**Attachment: Proposed amendments to AER's RIT-T application guidelines to facilitate the delivery of AEMO's Integrated System Plan**

The Regulatory Investment Test (RIT) is a cost-benefit analysis that network businesses must perform and consult on before making major investments in their networks. Attached are proposed amendments to the AER RIT-T applications guidelines to facilitate the delivery of AEMO's Integrated System Plan.

They cover:

- Mark-ups to AER's RIT-T application guidelines to facilitate the adoption of the identified investment pathway and assumptions in AEMO's Integrated System Plan in the RIT-T.
- A worked example of how this would operate is also provided.

A worked example as to how a transmission extension to a Renewable Energy Zone identified in AEMO's Integrated System Plan should be treated under the RIT-T.

The amendments would be made to section 3.5 and appendix A of the AER's guidelines which set out the methodology for calculating market benefits in a RIT-T and guidance and worked examples on classes of market benefits respectively.

## 3.5 Methodology for calculating market benefits

### States of the world and reasonable scenarios

As set out in the RIT-T, the market benefit of a credible option is obtained by:

i. comparing, for each relevant reasonable scenario*:*

   (A) the state of the world with the credible option in place, with

   (B) the state of the world in the base case

ii. weighting any positive or negative benefit derived in (i) by the probability of each relevant reasonable scenario occurring (or by an alternative weighting where appropriate).[1]

A state of the world is a detailed description of all of the relevant market supply and demand characteristics and conditions likely to prevail if a credible option proceeds or —if the credible option does not proceed—in the base case. A state of the world should be internally consistent in that all aspects of the state of the world could reasonably coexist.

Crucially, the pattern of new generation development (incorporating capacity, technology, location and timing) is likely to vary depending on which credible option (if any) proceeds. Therefore, each credible option—as well as the base case—will be associated with a different state of the world reflecting different patterns of generation investment and other characteristics and conditions.

Where the identified need for a credible option is to meet any of the service standards linked to the technical requirements of schedule 5.1 or in applicable regulatory instruments, the base case may reflect a state of the world in which those service standards are violated. However, this does not alter the need for the use of a certain state of the world in which no credible options are incorporated to provide a consistent point of comparison across all credible options for meeting those mandatory requirements. This is consistent with the requirement in clause 5.16.1(c)(1) of the Electricity Rules that the RIT-T be based on a cost-benefit analysis that includes an assessment of a situation in which no option is implemented.

As noted above, the calculation of the market benefit for a given credible option involves a ~~probability~~ weighting of the benefits arising from that option **across a range of reasonable scenarios**. That is, two states of the world (one with the credible option in place and the other being the base case with no credible option in place) need to be developed in respect of each reasonable scenario.

A reasonable scenario is a set of variables or parameters that are not expected to change across each of the relevant credible options or the base case.

For example, the level of economic growth and the associated level of base electricity demand are key components of a reasonable scenario. In a particular analysis, it may be

[1] Draft note for AER: To allow this amendment to the guidelines to operate the RIT-T should also be amended

appropriate to assess the benefits of a credible option across high, medium and low demand reasonable scenarios. To the extent that a demand-side option leads to lower peak demand under each of these reasonable scenarios, this effect should be accounted for in the states of the world associated with that option in each of those reasonable scenarios. This ensures that the benefits of the demand-side option are transparently calculated separately in high, medium and low demand scenarios, because such benefits of the demand-side option may vary according to the demand scenario.

Likewise, the unit capital and operating costs of generation plant (in $/MW or $/MWh) should be independent of the credible option under consideration. Similarly, the value of any greenhouse or environmental penalties and the value of unserved energy should also be independent of the credible option under consideration.

Notwithstanding the need for ~~probability~~ weighting of market benefits to derive the market benefit of a credible option, the AER expects that TNSPs will continue to provide details of the estimated market benefits of a credible option under each reasonable scenario.

Therefore, the calculation of market benefit **for a given credible option** involves three key steps:

- **deriving** the states of the world with and without the credible option in place in each reasonable scenario
- **comparing** the relevant states of the world with and without the credible option in place in each reasonable scenario to derive the market benefit of the credible option in each reasonable scenario, and
- **weighting** the market benefits arising in each reasonable scenario ~~by the probability of that reasonable scenario occurring~~.

These steps are discussed further below.

### Deriving relevant states of the world

All assets and facilities in existence at the time the RIT-T is applied must, at least initially, form part of all relevant states of the world (both with and without the credible option in place and in all reasonable scenarios).

Beyond taking account of existing assets and facilities, to fully describe a state of the world, a TNSP must derive appropriate committed, anticipated and modelled projects — that is the future evolution of and investment in generation, network and load. Committed, anticipated and modelled projects are defined in the RIT-T.

In deriving relevant states of the world, the TNSP should have regard to transmission and distribution projects that are identified in AEMO's most recent Integrated System Plan (or in any equivalent document published by AEMO) as either being part of the optimal future development path for the NEM or as being part of a relevant ISP scenario. If a TNSP deviates from the relevant future development path in AEMO's most recent Integrated System Plan (or in any equivalent document published by AEMO), the TNSP should clearly set out its reasoning. Such reasoning could include significant market or policy developments that have occurred subsequent to the publication of the ISP.

These projects should be considered to be 'modelled projects' for the purposes of the RIT-T application.

The exception is any network project(s) which forms part of the credible options being considered under that specific RIT-T. This project(s) should not form part of the assumed state of the world without the option in place.

As with existing assets and facilities, committed projects have to form part of all states of the world.

Anticipated projects should be included in all **relevant** states of the world, based on the reasonable judgment of the TNSP.

The choice of modelled projects in a given state of the world will need to be determined based on appropriate market development modelling and consistency with the latest ISP

Market development modelling involves determining what kind of projects (in particular but not limited to generation projects) would be developed in the longer term both with and without the credible option proceeding.

In accordance with paragraph 21 of the RIT-T, market development modelling:

- must be undertaken on a least-cost/central planning-style basis orientated towards minimising the cost of serving load (or allowing load to remain unserved if that is least cost) while meeting minimum reserve levels (least-cost market development modelling), and
- may, where appropriate, be undertaken on a private benefit basis as a sensitivity (market-driven market development modelling).

The reserve margin developed by AEMO may be treated as an exogenous input into a least-cost market development model.

Other assumptions used in the market modelling should reflect those adopted by AEMO in the preparation of its ISP as far as possible, unless the TNSP has a particular reason to deviate from those assumptions (in which case the TNSP should set out this reason). This includes (but is not limited to) assumptions in relation to emission constraints, jurisdictional emissions policies, fuel costs and future generation and other technology costs.

The reason why least-cost market development modelling must be undertaken is that it relies on relatively uncontroversial assumptions and methodologies (derived from operations research), whereas market-driven market development modelling may be strongly influenced by assumptions regarding plant bidding behaviour and ownership.

By enabling the derivation of modelled projects in the presence and absence of a credible option, market development modelling assists in determining the market benefits of the credible option in a given reasonable scenario. For example, market development modelling may assist in determining whether—in high, medium or low reasonable scenarios—a network option is likely to lead to the deferral (or advancement) of new generation investment compared to the relevant base case. To the extent it does, this would constitute a positive (or negative) contribution to the market benefit of the credible option, respectively, in each of those reasonable scenarios.

For example, consider a situation where the identified need is the meeting of a mandatory service standard and there are two credible options that would satisfy that need – a network option and a demand-side response option. This situation would require the derivation of three distinct states of the world (and consequently, three market development scenarios based on appropriate market development modelling) in respect of each reasonable scenario.

Specifically, it would require the derivation of:

- a base case state of the world assuming no implementation of either credible option
- a network state of the world assuming implementation of the network credible option only, and
- a demand-side response state of the world assuming implementation of the demand-side response credible option only, across all reasonable scenarios*.*

**Comparing relevant states of the world**

The market benefit of a credible option in a given reasonable scenario is obtained by comparing the state of the world with the option in place with the base case state of the world. An explanation of how this is achieved for each class of market benefit is outlined below (see Categories of market benefit).

**Undertaking the comparison across all reasonable scenarios**

The derivation of states of the world with and without a credible option in place and the comparison between the credible option and the base case states of the world must be undertaken across all reasonable scenarios.

For example, assuming the same two credible options (a network option and a demand-side option) and three reasonable scenarios (high, medium and low demand), it is necessary to:

- **derive** a network option, a demand-side option and base case states of the world under conditions of high, medium and low demand, and
- **compare** the credible option and base case states of the world under conditions of high, medium and low demand.

This will require nine market development modelling paths to establish nine states of the world*:*

1. network option with high demand
2. demand-side option with high demand
3. base case with high demand
4. network option with medium demand
5. demand-side option with medium demand
6. base case with medium demand
7. network option with low demand

8. demand-side option with low demand, and
9. base case with low demand.

It will then be necessary to compare (1) and (2) against (3), (4) and (5) against (6) and (7) and (8) against (9). This should yield the market benefits of the network option and the demand-side option in each of the three reasonable scenarios.

For this example, assume that the network option has a market benefit of:

- $30 million in a high demand scenario
- $20 million in a medium demand scenario and
- $10 million in a low demand scenario.

Further assume that the demand-side option has a market benefit of:

- $40 million in a high demand scenario
- $10 million in a medium demand scenario and
- $5 million in a low demand scenario.

**Weighting the market benefits arising in each reasonable scenario**

The final step is to weight the market benefits of each credible option arising in each reasonable scenario to derive the market benefit of that credible option.

These weightings may be based on the probabilities of each of the scenarios occurring.

Drawing from the above example, assume that the probability of a:

- high demand scenario is 50 per cent
- medium demand scenario is 40 per cent, and
- low demand scenario is 10 per cent.

Under these assumptions, the market benefit of the:

- network option is $24 million (being 0.5*$30m + 0.4*$20m + 0.1*$10m)
- demand-side option is $24.5 million (being 0.5*$40m + 0.4*$10m + 0.1*$5m).

Alternative weights may also be adopted, particularly where the investment enables the avoidance of a low probability but high consequence event, and where customers are reasonably expected to place a strong preference on avoiding such outcomes.

More detailed examples are provided below in section 3.6.

**[Remainder of section omitted]**

## 3.6 Uncertainty and risk

The AER recognises that at the time of applying the RIT-T the future will be uncertain. Given this, the expected costs and market benefits of a credible option (and therefore the net economic benefit) may be uncertain. This uncertainty may have a material impact on the selection of the preferred option. The following provides information and guidance on how a TNSP can respond to uncertainty when applying the RIT-T.

### Uncertainty regarding market benefits and costs

Where the calculation of the market benefits or costs of a credible option is affected by material uncertainty over the future market supply and demand conditions and characteristics, this is to be primarily reflected in the choice of the **range of reasonable scenarios**. Those reasonable scenarios should reflect the range of potential outcomes. Associated with each reasonable scenario is a probability corresponding to the likelihood of that scenario occurring.

The requirement for market benefits and costs to be ~~probability-~~weighted represents a minor additional step compared to the process under the previous regulatory test of ranking credible options based on market benefits across a range of reasonable scenarios.

#### Market benefits

The market benefit of a credible option is the ~~probability-~~weighted sum of the market benefits of that option arising across all reasonable scenarios. The methodology for assigning ~~probabilities~~ weights to each reasonable scenario will depend on the nature of the reasonable scenarios, and the methodology that has been used to define it.~~for defining the reasonable scenario.~~

The most common approach to weighting reasonable scenarios is expected to be on the basis of the probability of that scenario occurring. However, alternative weights may also be adopted, particularly where the investment enables the avoidance of a low probability but high consequence event, and where customers are reasonably expected to place a strong preference on avoiding such outcomes.

In the case of probability weights the methodology used to define the scenario may be relevant in considering the appropriate weighting. For example, where there is uncertainty about future demand, two different methodologies are possible:

- Under the first approach, a range of equally-spaced values for future demand is chosen, and probability weightings for each of these values chosen. Extreme values of future demand will receive a lower probability than values closer to the mean.
- Under the second approach, different values for future demand are ranked, and then divided into groups—quartiles, or deciles, etc. A representative value for demand from each group is then selected. The probability assigned to each representative value is the same—25 per cent in the case of quartiles, 10 per cent in the case of deciles, etc. Under this approach, the probability of each demand value arising is constant, but the chosen representative demand values are likely to be grouped closer together for values of demand closer to the mean.

Either approach is acceptable. However the methodology for assigning probabilities to each reasonable scenario must be consistent with the methodology for choosing the reasonable scenarios themselves.

Where a TNSP has no material evidence for assigning a higher probability for one reasonable scenario over another, a TNSP may weight all reasonable scenarios equally.

# Additional Worked Examples proposed for AER RIT-T Application Guidelines.

## Deriving a state of the world that reflects ISP assumptions

Proposed for inclusion in Section 3.5:

**Example 6a Deriving a state of the world that reflects ISP assumptions**

The identified need is a reduction in the cost of meeting future emissions targets by increasing interconnection between jurisdiction A with a low level of renewable resources and jurisdiction B with a high level of renewable resources.

AEMO's most recent ISP includes commissioning of a new interconnector of 200 MW between jurisdictions A and B in 2025. It also identifies additional interconnection between jurisdiction A and C of 150 MW in 2027 as forming part of the optimal NEM development path under all ISP scenarios, as well as a 100MW transmission extension to a REZ in jurisdiction B in 2026, in the fast change ISP scenario, that is expected to facilitate connection of 80-120MW of wind generation.

AEMO's ISP includes assumptions in relation to emissions reductions of 28% by 2030 (neutral and slow change scenarios) and 52% by 2030 (fast change scenario).

The relevant state of the world for the RIT-T with no credible option in place should reflect:

- Additional interconnection between jurisdictions A and C of 150MW in 2027, in all scenarios
- 100 MW transmission extension to a REZ in jurisdiction B in 2026 in a high scenario
- Additional modelled generation to meet the 28% emissions constraint in 2030 in a central and low scenario, and to meet a 52% emissions constraint in a high scenario.

The relevant state of the world for the credible option of a 200MW interconnector between jurisdictions A and B in 2025 would then be derived on the basis of:

- A 200 MW interconnector between jurisdictions A and B being in place in 2025 in all scenarios
- Additional interconnection between jurisdictions A and C of 150MW in 2027 also being in place in all scenarios
- A 100 MW transmission extension to a REZ in jurisdiction B in 2026 being in place in a high scenario
- Modelled generation to meet the 28% emissions constraint in 2030 in a central and low scenario, and to meet a 52% emissions constraint in a high scenario.

## Applying the RIT-T to a transmission extension to a REZ

Could be inserted in the AER Guideline as part of the current *Appendix A: Guidance and worked examples on classes of market benefit.*

- *Section A.4 Costs to other parties*, currently provides examples of how the RIT-T should be applied to transmission investment that has an impact on the plant (ie, generation) expansion path of the market.

**Example 25: Transmission extension to facilitate development of a Renewable Energy Zone (REZ)**

The credible option is the extension of the transmission network to enable the development of a REZ in jurisdiction B ($REZ_B$). This REZ has been identified in AEMO's latest ISP as a priority REZ with the potential for the development of 100-150MW of wind generation. AEMO has identified that a transmission extension of 150MW in 2026 would facilitate development of this REZ.

AEMO's most recent ISP also includes commissioning of a new interconnector of 200 MW between jurisdictions A and B in 2025 under all ISP scenarios, as well as an 80MW transmission extension to a REZ in jurisdiction C in 2028, in the high ISP scenario.

In applying the RIT-T to a transmission extension to $REZ_B$, the TNSP would assume:

- Emission reduction targets, fuel prices and other relevant assumptions in line with the ISP
- That key transmission augmentations included in the ISP are in place in the base case, at the time and MW capacities identified in the ISP.
  - This includes transmission extensions to other REZs included in the ISP, with the exception of $REZ_B$
- The relevant state of the world in the RIT-T base case with no extension option to $REZ_B$ in place will therefore include:
  - In all scenarios, a new interconnector of 200 MW between jurisdictions A and B in 2025
  - In the high scenario, an 80MW transmission extension to a REZ in jurisdiction C in 2028.
  - The generation expansion path in the base case will reflect market modelling outcomes, with the above transmission investments assumed to be in place.
- The impact on the generation expansion path from building the extension to $REZ_B$ will then be calculated based on:
  - re-running the market modelling for each scenario to identify the generation expansion path with the extension to $REZ_B$ in place (which would be expected to show generation development at the REZ)
  - calculating the difference in generation investment costs between the expansion path in the relevant base case and the expansion path with the extension to $REZ_B$ in place - which will reflect changes in the location and/or type of generation plant compared with the base case.