minimise Humelink construction expenditure (this is discussed in greater detail below in section 5.3.3).

5.3 Other additional potential mechanisms for capex efficiency

This section sets out three efficiency mechanisms that potentially ensure the efficient delivery of the Humelink Project and would apply in addition to the incentives outlines in Scenario A and B.

5.3.1 Ex-post capex adjustments

The National Electricity Rules (NER) provides the AER with a limited discretion to review the amount of capex rolled into the RAB to ensure its consistency with certain efficiency-based requirements.³⁰ One of the circumstances that the AER may write down the value of capex to be rolled into the RAB is when the overspending requirement is satisfied.

The overspending requirement applies when the sum total of capex incurred by the TNSP exceeds the sum of forecast capex that has been accepted or substituted by the AER over the 'review period', which covers:³¹

- the previous control period (excluding the last two regulatory years of that control period); and
- the last two regulatory years of the regulatory control period immediately preceding.

³⁰ NER, clause S6A.2.2A.

³¹ NER, clause 6A.2.2A(a1).

The AER may exclude some or all of the overspend if it concludes that the overspend does not meet the capex criteria set out in the NER, ie, it is not prudent and efficient. In making a determination on whether the overspending requirement has been met, the AER must only take into account information and analysis that the TNSP could reasonably be expected to have considered or undertaken at the time it undertook the relevant capex.

Under the current NER, Humelink could potentially be subject to three potential ex-post reviews (and adjustments) if the overspending requirement is met, with:

- capex incurred in FY2018 to FY2021 would have been within the 'review period' assessed by the AER in Transgrid's 2023-28 determination;
- capex incurred in FY2022 to FY2026 is within the 'review period' to be assessed by the AER in Transgrid's 2028-33 determination; and
- capex incurred in FY2027 and beyond would fall into the 'review period' to be assessed by the AER in Transgrid's 2033-38 determination.

I note that the Australian Energy Market Commission (AEMC)'s Transmission planning and investment review Stage 3 final report (May 2023) recommended rule changes to facilitate a targeted ex-post review mechanism for completed ISP projects. The new ISP ex-post review mechanism would:³²

- separate the review of ISP project capex, which would commence when the project is completed and would be triggered where total ISP capex is greater than forecast for the project; and
- change the period over which the ISP project capex is reviewed to cover all project expenditure.

To date, a proposal for this rule change has not been received by the AEMC.³³

The possibility of the AER conducting an ex-post review provides a further significant incentive for Transgrid to minimise capex on Humelink to both:

- ensure that it is able to demonstrate that expenditure was prudent, in the event that an ex post review is triggered, and the relevant review period includes Humelink capex; and
- reduce the risk of the over-spending requirement being met and therefore of an ex-post review being triggered, by ensuring that Transgrid's total capex over the 'review period' is less than that forecast including the contingent projects.

5.3.2 Humelink governance and assurance plan

I understand that Transgrid has established a robust governance and assurance plan to ensure the efficiency and prudence of all Humelink expenditure. This governance plan covers the competitive procurement of ITC D&C contracts for both the Humelink Eash and West packages, which is estimated by Transgrid to save consumers \$237 million compared to a fixed price D&C contract.

A feature of the Humelink ITC D&C contract is that contractors have entered into a gain/pain share arrangement which shares the risks of the reimbursable costs and incentivises the contractor to minimise these costs.

HumeLink will follow the Prescribed Network Capital Investment Process (PNCIP) which sets out Transgrid's network capital investment process to justify, govern, and optimise investments for assets that deliver prescribed transmission services.

Key objectives of this framework are to:

³² AEMC, *Transmission planning and investment review | Final report*, 4 May 2023, pp 37-38.

³³ <https://www.aemc.gov.au/our-work/changing-energy-rules/rule-changes>, accessed 29 January 2024.

- deliver value to Transgrid's customers;
- manage the risks of the project delivery;
- deliver a fit for purpose asset that can be safely and efficiently operated over its design life;
- deliver zero critical risk harm events for workers and the general public;
- provide on-going engagement with stakeholders and community; and
- preserve Transgrid's social licence through a safe, environmentally sustainable and culturally respectful approach.

Due to the significant level of complexity, scale and stakeholder interest the Humelink Project has a detailed governance and assurance plan developed by a dedicated Project Director and Project Team.

The governance and assurance plan clearly defines the governance structure, roles, accountabilities and reporting to be applied to the project. As well as insuring that there is a process of identifying and performing independent and objective reviews to confirm that the ongoing work undertaken is appropriate and complete to the agreed quality and that the risks are known, and effective controls and mitigations are in place.

I understand that plan reflects good industry practice and framework for efficiently delivering the Humelink Project.

5.3.3 Implications of overspends being financed by equity

I have been asked to assess the financial implications of a scenario where Transgrid cannot use debt to finance any overspend on Humelink until the overspend is rolled into the asset base. In other words, a scenario where any expenditure above the capex allowance must be financed using only equity rather than a combination of debt (60 per cent) and equity (40 per cent).

A requirement to finance any Humelink overspend with equity, rather than a combination of debt and equity, increases the financing costs to Transgrid during the 2023-28 period. Higher financing costs arise because the cost of equity is higher than the WACC, as businesses use a combination of debt and equity to lower the cost of financing investments.

Table 5-3 sets out the financial penalties of a constant percentage overspend on Humelink, if only equity is used to finance Humelink overspend during the 2023-28 period.

Table 5-3: Incentive penalties of a constant percentage overspend if financed only be equity

Overspend (%)	Overspend (\$m FY28 NPV)	Financing cost (\$m FY28 NPV)	Unmodified CESS (30% sharing)	Incentive rate (No CESS)	Modified CESS (0% sharing)
5%	\$310.4	\$31.4	33.9%	10.1%	3.9%
10%	\$620.8	\$62.8	33.9%	10.1%	3.9%
15%	\$931.2	\$94.1	33.9%	10.1%	3.9%
20%	\$1,241.5	\$125	33.9%	10.1%	3.9%
50%	\$3,103.9	\$318.8	33.9%	10.1%	3.9%

Assuming a 7.48 per cent cost of equity, 5.77 per cent nominal WACC, 2.77 per cent real WACC, an inflation forecast of 2.92 per cent consistent with Transgrid's 2023-28 regulatory determination and an assumption of a gearing ratio of 0 per cent for Humelink overspend for the 2023-28 regulatory period.



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