TSA Riley

Review of Aspects of Ergon Energy Replacement Expenditure

Opinion re EMCa review of aspects of Ergon Energy proposed replacement expenditure

21 October 2024

Document Control

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1. Introduction

1.1 Purpose

The Australian Energy Regulator (AER) engaged Energy Market Consulting Associates (EMCᵃ) to undertake a technical review of aspects of the replacement expenditure (repex) and augmentation expenditure (augex) proposed by Ergon Energy (part of Energy Queensland Limited (EQL)) in its regulatory proposal for the 2025-30 Regulatory Period. The EMCᵃ findings in turn informed AERs *Draft Decision – Ergon Energy Electricity Distribution Determination 2025-2030* (September, 2024).

Ergon Energy (Ergon) is contesting elements of the EMCᵃ Report (August, 2024) and are seeking an independent review of some of its key findings. They have engaged TSA Riley to provide an independent opinion on findings 23, 24 and 25 of the EMCᵃ Report (August, 2024), which relate to the application by Ergon of Cost Benefit Analysis (CBA) methods to the evaluation of repex.

The purpose of this report is to provide our independent opinion on the application of CBA methods to the evaluation of repex, in relation to findings 23, 24 and 25 of the EMCᵃ Report (August, 2024).

1.2 Scope of this review

This report is limited to the provision of an opinion with respect to findings 23, 24 and 25 only. The report does not offer an opinion on other findings from the EMCᵃ Report (August, 2024) nor does it provide an opinion on other aspects of the AER Draft Decision (DD). It does not review other CBA input assumptions and approaches to benefit valuation.

2. Context

EMCᵃ reviewed aspects of the replacement expenditure (repex) and augmentation expenditure (augex) proposed by Ergon in its regulatory proposal for the 2025-30 Regulatory Period. Their report concluded that:

"*CBA methods applied for the proposed repex include some fundamental flaws*"[1]

To support this statement, they documented the following three findings:

EMCᵃ findings re CBA methods and modelling assumptions

23. *By specifying the counterfactual as a continuation of Ergon's current practice for the ex ante forecast, the Cost Benefit Analysis (CBA) that Ergon has utilised provides no assessment of the net benefits of its proposal. Instead, the CBA effectively assumes (without demonstrating this) that the current replacement level and associated replacement policy has a net benefit and then measures only the variance in NPV of standardised alternative options relative to this.*

24. *The preferred option is presented as providing a more positive NPV result when compared with the options that Ergon has assessed. However, this is predicated on what we consider to be an invalid assumption that the counterfactual is a continuation of the investment option that Ergon is currently undertaking and which is higher than the long-term average.*

25. *Our concerns with Ergon's analysis and modelling assumptions cast doubt on Ergon's ability to draw meaningful conclusions from its analysis.*

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[1] EMCᵃ Report (August 2024, p. xii)

The AER broadly reflected these findings in its DD stating that:

"*we found a lack of robust cost benefit analysis to support its forecast including incorrect application of the counterfactual*"[2]

Ergon contests this finding and believes that the selection of base case is appropriate and that the CBA analysis conclusions are robust to alternative base case assumptions. Ergon is seeking an independent opinion to substantiate or negate their position.

3. Our Approach

We followed the below approach to undertake our independent review of the EMC[a] Report (August, 2024),

Data Acquisition:

- We reviewed the following documents:
  - the EMC[a] Report (August, 2024)
  - selected Ergon repex Business Cases, including the Pole Replacements Business Case (January, 2024)
  - Attachment 5 Capital Expenditure of the AERs Draft Decision – Ergon Energy Electricity Distribution Determination 2025-2030 (September, 2024).
- We engaged with key Ergon stakeholders, including those involved in the preparation of repex business cases and in the ongoing engagement with AER and EMC[a] during the development of the AER DD.

Analysis of EMC[a]'s findings

- We tested the validity of Ergon's counterfactual:
  - Reviewing Ergon's proposed counterfactual against industry principles
  - Assessing the validity of Ergon's proposed counterfactual in the context of a Pole Replacement Business Case
- We tested the impact of different counterfactuals on the outcomes of the CBA
  - Reviewing if alternative base case change CBA conclusions
  - Assessing when the selection of a counterfactual could affect the outcomes of a CBA.

The following sections provides details of our analysis and findings and how it led to our final opinion against EMC[a] findings 23, 24 and 25.

4. TSA Riley's Independent Opinion

Following the review of the data outlined in section 3, it is the independent opinion of TSA Riley that

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[2] Attachment 5 Capital Expenditure of the AERs Draft Decision – Ergon Energy Electricity Distribution Determination 2025-2030 (September 2024,

p.19).

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TSA Riley Independent Opinion

EMC[a] findings 23, 24 and 25 cannot be substantiated. Ergon's selection of counterfactual does not invalidate their analysis. Meaningful conclusions can be drawn from the analysis presented in the Pole Replacement Business Case (January 2024) and other repex business cases supporting Ergon's proposed repex expenditure.

There appears to be no barrier to EMC[a] and the AER proceeding to evaluate the validity of the CBA modelling more broadly.

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Our opinion is underpinned by the following observations:

1. **It would be unrealistic for a counterfactual (base case) to include no capital expenditure for replacement works in the context of a portfolio of ageing assets where a duty of care exists to adhere to electrical safety standards**. It would not be realistic or 'business-as-usual' for Ergon to have no rolling replacement works program and further, a zero-replacement assumption would also conflict with accepted industry principles regarding base case specification.

2. Ergon's decision to specify **a base case** in the Pole Replacement Business Case **that reflects continuation of current practice (i.e. continuation of recent repex expenditure) is defendable**, particularly within an environment where observed failure rates indicate that any reduction in replacement expenditure may put Ergon at continued risk of failing to meet regulatory standards.

3. The Pole Replacement Business Case **'Option 3 – Repex Live Scenario' also represents a defendable**, albeit conservative, **alternative lower spend base case.**

4. **Even if the alternative lower spend Option 3 – Repex Live Scenario' was adopted as the base case, it would not invalidate Ergon's current** Pole Replacement Business Case **CBA analysis and conclusions**.

5. Our Analysis

This report uses the Pole Replacement Business Case (January 2024) as an example for demonstrating findings and opinions as it represents the largest single component of the proposed Ergon repex. Our analysis still applies for other similar repex CBA assessments prepared by Ergon.

5.1 Testing the validity of Ergon's counterfactual

Reviewing Ergon's proposed counterfactual against industry principles

In CBA, the counterfactual or 'base case' sets the critical baseline against which you analyse the economic impacts of an investment.

The appropriate specification of a base case is frequently debated and a point of contention in project evaluation. Whilst business case and CBA frameworks available across jurisdictions document various principles regarding base case specification, the principles remain, to some extent, open to interpretation. A summary of some of the key principles contained within other industry accepted guidance is tabled below.

Table 1 Principles guiding base case development

Infrastructure Australia Assessment Framework	Queensland Government Business Case Development Framework and Project Assessment Framework	NSW Government Guide to Cost-Benefit Analysis
The base case should identify the expected outcomes of a 'do-	The base case should represent a realistic, practicable and workable	It is a 'business as usual' situation, sometimes referred to as the

Infrastructure Australia Assessment Framework	Queensland Government Business Case Development Framework and Project Assessment Framework	NSW Government Guide to Cost-Benefit Analysis
minimum' situation, assuming the continued operation of the network or service under good management practices	assessment of the business-as-usual (BAU) state	'counterfactual.
We recommend the committed and funded expenditure approach to defining the base case, but recognise that some states and territories use the planning reference case approach	Practical examples of base case considerations: • minimum expenditure to keep the asset/infrastructure operationally safe • Reasonable changes that could be 'reasonably expected' to happen given statutory obligations and/ or professional standards (including modest spending to improve the effectiveness of existing assets and to maintain social licence to operate)	Assumes Government policies remain as they are and generally retains the status quo. That is, continuation of current quantity and quality of services including planned maintenance and usage. Some base cases can be described as a 'do-minimum' scenario: there is a commitment to or unavoidable need for some further investment to maintain current service standards, keep services or infrastructure safe and operational, or meet legislated requirements.
General operating, routine and periodic maintenance costs will continue to occur, plus a minimum level of capital expenditure to maintain services at their current level without significant deterioration. This may include asset renewals and replacement of life-ending components on a like-for-like basis, as well as committed and funded projects and smaller scale changes required to sustain viable operations under the base case	In some circumstances, the BAU may represent a do-minimum, CAPEX spend where the level of service is sustainable from a social licence, legal or regulatory perspective.	Typical characteristic of a base case include: • that existing infrastructure is maintained according to current funding commitments or at the minimum level to remain safe and operating • End-of-life assets typically replaced (with a new asset of comparable standard) if required to remain safe and operating

Sources: Infrastructure Australia Assessment Framework – Guide to Economic Appraisal (July, 2021); Queensland Government Business Case Development Framework – Stage 3 Detailed Business Case Guideline (release 3.1, 2024); TPG23-08 NSW Government Guide to Cost-Benefit Analysis (March, 2023)

Some of the key shared principles across the frameworks include that:

- It is generally unrealistic for the base case to be a zero spend or 'do nothing' situation.

- A base case should be realistic and represent a business-as-usual state of the world.

- Expenditure to maintain a minimum acceptable level of service should be included in a base case. Considerations in determining the minimum acceptable level of service include meeting service standards/regulatory standards, keeping infrastructure safe and operational, and maintaining a social licence.

- A base case may include asset renewals and replacements.

Guidance from the AER with respect to the base case includes the following:

"When analysing options for asset retirement or de-rating decision-making, the counterfactual (or base case) represents the 'business-as-usual' (BAU) cost of service. That is, the expected cost that would be incurred if the asset is not retired or de-rated, but remains in service, operated, and maintained on a BAU basis"[3]

Whilst the starting point for a base case under AER guidance would be to assume assets are 'not retired or de-rated, but remain in service, operated, and maintained on a BAU basis', the guidance does goes on to say: -

"The counterfactual represents the costs that consumers would incur if the asset continued to be operated under the standard operating and maintenance practices that the business would generally apply. This can be thought of as the costs that would arise in the case of 'doing noting [sic] materially different' from the usual practices of the business under its usual asset management practices"[4]

This further guidance indicates that **if the usual practices of a business would always involve a degree of asset replacement expenditure each year, inclusion of replacements is defendable**.

It is TSA Riley's opinion that **it would be unrealistic for a base case to include no capital expenditure for replacement works in the context of a portfolio of ageing assets where a duty of care exists to ensure adherence to electrical safety standards**. It would not be realistic or 'business-as-usual' for Ergon to have no rolling replacement works program. A zero-replacement assumption would also conflict with accepted industry principles regarding base case specification (Table 1).

Applying base case principles to the Pole Replacement Business Case

A regulatory standard set via the *Queensland Electrical Safety Codes of Practice (ESCOP) 2020 – Works* includes, amongst other requirements, achievement of a minimum three-year average reliability of 1:10,0000 pole failure per annum (ESCOP s5.1). This translates to a limit of 97 pole failures per annum for Ergon to conform to the legislative performance targets. The 3-year moving average of the actual observed failures (as reported on page 24 of the Pole Replacements Business Case) is sitting above the regulatory standard (Figure 1).
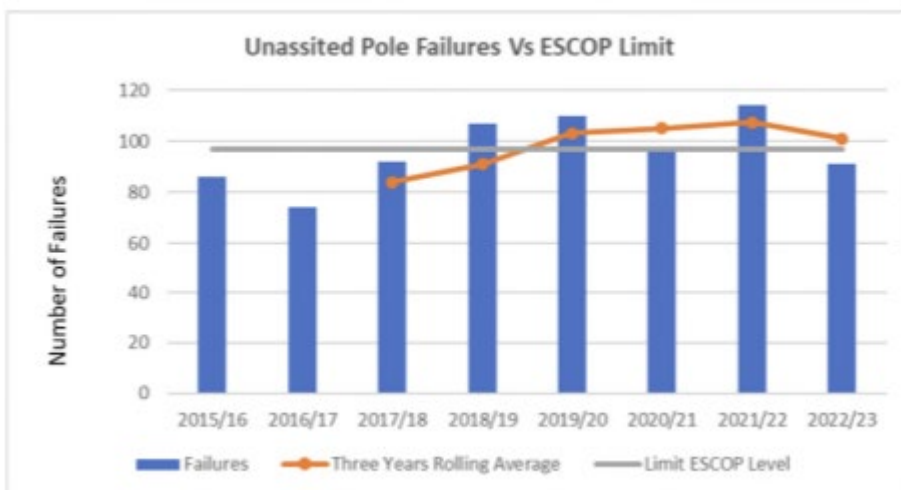

Figure 1 Extract from Pole Replacements Business Case (Unassisted Pole Failures Vs ESCOP Limit, , p.32)

Reflecting on the various industry guidance available regarding base cases, This regulatory context further confirms TSA Riley's opinion that Ergon's decision to specify **a base case in the Pole Replacement Business Case that reflects continuation of current practice is defendable,** particularly within an environment where observed failure

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[3] AER Industry Practice Application Note Asset Replacement Planning (2019, p.27)
[4] AER Industry Practice Application Note Asset Replacement Planning (2019, p.27)

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rates indicate that any reduction in replacement expenditure may put Ergon at continued risk of failing to meet regulatory standards.

Notwithstanding this opinion, one could argue for an alternative base case that involves a substantially lower level of repex in accordance with what has been presented in the Pole Replacement Business Case as 'option 3' (see Figure 2). Such a base case could be defended on the basis that modelled failure rates may, under this scenario, remain marginally below regulated limits. Further, by virtue of option 3 being presented as a potential option in the business case, it can also be argued that this represents an acknowledgement by Ergon that the option represents a viable and realistic 'do-minimum' investment.
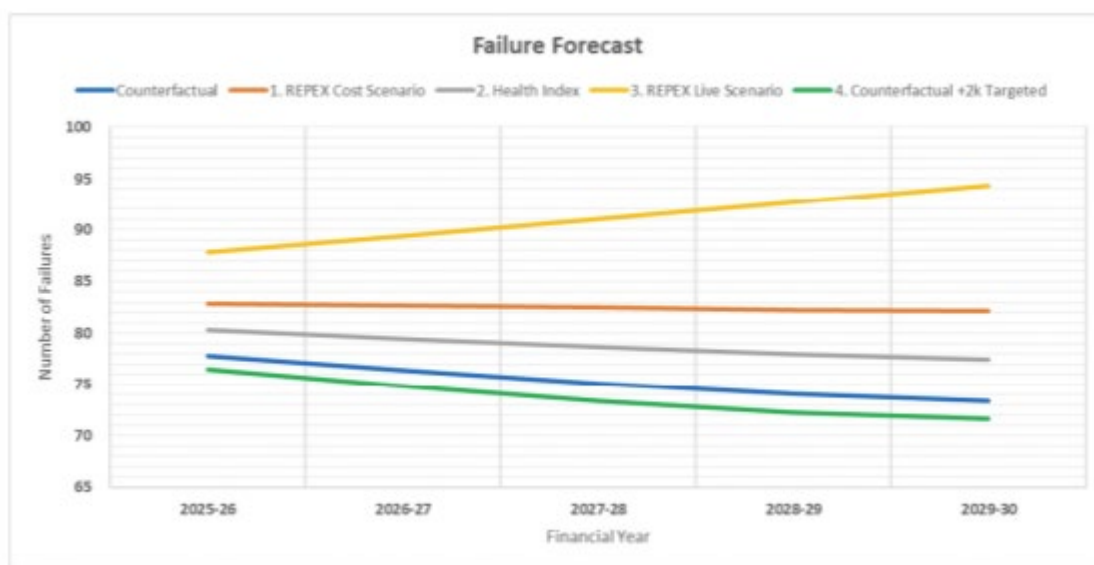

Figure 2 Extract from Pole Replacements Business Case (Failure Forecast Intervention Options, p.32)

It is TSA Riley's opinion that the Pole Replacement Business Case '**option 3 – Repex Live Scenario' represents a defendable, albeit conservative, alternative base case** (counterfactual). Option 3, putting aside regulatory obligations, is a defendable do minimum approach as the level of replacements is close to what Ergon was delivering prior to the recent uplift in volumes.

In TSA Riley's opinion a materially lower level of investment to option 3 would almost certainly result in pole failure rates exceeding regulatory standards. Also, as further explained below, **the adoption of an even lower spend base would not, in any way, invalidate Ergon's Pole Replacement CBA analysis and conclusions**.

5.2   Testing the impact of counterfactual choice on CBA outcomes

Reviewing if an alternative base case changes the CBA conclusions

The Pole Replacement Business Case applies a form of incremental analysis and determines the incremental Net Present Value (NPV) of options relative to the counterfactual. This represents an appropriate form of analysis for choosing between options where each option involves different scales of the same initiative (i.e. different levels of pole replacement). These features are common to other business cases prepared by Ergon for repex expenditure. The level of pole replacement under each option is summarised in Table 2.

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Table 2 Option replacement volumes - Pole Replacement Business Case (January 2024)

Item	Option 1	Option 2	Option 3	Option 4	Counterfactual
Replacement volumes	10,413	13,250	5,745	18,622	16,622

EMC[a] finding 23 states that:

"the Cost Benefit Analysis (CBA) that Ergon has utilised provides no assessment of the net benefits of its proposal. Instead, the CBA effectively assumes (without demonstrating this) that the current replacement level and associated replacement policy has a net benefit and then measures only the variance in NPV of standardised alternative options relative to this".[5]

As each option considered in the Pole Replacement Business Case and other repex business cases presented by Ergon involve different scales of the same initiative, incremental NPVs reported are additive.

That is, given three investments in order of scale A, B and C, where NPV (A-C) refers to the incremental NPV of investment A relative to investment C,

NPV (A – C) = NPV (A – B) + NPV (B – C)

so long as the scope of C is contained within (is a subset of) B and in turn A. Based on discussions with Ergon and a review of option specification, it would be correct to state that, with some very limited exceptions, the specific 5,745 poles included in option 3 are contained within the 10,413 poles in option 1 that are in turn contained within the 13,250 poles in option 2 etc.

Given this, TSA Riley contests EMC[a] finding 23 on the basis that Ergon have presented in the Poll Replacement Business Case and other repex business cases a range of additive investments, including options involving a smaller scale of investment to the identified counterfactual (i.e. Pole Replacement option 3 – 5,745 polls replaced) as well as a larger scale of investment (i.e. Pole Replacement option 4 – 18,622 polls replaced) thus enabling conclusions to be reached regarding the benefits associated with the counterfactual itself.

Table 3 below presents what the outcomes of the analysis would be if the least cost option 3 (5,745 polls replaced) is instead selected as the counterfactual. The calculation of incremental NPV options, including the old counterfactual, against the new counterfactual can be easily undertaken given that each option represents a different scale of the same initiative.

Table 3 Incremental NPV associated with alternative base case - Pole Replacement Business Case

Item	Option 1	Option 2	Option 3 (New counterfactual)	Option 4	Option 5 (Old Counterfactual)
Replacement volumes	10,413	13,250	5,745	18,622	16,622
Net NPV	$1,248	$1,601	$0	$2,075	$1,947
Investment Risk	Low	Low	Very low	High	Medium*

[5] EMC[a] Report (August 2024, p. xii)

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Item	Option 1	Option 2	Option 3 (New counterfactual)	Option 4	Option 5 (Old Counterfactual)
Delivery constraint	Low	Low	Very low	Med	Low/Medium*
Ranking by NPV only	4	3	5	**1**	2
Ranking after considering risk and deliverability	4	3	5	2	**1**

Investment risk and delivery constraints are a function of the volume of replacements targeted in any one year. Consequently, the ratings assigned to option 5 (old counterfactual) are assumed to lie between the ratings assigned in the business case for option 4 and option 2.

As can be seen in Table 3, **adopting** the least cost option presented by Ergon (**Option 3) as the counterfactual does not invalidate Ergon's Pole Replacement Business Case CBA analysis and conclusions**. A continuation of current levels of repex (16,622 replacements p.a.) remains the preferred investment option with an NPV of $1,947.

Whilst it is acknowledged that the above arguments have not sought to prove that option 3 (the new counterfactual) itself would deliver net benefits to a theoretical zero replacement scenario, this fact is not relevant if it is accepted that option 3 represents the minimum acceptable spend that would occur under BAU. For the reasons outlined in section 5.1 and section 5.2 above, **it is TSA Riley's opinion that a base case or counterfactual involving a capital spend lower than that proposed by option 3 would likely breach well accepted principles of a base case specification**.

On the basis that other repex business cases prepared by Ergon are of a similar nature to Pole Replacement Business Case, **TSA Riley is of the opinion that EMC[a] findings 23, 24 and 25 cannot be substantiated. Ergon's selection of counterfactual does not invalidate their analysis. Meaningful conclusions can be drawn from the analysis presented**. Consequently, **there appears to be no barrier to EMC[a] and the AER proceeding to evaluate the validity of the CBA modelling more broadly.**

Selection of the counterfactual – when it matters and when it doesn't

Two hypothetical examples are presented below to demonstrate when the selection of the counterfactual is relevant to CBA conclusions in circumstances where all options represent different scales of the same initiative.

Referring to Figure 3, assume that a counterfactual (CF) is selected and the incremental NPV of option 1 (Op1) is calculated relative to a counterfactual (the red shaded area). Given the assumed shape of the benefits function (decreasing returns with MB>MC for the first asset replaced), it would follow that the counterfactual itself must exhibit a positive NPV. Selection of an alternative lower spend counterfactual would not negate the conclusion that option 1 is the preferred investment. In this example, conclusions of the analysis would not be affected by the choice of any counterfactual involving spending less than that proposed by option 1.
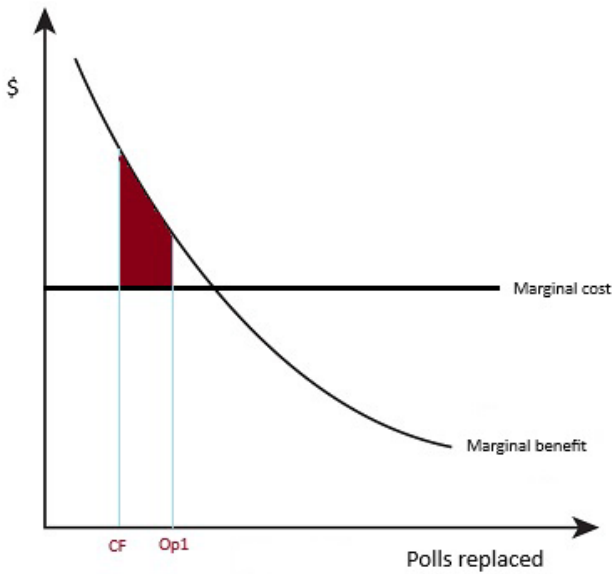
Figure 3 Hypothetical CBA example A

In the second example provided below in Figure 4, a benefits function is presented that initially exhibits increasing returns and then, at higher investment volumes, decreasing returns. Here, at low levels of investment it is the case that MB<MC. The incremental NPV of option 1 relative to a counterfactual (CF) is given by the pink shaded area and option 1 would be correctly identified as superior to CF as it involves a positive incremental NPV.   If we further assume that an alternative counterfactual is selected (CF1), the NPV of option 1 would then be the sum of the pink and orange shaded areas resulting in a negative NPV for option 1 and CF1 being correctly identified as the superior investment. In this example, it is clear that the decision on the conterfactual impacts the conclusions. In a scenario where a counterfactual would be considered valid as a low or zero investment volumes, it would be concluded that this low or zero replacement counterfactual was preferred to any other investment because the area underneath the MC curve and bounded by the MB curve exceeds the area above the MC curve and bounded by the MB curve.
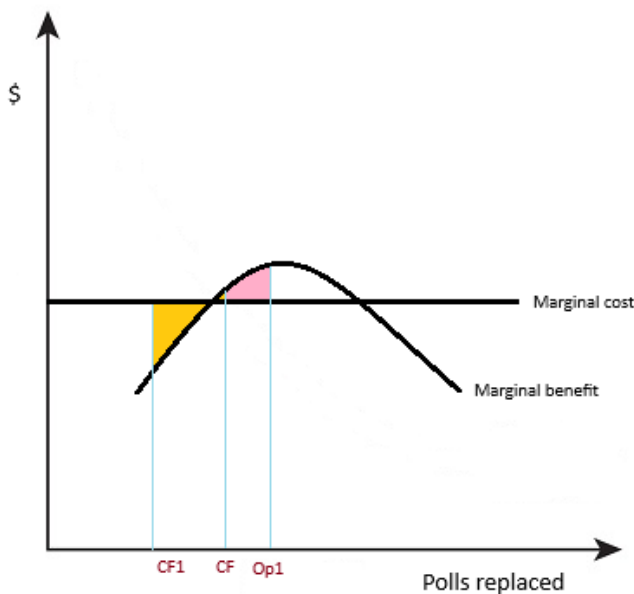

Figure 4 Hypothetical CBA example B

Following discussions with Ergon and a review of the business case documentation, we note that the benefits functions informing each repex business case generally exhibit decreasing returns. This indicates that the marginal benefits are akin to example A provided above. This observation provides further weighting to the **TSA Riley opinion that Ergon's CBA analysis is not invalidated by virtue of what EMC[a] and AER consider to be an 'incorrect' counterfactual specification**.

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