Draft

Application guidelines

Regulatory investment test for transmission

~~December 2018~~May 2020

AUSTRALIAN ENERGY REGULATOR

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01	29 June 2010	76
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Contents

Shortened forms

Shortened form	Full form
ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
ALARP	as low as reasonably practicable
BAU	business-as-usual
conclusions report	project assessment conclusions report
consultation report	project specification consultation report
draft report	project assessment draft report
HILP event	high impact low probability event
IASR	inputs, assumptions and scenarios report
ISP	~~integrated system plan~~Integrated System Plan
MVAr	mega volt-amperes (reactive)
MW	megawatt
MWh	megawatt hour
~~NEL~~	~~National Electricity Law~~
NEM	National Electricity Market
NEO	National Electricity Objective
NER	National Electricity Rules
network business	a distribution or transmission network service provider
~~NTNDP~~	~~national transmission network development plan~~
~~Other Party~~	~~a party other than a Participant~~
~~Participant~~	~~a registered participant under the NER or any other party in their capacity as a consumer, producer or transporter of electricity in the market~~
REC	renewable energy certificate
RET	renewable energy target
~~REZ~~	~~renewable energy zone~~

RIT–D	regulatory investment test for distribution
RIT–T	regulatory investment test for transmission
SRMC	short-run marginal cost
~~transmission business~~TNSP	transmission network service provider
VCR	value of customer reliability

1 Nature and authority

1.1 Introduction

Consistent with the requirements of clause 5.16.2 of the National Electricity Rules (NER), this document (the RIT–T application guidelines) sets out guidance for the operation and application of the regulatory investment test for transmission (the RIT–T~~).~~) for RIT–T projects that are not actionable Integrated System Plan (ISP) projects.

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1.2 Authority

Clause 5.16.2 of the NER requires the Australian Energy Regulator (AER) to develop and publish, in accordance with the transmission consultation procedures, guidelines for the operation and application of the RIT–T~~.~~ for RIT–T projects that are not actionable ISP projects. The RIT–T application guidelines must:

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- ~~Give~~give effect to and be consistent with the relevant provisions of the NER~~.~~[1];
- ~~Provide~~provide guidance on:
  - the operation and application of the RIT–T;
  - the process to be followed in applying the RIT–T; and
  - how we will address and resolve disputes raised on ~~the~~ RIT–T ~~and its application~~applications; and
- ~~Provide~~provide guidance and worked examples as to:
  - what constitutes a credible option;
  - acceptable methodologies for valuing the costs of a credible option;
  - what may constitute an externality under the RIT–T;
  - the classes of market benefits to be considered;
  - the suitable modelling periods and approaches to scenario development;
  - acceptable methodologies for valuing the market benefits ~~of a credible option~~, including option value, competition benefits and market benefits that accrue across regions;
  - the appropriate approach to undertaking sensitivity analysis;
  - ~~the~~ appropriate approaches to assessing uncertainty and risks; and
  - when a person is sufficiently committed to a credible option for reliability corrective action to be ~~characterised as~~ a proponent.[2]

1.3 Role of the RIT–T application guidelines

1 NER ~~clauses~~cl. 5.15.2, 5.16.2–4, and rule 5.16B.

2 ~~This is~~We provide this guidance in section 3.2.4 as required under NER cl. 5.16.2(c)(9) for the purposes of NER ~~clause~~cl. 5.15.2(b)(7).

RIT–T proponents must apply the RIT–T to all proposed transmission investments that are not actionable ISP projects, except in the circumstances described in NER clause 5.16.3~~.~~ ~~The~~(a). These RIT–T application guidelines provide guidance on ~~the operation and application of the RIT–T, the process for~~ how RIT–T proponents ~~to~~will apply the RIT–T (including the process they must follow ~~in applying the RIT–T,~~), and how we will address and resolve RIT–T disputes ~~regarding the RIT–T~~.

RIT–T proponents should read the RIT–T application guidelines in conjunction with the requirements in the RIT–T instrument and the relevant clauses of the NER.

1.4 Definitions and interpretation

In these RIT–T application guidelines, the words and phrases have the meaning given in the ~~RIT–T~~NER, or otherwise in~~:~~ the RIT–T instrument or glossary.

~~• the glossary; or~~

~~• the NER.~~

1.5 Process for revision

We may amend or replace these RIT–T application guidelines from time to time in accordance with the transmission consultation procedures and NER clause 5.16.2~~.~~(e).

1.6 Version history and effective date

A version number and an effective date of issue will identify every version of these RIT–T application guidelines.

Each version of these RIT–T application guidelines will be effective from its effective date of issue, and RIT–T proponents should apply it as soon as practical. However, for compliance purposes concerning a RIT–T, we will only have regard to the guidance that was in effect when a RIT–T proponent initiated the RIT–T in question. In this context, initiated means from the publication of a project specification consultation report (consultation report).

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2 Overview of the RIT–T

RIT–T proponents must apply the RIT–T in accordance with the procedures under NER clause 5.16.4 to assess the economic efficiency of proposed investment options. The RIT–T aims to promote efficient transmission investment in the national electricity market (the NEM) by promoting greater consistency, transparency and predictability in transmission investment decision making.

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2.1 Purpose of the RIT–T

NER clause 5.~~16~~15A.1(c) states that the purpose of the RIT–T is to:

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> … identify the *credible option* that maximises the present value of net economic benefit to all those who produce, consume and transport electricity in the *market* (the *preferred option*). For the avoidance of doubt, a *preferred option* may, in the relevant circumstances, have a negative *net economic benefit* (that is a net economic cost) ~~where~~to the extent the *identified need* is for *reliability corrective action* or the provision of *inertia network services* required under clause 5.20B.4 or the provision of *system strength services* required under clause 5.20C.3.

Fulfilling this purpose contributes to achieving the National Electricity Objective (NEO) to promote efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity.[3] Before investing in a large transmission project to meet a need on the transmission network, a RIT–T proponent must consider all credible options to meet that need, before selecting the option that maximises the net economic benefit across the market. This reduces the ~~risks~~risk that consumers will pay for inefficient investments.

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Requiring RIT–T proponents to consider all credible options, including where there is a non-network proponent, promotes ~~competitive neutrality, which promotes selecting~~ an environment where competition can occur and the most efficient ~~investment. This also encourages efficient outcomes in the longer term by supporting~~investments go ahead. For instance, requiring RIT–T proponents to consider non-network options on an equal footing supports efficient contestable market development ~~and performance by promoting~~. Also, in requiring that the most efficient investments to go ahead, the RIT–T promotes a predictable network development framework around which competitive investments in the NEM can be made without bearing unnecessary risks arising from inefficient investment. All these factors encourage efficient outcomes in the longer term.

The RIT–T further promotes investment efficiency by imposing transparency and accountability on major transmission investment decisions. This contributes to the NEO to the extent that other efficiency incentives under regulatory regime are imperfect, or relatedly, to the extent that the economic interests of the RIT–T proponent differ from what maximises the net economic benefit across the market.

2.2 Projects subject to a RIT–T assessment

NER clause 5.16.3(a) requires a RIT–T proponent apply the RIT–T to a RIT–T project that is not an actionable ISP project unless the project falls under defined circumstances~~.~~ (as

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[3] ~~NEL~~National Electricity Law, Section 7.

discussed later in this section). NER clause 5.10.2 defines a RIT–T project ~~as~~that is not otherwise an actionable ISP project as: a project to address an identified need that a transmission network service provider (~~transmission business~~TNSP) has identified, or a joint planning project if:

- ~~At~~at least one potential credible option to address the identified need includes investment in a network or non-network option on a transmission network (other than dual function assets) with an estimated capital cost greater than the cost threshold that applies under NER clause 5.16.3(a)(2); or
- the network service providers (network businesses) affected by the joint planning project have agreed that the RIT–T should be applied to the project.

~~The circumstances where a~~A RIT–T proponent does not need to apply the RIT–T ~~include where~~in the following circumstances:

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- The RIT–T project is required to address an urgent and unforeseen network issue that would otherwise put at risk the reliability of the transmission network (see section 2.2.1).
- ~~Estimated~~The estimated capital cost of the most expensive technically and economically feasible option to address the identified need is less than the RIT–T cost threshold (as varied in accordance with a 'RIT–T cost threshold' determination).[4] For an explanation of what is 'economically feasible', see section 2.2.2. For an explanation of how external capital contributions relate to this RIT–T exemption, see section 2.2.3.
- ~~Proposed~~The proposed expenditure (a) relates to maintenance, and (b) is not intended to augment the transmission network or replace network assets.
- ~~Proposed~~The proposed investment is intended to re-route one or more paths of the network for the long term and has a substantial primary purpose other than ~~the need~~ to augment the network. The RIT–T proponent must reasonably estimate that the investment will cost less than the RIT–T cost threshold[5] or is likely to have no material impact on network users.
- ~~Identified~~The identified need can only be addressed by expenditure on a connection asset, which provides services other than prescribed transmission services or standard control services. This is because the TNSP would be providing a specific customer with a connection service, and would be charging them for that service.
- ~~Cost~~The cost of addressing the identified need is to be fully recovered through charges other than charges in respect of prescribed transmission services or standard control services. For an explanation of how external capital contributions relate to this RIT–T exemption, see section 2.2.3.
- ~~Proposed~~The proposed expenditure relates to a 'protected event emergency frequency control scheme' investment and is not intended to augment the transmission network.

4 Under clause 5.15.3 of the NER, we must review RIT–T cost thresholds every three years. We will publish details regarding any review of the RIT–T thresholds (including any revisions to this threshold) on our website www.aer.gov.au. This threshold was $6 million at the time of drafting ~~and will remain $6 million from 1 January 2019.~~

5 For further details see the previous footnote.

- The proposed expenditure is an inertia service payment or a system strength service payment.
- The proposed expenditure is for network investment that the TNSP undertakes to satisfy its obligation as an Inertia Service Provider or System Strength Service Provider under NER clause 5.20B.4 or clause 5.20C.3, respectively and:
    - immediately prior to the Australian Energy Market Operator (AEMO) giving the shortfall notice, the TNSP was not obligated to provide the inertia network services for that inertia sub-network or the system strength services for that fault level node; and
    - the TNSP has less than 18 months after the notice is given by AEMO to make the inertia network or system strength services available.

In determining whether a RIT–T proponent must apply the RIT–T to a proposed project, that proponent must not treat different parts of an integrated solution to an identified need as distinct and separate options.[6]

~~A transmission business~~A TNSP must apply the RIT–T to an asset replacement program if the expected capital costs of the program are above the RIT–T cost threshold and if the program is to address an identified need. For ~~the purpose of~~ applying this guidance, we consider that an asset replacement program to address an identified need is a proactive program ~~to replace~~replacing multiple assets of the same type as part of one plan to meet a network investment objective. For example, this might include a program to proactively replace a large number of protection relays prior to failure. This type of program might be driven by costs savings from bulk replacement and expected benefits from avoiding costs associated with an increased probability of failure. For specific information on performing economic assessments on replacement programs, see our industry practice application note on asset replacement planning ~~(a finalised version of the note will be available before February 2019).~~.[7]

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For completeness, asset replacement programs for the purpose of the above guidance differ from ongoing efforts to reactively replace multiple small assets, such as ongoing work to replace pylons that have failed inspection or serviceability tests. We would expect that this latter type of expenditure would be captured in the revenue allowance as business-as-usual (BAU) replacement expenditure.

NER clause 5.16.3(d) requires that where a ~~transmission business~~TNSP does not need to apply the RIT–T to a proposed investment (with the exception of funded augmentations)[8], it must ensure, acting reasonably, that the investment is planned and developed at least cost over the life of the investment. That is, the TNSP must still act reasonably to plan and deliver the investment efficiently.

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6 See ~~clause~~NER, cl. 5.16.3(e) ~~of the National Electricity Rules.)~~.

7 ~~A draft version of the note is, and a final version will be available on our website under: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning.~~ AER, *Industry practice application note: Asset replacement planning*, January 2019.

8 A funded augmentation is a transmission network augmentation for which a ~~transmission business~~TNSP is not entitled to receive a charge under NER chapter 6A.

More generally, since the principles behind the RIT–T represent good practice, we encourage ~~network businesses~~TNSPs to perform transparent efficiency assessments, engage effectively with their stakeholders, and procure solutions competitively wherever possible. To assist in the latter, we encourage ~~network businesses~~TNSPs to proactively develop relationships with non-network businesses and make useful and user-friendly data available in their annual planning reports and other relevant documents. ~~Network businesses~~TNSPs should use their discretion in determining the rigour they apply to their investment decisions, which should be commensurate with the magnitude and risks associated with the investment at hand.

2.2.1 Urgent and unforeseen investments

As outlined in NER clause 5.16.3(a)(1), a RIT–T proponent does not need to apply the RIT–T to a RIT–T project to address an urgent and unforeseen network issue that would otherwise put the reliability of the transmission network at risk. Under NER clause 5.16.3(b), a RIT–T project is only subject to this exemption if:

- it is necessary that the assets or services to address the issue be operational within six months of ~~when~~ the issue being identified;
- the event or circumstances causing the identified need was not reasonably foreseeable by, and was beyond the control of, the network business (or businesses) that identified the identified need;
- a failure to address the identified need is likely to materially adversely affect the reliability and secure operating state of the transmission network; and
- it is not a contingent project.[9]

2.2.2 Economically feasible

Under NER clause 5.16.3(a)(2), a RIT–T proponent need not apply the RIT–T where the most expensive option to address the identified need which is technically and economically feasible is less than the RIT–T cost threshold. We provide this guidance because the NER do not define the term, 'economically feasible' for the purpose of this clause.

Whether an option is economically feasible will depend on the particular circumstances surrounding the RIT–T assessment. However, as general guidance, an option is likely to be economically feasible where its estimated costs are comparable to other credible options that address the identified need. One important exception to this general guidance applies where a credible option or options are expected to likely deliver materially higher market benefits. In these circumstances, the option may be 'economically feasible' despite the higher expected cost.

2.2.3 Capital cost thresholds and external contributions

A RIT–T project is exempt from a RIT–T if the estimated capital cost of the most expensive option to address the identified need that is technically and economically feasible is less than

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9 We determine contingent projects under NER clause 6A.8.1(b) as part of a transmission revenue determination.

the RIT–T cost threshold.[10] Since the NER refer to the capital cost of an option, an external financial or capital contribution would produce an exemption if it reduced the capital cost of the option to be below the RIT–T cost threshold.

In practice, this means a RIT–T is not required for a RIT–T project if an external contribution results in the project falling below the RIT–T cost threshold. In these circumstances, the external contribution means that, to the extent of that contribution, the costs of the project do not need to be recovered from electricity consumers via the regulated charges of the relevant network business (or businesses).

10 NER clause 5.16.3(a)(2). The RIT–T cost threshold is currently $6 million and will remain $6 million until at least end-2021. See AER, *Final determination: Cost thresholds review*, November 2018.

3 Operation and application of the RIT–T

This part of the RIT–T application guidelines provides guidance on the operation and application of the RIT–T. The broad steps for applying the RIT–T are:

1. ~~Identify~~identify a need for the investment, known as the identified need (section 3.1~~).~~);
2. ~~Identify~~identify a set of credible options to address the identified need (section 3.2~~).~~);
3. ~~Characterise~~characterise the base case, under which to compare credible options (section 3.3~~).~~);
4. ~~Identify~~identify reasonable inputs to include in the cost benefit analysis (section 3.4~~).~~);
5. ~~Quantify~~quantify the expected costs of each credible option (see section 3.5~~).~~);
6. ~~Identify~~identify what classes of market benefits to quantify (see section 3.6~~).~~);
7. ~~Quantify~~quantify the expected market benefits of each credible option, by:
   (a) ~~Identifying~~identifying a set of reasonable scenarios under which to derive states of the world to compare the market benefits of that credible option relative to the base case; and
   (b) ~~Calculating~~calculating the expected market benefit of that credible option over a probability weighted range of reasonable scenarios (sections 3.7, 3.8, 3.9 and appendix A~~).~~); and
8. ~~Quantify~~quantify the expected net economic benefit of each credible option and identify the preferred option as the credible option with the highest expected net economic benefit (section 3.10).

3.1 Identified need

Chapter 10 of the NER defines an identified need as the objective a network business seeks (or network businesses seek) to achieve by investing in the network. Either a network or a non-network option may address an identified need.

An identified need may consist of ~~an increase in the sum of consumer and producer surplus in the NEM. Also, or alternatively, an identified need may be for reliability corrective action, as per NER 5.16.1(b). This is where~~:

- ~~-~~an increase in the sum of consumer and producer surplus in the NEM;
- reliability corrective action as defined in NER 5.10.2;
- the provision of inertia network services required under NER clause 5.20B.4; or
- the provision of system strength services required under NER clause 5.20C.3.

The following guidance is relevant to identified needs for reliability corrective action:

- NER 5.10.2 defines reliability corrective action as a network business' investment in its network to meet 'the service standards linked to the technical requirements of schedule

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5.1 or in applicable *regulatory instruments*[11] and which may consist of *network options* or *non-network options*'.

- Applicable regulatory instruments include all laws, regulations, orders, licences, codes, determinations and other non-NER regulatory instruments that apply to Registered Participants to the extent that they regulate or relate to network access, connection, services, service price or augmentation. Given this, the ~~range of~~ matters covered by applicable regulatory instruments ~~is~~are quite broad.
- The capital expenditure objectives in NER 6A.6.7(a) should guide RIT–T proponents when considering what service level outcomes are required to meet the above service standards.

In all cases, it is essential that RIT–T proponents express the identified ~~needs~~need as the achievement of an objective or end, and not simply the means to achieve the objective or end. This objective should be expressed as a proposal to electricity consumers and be clearly stated and defined in RIT–T reports[12], as opposed to being implicit. Framing the identified need as a proposal to consumers should assist the RIT–T proponent in demonstrating why the benefits to consumers outweigh the costs. That is, the RIT–T proponent should articulate its investment objective to increase consumer and producer surplus in the NEM or undertake reliability corrective action as an objective to deliver a benefit or benefits to electricity consumers.

Framing an identified need as an objective more broadly, rather than a means to achieve an objective, should prevent biasing the development of credible options towards a particular solution. NER clause 5.15.2(b) prescribes that RIT–T proponents must consider all options that could reasonably be considered credible options. In doing so, RIT–T proponents must take several factors into account; including energy source, technology, ownership, the extent it enables electricity trading, whether it is a network option or a non-network option, whether it is intended to be regulated, whether it has a proponent, and any other reasonable factor. RIT–T proponents should consider these factors without bias. A description of an identified need should not mention or explain a particular method, mechanism or approach to achieving a desired outcome.

For the above reasons, it is important to frame the identified need well from the start of the RIT–T application process. On this basis, RIT–T proponents might find it valuable to engage with key stakeholders (including consumer representatives and ourselves) on framing the identified need early on, potentially even prior to formally commencing the RIT–T process.

Example 1: Framing an identified need

A RIT–T proponent has concerns over the levels of reactive power near a terminal station and needs better voltage support. It considers that installing additional capacity banks would be a good way to provide this support.

11 See NER chapter 10 for a definition of 'applicable regulatory instruments'.
12 That is, the reports the RIT–T proponent must publish under NER clause 5.16.4.

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~~When framing an identified need, the~~The RIT–T proponent should ~~consider whether it is framing~~frame the identified need as:

- ~~An~~an increase in producer and consumer surplus ~~or~~, reliability corrective action~~.~~ as defined in NER 5.10.2, the provision of inertia network services under NER clause 5.20B.4, or the provision of system strength services under NER clause 5.20C.3. If ~~it~~the identified need is for reliability corrective action, the identified need must point to the clear service standard obligation to justify the network investment in question. ~~Otherwise~~If otherwise, and if neither clauses 5.20B.4 or 5.20C.3 apply, the identified need must be driven by an increase in consumer and producer surplus~~.~~;
- ~~An~~an objective, rather than a means to achieve an objective. In this example, an appropriate objective would be 'enhancing the voltage support in the vicinity of the terminal station'. In contrast, a means to achieve the objective might be, 'installing additional capacitor banks at the terminal station'~~.~~; and
- ~~A~~a proposal to consumers. To assist consumers ~~engage~~in engaging with the RIT–T application, it is valuable for them to understand why it is in their interest to meet the identified need. Given this, in describing an identified need, a RIT–T proponent may find it useful to explain what will or may happen if it performs BAU activities rather than taking a specific action to address the identified need. For example, better voltage support might deliver benefits to consumers by increasing the quality of electricity supply, and preventing brown-outs, black-outs and damaged electrical appliances.

3.2 Credible options

This section provides guidance on how to apply NER clause 5.15.2(a), which provides that a credible option is an option (or group of options) that:

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- ~~Addresses~~addresses (or address) the identified need. That is, achieves the objective that the RIT–T proponent seeks to achieve by investing in the network;
- ~~Is~~is (or are) commercially and technically feasible; and
- ~~Can~~can be implemented in sufficient time to meet the identified need. That is, can be implemented to meet any specific timing imperatives of the RIT–T proponent's objective.

To the extent possible, RIT–T proponents should construct credible options using individual options that meet identified needs over broadly similar timeframes. This facilitates the use of similar modelling periods (see section 3.12) and increases the transparency and robustness of the analysis.

For meeting a service standard, the RIT–T proponent's choice of credible options should reflect the degree of flexibility offered by that service standard. For example, a standard might refer to maximum levels under the system average interruption duration index and the system average interruption frequency index across the RIT–T proponent's network over a year. In this case, the RIT–T proponent should consider options at various locations on its network if some credible options could be more effective in limiting the network-average interruptions that increase these indexes than if it restricted its attention to options in a single area.

In addition to helping stakeholders interpret the elements of NER clause 5.15.2(a), this section also provides guidance on determining a reasonable number and range of credible options, and on developing credible options with option value.

3.2.1 Addressing the identified need

As discussed in section 3.1, an identified need is the objective that a network business (or network businesses, in the case of joint planning) seeks (or seek) to achieve by investing in the network. An option addresses an identified need if the RIT–T proponent reasonably considers that the option would, if commissioned within a specified time, be highly likely to meet that identified need.

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Since a credible option can be an option or group of options that address an identified need, a set of projects may constitute one credible option if they form one integrated solution to meet an identified need.

Example 2 provides guidance on two different types of identified needs, along with credible options to meet each of those identified needs.

Example 2: Identified need and credible options

Identified need driven by service standards

Changing patterns of generation investment have increased the likelihood of breaching voltage service standards in the next few years.

The identified need in this example is to ensure that voltage standards as outlined in Schedule 5.1 of the NER continue to be satisfied. In stating this identified need, we would expect the RIT–T proponent to explicitly reference the relevant NER clause (or clauses), as well as specify the timing and extent of the breach expected.

An example of a credible option to address this identified need is the installation of one or more voltage control network elements, such as a static volt-ampere reactive compensator.

Identified need driven by market benefits

Rapid load growth in a remote area with a limited sized link with the rest of the shared network and costly local generation options indicates that it is likely to be net beneficial to augment the link in the future.

The identified need in this example is an (expected) increase in net economic benefits compared to the base case, which is expected to benefit electricity consumers though lower electricity costs. In formulating credible options to meet this identified need, we would expect the RIT–T proponent to reference the driver (or drivers) of the net economic benefits expected to flow from the credible option. For instance, a transmission augmentation could be justified if it was expected to reduce variable operating costs from facilitating the substitution of high-fuel cost plant with low-fuel cost plant, thereby lowering generation costs for electricity consumers.

An example of a credible option to address this identified need is the augmentation of network element(s) that would increase the capacity of the area's existing link.

Identified need driven by safety

Routine inspections of a substation have revealed that twelve transformer bushings installed in the 1960s and 1970s are now in poor condition. If the identified bushings remain in service, ~~these~~there is an increased likelihood that a number of these assets will fail in future years, which could result in projectiles, fires and oil spills that present an intolerable risk to those in the immediate vicinity, and potentially the wider area.

This situation might lead to an identified need that is driven by an increase in consumer and producer surplus if there is a NEM-wide economic justification for addressing that safety risk. For instance, credible options that prevent the safety risk from materialising may avoid involuntary load shedding and reduce operating and maintenance costs incurred by other parties.

Where an applicable jurisdictional Electricity Safety Act requires that safety risks be managed in accordance with the 'As Low As Reasonably Practicable' (ALARP) principle, this requirement might justify valuing safety risks using a 'gross disproportionate factor'. For example, a gross disproportionate factor might include valuing death at three, six or 10 times the value of statistical life. The RIT–T proponent must justify its use of any gross disproportionate factor and reference the compliance requirement driving its use of that factor.

3.2.2 Commercially and technically feasible

An option is commercially feasible under NER clause 5.15.2(a)(2) if a reasonable and objective operator, acting rationally in accordance with the requirements of the RIT–T, would be prepared to develop or provide the option in isolation of any substitute options.

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NER clause 5.15.2(d) prevents a RIT–T proponent from rejecting an option that would otherwise satisfy the RIT–T on the basis that it lacks a proponent. Such an option would be commercially feasible because, if undertaken, it would satisfy the RIT–T and therefore provide the investor with a reasonable expected return. This requirement prevents a RIT–T proponent from 'gaming' the RIT–T by only agreeing to act as a proponent for a network option that is over-engineered, more expensive and less net beneficial than other network options. Example 3 below provides an example of this.

An option is technically feasible if there is a high likelihood that it will, if developed, provide the services that the RIT–T proponent has claimed it could provide for the purposes of the RIT–T assessment. In providing these services, the option should also comply with relevant laws, regulations and administrative requirements. Technical feasibility will always turn on the relevant facts and circumstances, although example 3 provides a brief stylised example.

Example 3: Feasibility of options

Commercial feasibility

The most likely option in a particular area for enhancing the sum of consumer and producer surplus is to augment an existing 150 km transmission line between a group of generators and a major load centre.

However, the RIT–T proponent refuses to act as a proponent for this option and thereby claims that the option is not a credible option for enhancing net economic benefits. Instead, the RIT–T proponent proposes a more expensive option involving a line following a longer (300 km) route than the existing line.

In this case, the cheaper augmentation must be considered a credible option, because a reasonable and objective RIT–T proponent would be willing (in isolation of any other substitute projects it might have in mind) to construct it if it passed the cost–benefit analysis set out in the RIT–T.

Technical feasibility

A non-network proponent has suggested a local geothermal generation option as an alternative to the network option above. According to the proponent, the local geothermal option would provide the same services as the RIT–T proponent's proposed network option.

However, the RIT–T proponent ~~reasonably believes~~identifies that the proposed location for the geothermal option ~~will not be feasible presently due~~displays geological characteristics that are expected to challenge the ~~relatively untested nature~~technical viability of ~~the~~ geothermal generation. The RIT–T proponent also identifies that there has been little testing of geothermal technology in locations with similar geological conditions in Australia or internationally. In this case, it could exclude the geothermal plant from being considered as a credible option due to a lack of technical feasibility.

3.2.3 Developing credible options with option value

A RIT–T proponent may find value in retaining flexibility to respond to changing market developments or scenarios as they emerge where there is material uncertainty and the option/s it is considering involve a sunk or irreversible action. For example, where there is uncertain future demand for connections from wind generators at a remote connection point, it may be efficient for the RIT–T proponent to configure the connection assets so they can easily augment them in the future should additional demand for connections at this connection point arise.

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A credible option may include a decision rule or policy specifying, not just an action or decision to take now, but also an action or decision to take in the future if the appropriate market conditions arise. For example, where future demand growth is uncertain, the following may all be legitimate credible options:

- Option (a): fully upgrade a transmission line in the immediate term to accommodate all likely demand growth over the next 15–20 years.
- Option (b): upgrade a transmission line to cover likely demand growth in the next five years (without any further consideration of the potential for further growth in the future) coupled with a generic non-network option if necessary following a decision based on the same 'decision rule' as for option (c) (see below). While this option should be lower cost

than Option (a) in most if not all scenarios, it should also have lower market benefits than Option (a), particularly after year five under higher demand scenarios.

- Option (c): upgrade a transmission line as per Option (b), but also allow for sufficient extra space ~~to~~ (perhaps by installing larger towers than necessary) to allow for a relatively low-cost expansion of the network following a decision based on a 'decision rule' (for example, if peak demand reaches a specified level). The extra space provided under this option would likely incur an additional up-front cost relative to Option (b). To capture the higher market benefits of this option relative to Option (b), the RIT–T proponent would need to include a scenario where peak demand reaches the specified level, and then model the costs and benefits of the second stage expansion versus the costs and benefits of the non-network supplementary project that would be triggered under option (b).

For clarity, when a decision rule leads to a new stage of the RIT–T project ('stage two'), the RIT–T proponent should:

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- ~~Transparently~~transparently update stakeholders on how it applied its decision rule to commence stage two, such as by providing an addendum to its project assessment conclusions report (conclusions report~~).~~); and
- ~~Apply~~apply a new RIT–T before commencing the second stage ~~two~~ of the RIT–T project if:
  - ~~The~~the stage two investment passes the RIT–T cost threshold; and
  - ~~There~~there has been a material change in circumstances beyond the contingencies explored in the decision rule. As an example, while the decision rule under Option (c) above was based on peak demand reaching a specified level, there may have been a material change in input costs that was not consistent with stage two of the preferred option identified. Another material change in circumstances could be the formerly~~-~~ unforeseen availability of an alternative credible option, such as demand response provided by a virtual power plant program.

The ability of a RIT–T proponent to formulate credible options incorporating a decision rule or policy enables the RIT–T cost benefit analysis to include option value as a potential source of market benefit. Section 3.9 discusses this further by providing guidance on identifying credible options where there is a material degree of uncertainty.

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3.2.4 Number and range of credible options

NER clause 5.15.2(b) requires a RIT–T proponent consider all options it could reasonably classify as credible options, taking into account:

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- energy source;
- technology;
- ownership;
- the extent to which the credible option enables intra-regional or inter-regional trading of electricity;

- whether it is a network or non-network option;
- whether the credible option is intended to be regulated;
- whether the credible option has a proponent; and
- any other factor which the RIT–T proponent reasonably considers should be taken into account.

The number of credible options that a RIT–T proponent assesses for meeting a particular identified need should be proportionate to the magnitude of the likely costs of any credible option. ~~Therefore~~For example, if the RIT–T proponent reasonably estimates that ~~the costs attributable to any one of several~~a credible ~~options orientated towards meeting~~option to meet an identified need ~~at particular town is~~was $50 million, ~~the RIT–T proponent~~then it should consider a larger number and range of credible options than if the estimated cost of most credible options was around $10 million, all other things being equal.

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Criteria for proponents of credible options

NER clause 5.16.2(c)(9) requires the RIT–T application guidelines provide to guidance on when a person is sufficiently committed to a credible option for reliability corrective action to be characterised as a proponent. Specifically, this guidance is for the purposes of NER clause 5.15.2(b)(7), which requires RIT–T proponents to consider all options that could reasonably be considered as credible options, taking into account whether the credible option has a proponent.

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We consider a person can be characterised as a proponent of an option where it has identified itself to the RIT–T proponent in writing that it is a proponent of an option and has reasonably demonstrated a willingness and potential ability to devote or procure the required human and financial resources to ~~the~~:

- refine and develop the technical ~~specification and refinement~~specifications of the option if the RIT–T proponent agrees to consider the option as a credible option under the RIT–T application; and
- ~~development of~~develop the option if it is identified as the preferred option under the RIT–T. This requires, for example, that the person has expressed a willingness to accept a reasonable network support agreement to develop the credible option for a price no higher than what reasonably reflects the costs of the credible option applied in the relevant RIT–T assessment.

There may be more than one proponent for a given credible option.

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3.3 Characterising the base case

The base case is where the RIT–T proponent does not implement a credible option to meet the identified need, but rather continues its 'BAU activities'. 'BAU activities' are ongoing, economically prudent activities that occur in absence of a credible option being implemented. For RIT–T projects concerning asset retirement, replacement or de-rating decisions, the following costs are associated with BAU activities:

- Operational, maintenance and minor capital expenditure (below the RIT–T cost threshold) required to allow the ageing element to remain in service as effectively as possible for as long as possible.
- Credible BAU expenditure relating to the deteriorating asset to manage safety risk, environmental risk and equipment protection to the extent this expenditure meets legal obligations or is consistent with efficient industry practice. The RIT–T proponent should also consider any quantified 'risk costs' consistent with its BAU risk mitigation and management activities and with reference to our 'industry practice application note for asset replacement planning'~~ once it has been finalised~~.[13]

Generally[14], the trigger point for the timing of the credible option for a replacement RIT–T project would be when the present value of the monetised service costs exceed the present value of the replacement project costs.

Example 4 illustrates characterisation of the base case where the identified need for a credible option is to increase the sum of consumer and producer surplus in the NEM.

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Example 4: Characterising the base case for market benefit driven projects

Augmentation project to provide a net economic benefit

A RIT–T proponent is considering a network augmentation to avoid an increase in the expected volume of unserved energy as load at a particular location on its network grows.

No mandatory service standard or regulatory instrument is driving the augmentation to avoid expected load shedding~~.~~, nor are requirements under clause 5.20B.4 or 5.20C.3 of the NER. This implies that the identified need must be driven by an increase in the sum of consumer and producer surplus in the NEM. Accordingly, the base case for the RIT–T assessment must refer to a state of the world in which the RIT–T proponent does not pursue the augmentation project nor implement any other credible option to meet the identified need.

While this base case option in the face of ongoing load growth may eventually result in what appears to be unrealistically high levels of expected unserved energy, what is important from the perspective of a RIT–T assessment is that the base case provides a clear reference point for comparing the performance of different credible options.

The RIT–T assessment would then involve a comparison of:

- the net economic benefit available from the RIT–T proponent developing the augmentation option as against the base case; to
- the net economic benefit available from other relevant credible options as against the base case.

13 ~~A draft version of the note is, and a final version will be available before February 2019 on our website under: https://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/industry-practice-application-note-for-asset-replacement-planning.~~ AER, *Industry practice application note: Asset replacement planning*, January 2019.

14 There may be exceptions, such as when an identified need is for reliability corrective action.

The preferred option is the option that maximises the net economic benefit across the market. If no credible option yields a net economic benefit, this means the base case (that is, BAU activities) represents the best course of action.

Replacement project to provide a net economic benefit

A RIT–T proponent expects the condition of a network element to result in increasing volumes of expected unserved energy over time as the network element becomes increasingly prone to failure.

No mandatory service standard or a regulatory instrument requires the RIT–T proponent to avoid an expected increase in load shedding. Therefore, the identified need must be driven by an increase in the sum of consumer and producer surplus in the NEM. Accordingly, the base case for the RIT–T assessment should refer to a state of the world where the RIT–T proponent does not retire the poor condition element, nor implement any other relevant credible option. In this base case, the RIT–T proponent will still incur BAU operating, maintenance and minor capital (below the RIT–T cost threshold) expenditure to allow the network element to remain in service effectively for as long as possible.

While this base case option may eventually result in a complete and irreparable failure of the poor condition element and very high volumes of expected unserved energy, what is important from the perspective of a RIT–T assessment is that the base case provides a clear reference point for comparing the performance of different credible options.

The RIT–T assessment will then involve a comparison of:

- the net economic benefit available from replacing the poor condition network element as against the base case; to
- the net economic benefit available from other relevant credible options as against the base case.

The preferred option is the option that maximises the net economic benefit across the market. If no credible option yields a net economic benefit, it means the base case (that is, BAU activities) represents the best course of action.

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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~~to 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 NER clause 5.~~16.1(c~~15A.2(b)(1) that the RIT–T be based on a cost benefit analysis that includes an assessment of a situation in which no ~~credible~~ option is implemented.

Example 5 illustrates how to characterise the base case 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—that is, reliability corrective action.

Example 5: Characterising the base case for meeting a service standard

Augmentation project to meet a service standard obligation

A RIT–T proponent is considering a network augmentation to meet service standards contained in an applicable jurisdictional regulatory instrument as load grows. That is, reliability corrective action is driving this RIT–T.[15] The standard obliges the RIT–T proponent to meet service standards in the form of maximum levels of load at risk with a single credible contingency.

The RIT–T proponent must identify the credible option that maximises net economic benefit while meeting the standard. If no credible option that meets the standard offers a net economic benefit, the RIT–T proponent must identify the credible option that minimises the net economic detriment while meeting the standard. The RIT–T proponent must assess credible options against a base case where it does not implement a credible option to address the identified need, but rather conducts BAU activities.

The RIT–T proponent must consider credible options that take advantage of whatever flexibility the service standard obligation offers to maximise the net economic benefit or minimise the net economic cost of meeting the standard in question. This could mean considering options that relate to different locations on the network, that reduce levels of load at risk, or where a given option is implemented at different points in time.

Replacement project to meet a service standard obligation

A RIT–T proponent is considering replacing a poor condition network element so it will continue to meet service standards contained in a jurisdictional regulatory instrument. The instrument may oblige the RIT–T proponent to meet a reliability standard (for example, individual feeder standards in the form of maximum levels of load at risk with a single credible contingency) or some other service standard that is set out in NER schedule 5.1 or in an applicable regulatory instrument as defined in NER chapter 10. It is worth noting that the range of matters covered by 'applicable regulatory instruments' is potentially broad as these include all laws, regulations, orders, licences, codes, determinations and other non-NER regulatory instruments that apply to Registered Participants[16] to the extent that they regulate or relate to network access, connection, services, service price or augmentation.

Replacing the element will help avoid breaching limits relating to the service standard obligation as the poor condition element becomes increasingly prone to failure.

The RIT–T proponent must identify the credible option that maximises net economic benefit while meeting the standard. If no credible option that meets the standard offers a net economic benefit, the RIT–T proponent must identify the credible option that minimises net economic detriment while meeting the standard. The base case is where the RIT–T proponent conducts BAU maintenance (which may include minor capital works) of the existing network element, rather than implementing a specific credible option to address the identified need.

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15 NER cl. 5.10.2 defines reliability corrective action as a network business' investment in its network to meet 'the service standards linked to the technical requirements of schedule 5.1 or in applicable *regulatory instruments* and which may consist of *network options* or *non-network options*'.

16 'Registered participant' is defined in NER chapter 10.

Regardless of whether a reliability standard or ~~some~~ other service standard is driving the identified need, the RIT–T proponent should ~~characterise~~include in the base case ~~as~~ ongoing operating ~~and~~ /maintenance costs~~, as well as~~ and minor capital costs (~~that is,~~ below the RIT–T cost threshold) ~~associated with meeting~~to meet these standards using the poor condition assets, in addition to any expected unserved energy and/or risk costs.

The RIT–T proponent must consider credible options that take advantage of whatever flexibility the service standard obligation offers to minimise the cost of meeting that standard. This could mean considering options that relate to different locations on the network, that reduce levels of load at risk, or where a given option is implemented at different points in time.

3.4 Selecting reasonable inputs

~~As a principle, wherever possible, RIT–T proponents should use:~~

~~Inputs~~Except for specific circumstances, RIT–T proponents must adopt the inputs, assumptions and scenarios from the most recent Inputs, Assumptions and Scenarios Report (IASR). These circumstances are where the RIT–T proponent has demonstrated why a new, omitted or varied input, assumption or scenario is necessary. For example, it might be reasonable for a RIT–T proponent to do the following:

- Vary a parameter from the most recent IASR if there has been a material change in circumstances that the most recent ISP or an ISP update is yet to reflect. In such cases, the RIT–T proponent might demonstrate why the variation is necessary by receiving written indication from AEMO that there has been a material change in circumstances, which it intends to reflect in a future ISP or ISP update.
- Add a parameter to what is set out in the most recent IASR where the scope of the identified need is such that the ISP did not explore parameters relevant to the RIT–T project. For example, a parameter relating to a specific jurisdictional service standard might meet this category.

In general, if a RIT–T proponent requires an input, assumption or forecast that is not provided in the most recent IASR, it should use:

- inputs based on market data where this is available and applicable~~.~~;
- ~~Assumptions~~assumptions and forecasts that are transparent and from a reputable and independent source~~. In particular:~~, such as other material AEMO has published; and
    - ~~Material that the Australian Energy Market Operator (AEMO) publishes in developing the National Transmission Network Development Plan (NTNDP), Integrated System Plan (ISP), or similar documents should be a starting point for developing assumptions to use in a RIT–T analysis.~~
    - ~~Material that AEMO publishes in any~~ up-to-date ~~ISP or equivalent document, where that document has been adopted in the NER and/or National Electricity Law (NEL), should be used as a default for assumptions to use in a RIT–T analysis.~~
- ~~Up-to-date~~ and relevant information. ~~For instance, it might be appropriate to depart from information that AEMO has published where there is evidence and good reason to~~

demonstrate that alternative sources of information are more up-to-date or more appropriate to the particular circumstances under consideration.

3.4.1 Using integrated system plan and other external documents

RIT-T proponents should consider external documents, such as the most up-to-date material published by AEMO in developing the NTNDP, ISP, or similar documents when developing assumptions and inputs to use in a RIT-T analysis. It may be more appropriate to use alternative sources of information where there is evidence and good reason to demonstrate that this information is more up-to-date or is more appropriate to the particular circumstances under consideration.

In applying this guidance, RIT-T proponents should note that AEMO integrated its 2017 NTNDP into its 2018 ISP. Also, future changes to the NER and/or NEL are likely to integrate the previous NTNDP content into the ISP. Material that AEMO publishes in any up-to-date ISP or equivalent document that has been adopted in the NER and/or NEL should be used as a default for assumptions to use in a RIT-T analysis. For clarity, it would be reasonable to only depart from default assumptions in limited cases, such as if there has been a material change in circumstances such that data in the most up-to-date ISP has been superseded or changed.

Example 6 illustrates how a RIT-T proponent might use the ISP to inform its assessment of a transmission extension to a renewable energy zone (REZ). For a definition of a REZ, see the glossary in appendix B.

Example 6: Using the ISP to inform the assessment of a transmission extension to a REZ

Using the ISP to form identified needs and credible options

Assume that AEMO has an up-to-date ISP that forecasts a lowest present value resource cost path for generation and network infrastructure development that will meet reliability and renewable energy targets. A RIT-T proponent observes that, under this path in AEMO's neutral scenario, the following investments are commissioned within the near term:

- A REZ with the potential for the development of 100-150 MW of generation (REZ1).
- A transmission network extension of 150 MW, which is the RIT-T proponent's network option (project 1). Project 1 allows the benefits of REZ1 to be realised.

The RIT-T proponent should use AEMO's forecast path as a basis to:

- Articulate an identified need as increasing the net economic benefits in the NEM, where those benefits are driven by allowing REZ1 to deliver market benefits to the NEM; and
- Form a credible option based on project 1. For completeness, the RIT-T proponent should also develop a sensible range of other credible options, and should test project 1 against those other options.

When considering using this information, RIT-T proponents should recognise that it might be appropriate to depart from information that AEMO has published where there is evidence and good reason to consider that alternative sources of information are more up-to-date or more appropriate to the particular circumstances.

Using the ISP to form reasonable scenarios

The process of developing reasonable scenarios should follow our guidance in section 3.8.1, and our guidance in 3.4 above. On how to use the ISP when applying this guidance, the RIT-T proponent should:

- In the first instance, consider basing its reasonable scenarios on scenarios that AEMO's ISP explored, but:
    - To reduce the computational burden, exclude scenarios that will not be likely to affect the sign and ranking (if market benefits driven) or ranking (if reliability driven) of credible options.
    - Adjust scenarios that are unreasonable, internally inconsistent or have become outdated (for example, a major investment may have since been committed or cancelled). A RIT-T proponent should provide reasoning for adjusting an AEMO scenario.
    - Add reasonable scenarios that will be likely to affect the sign and/or ranking of credible options that the ISP has not explored. For instance, this kind of scenario might reflect information or impacts relating to an expected market or policy development.
- Where doing so is expected to have a material effect on the analysis (which may not be the case for minor intra-regional projects), include at least one reasonable scenario where:
    - projects under AEMO's network development path become committed consistent with the ISP's recommended timing; and
    - projects under AEMO's network development path do not become committed (unless they are already 'committed' or 'anticipated projects').

For completeness, if project 1 is in AEMO's network development path, it must be included in all non-'base case' states of the world and excluded from all 'base case' states of the world so its net economic benefit can be estimated. Similarly, if the RIT-T concerned a group of projects, that group of projects would be included in all non-'base case' states of the world and excluded from all 'base case' states of the world so its net economic benefit could be estimated.

Using the ISP to help calculate market benefits

Assume the RIT-T proponent wants to estimate the market benefits of the generation expansion path from building project 1, which results in extending the network to REZ1. In this case, the RIT-T proponent may do this by:

- ~~Taking the ISP market modelling results, which incorporate project 1 in a particular ISP scenario, to reflect outcomes under the state of the world in which project 1 proceeds in that scenario.~~
- ~~Obtain or derive the base case state of the world without project 1 present. It might be that the ISP does not include the state of the world without project 1 for a given ISP scenario. In these cases, the RIT–T proponent could attempt to obtain these results from AEMO (if available), work with AEMO to re-run the ISP modelling to generate the required results, or otherwise independently undertake market modelling for each reasonable scenario to identify the generation expansion path with the extension to REZ1 not in place. We would expect the different states of the world (with and without project 1) to show different levels of generation development at REZ1, unless a firm commitment exists for generators to connect to REZ1 irrespective of the commissioning of project 1 (that is, where those REZ1 projects are already 'committed').~~
- ~~Calculating the difference in generation investment and dispatch costs between the expansion path in the relevant base case and the expansion path with the extension to REZ1 in place. This will reflect changes in the location and/or type of generation plant compared with the base case.~~

~~For completeness, if a RIT–T proponent wanted to estimate the market benefits of the generation expansion path from building a group of projects (for instance, if this group of projects formed an integrated solution to meet an identified need), it would follow the process outlined above for the project group rather than for the individual project.~~

~~3.4.2~~3.4.1 Discount rates

~~Paragraph 14 of the~~ The RIT–T specifies that:[17]

> ~~The~~ 18. The *RIT–T proponent* must adopt the discount rate ~~in~~from the ~~RIT–T must be~~most recent *inputs, assumptions and scenarios report* unless it provides demonstrable reasons why a variation is necessary. If the *RIT–T proponent* decides to vary this parameter, this variation must be consistent with paragraph 19.
>
> 19. The present value calculations must use a commercial discount rate appropriate for the analysis of a private enterprise investment in the electricity sector. The discount rate used must be consistent with the cash flows being discounted.

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Consistent with the RIT–T requirement, present value calculations in the ISP must use a commercial discount rate appropriate for the analysis of a private enterprise investment in the electricity sector ~~and must be consistent with the cash flows that the RIT–T proponent is discounting. The lower boundary~~. Given this consistency, it should be ~~the regulated cost of capital~~suitable for RIT–T proponents to apply the discount rate that AEMO has applied in the most recent ISP.

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~~The above requirement provides RIT–T proponents with~~Where there are demonstrable reasons for why a RIT–T application should employ a different discount rate to the most recent ISP, the RIT–T provides the flexibility to adjust the discount rate to reflect the risks that different types of projects carry. We expect these adjustments would vary between

[17] AER, *Draft RIT–T*, May 2020, paragraphs 18–19.

identified needs rather than between credible options to address a specific identified need. It will typically be best practice to capture the relative riskiness of different credible options through scenario analysis rather than by using different discount rates (see section 3.8 on scenario analysis).

Considering the above, as a default, a RIT–T proponent should use the same discount rate for different credible options to address a given identified need. If a RIT–T proponent has a sound reason to depart from this default by using a different discount rate for a particular credible option, it must:

- ~~Clearly~~clearly and transparently provide this reasoning, including providing supporting evidence; and
- ~~Show~~show if or how this decision affects the ranking of credible options.

Since the discount rate is a particularly important parameter for estimating the present value of long term projects, we expect RIT–T proponents to explore:

- ~~Whether~~whether, as part of its scenario analysis, there is reason to include reasonable scenarios with different discount rates. If it includes a scenario with a lower than expected discount rate, it would also be reasonable to explore a scenario with a higher than expected discount rate. As required in ~~paragraph 14 of~~ the RIT–T, the regulated cost of capital should be the lower bound~~.~~; and
- ~~When~~when sensitivity testing the outcome of its cost benefit analysis, if applicable, illustrate 'boundary values' for discount rates at which the preferred option changes. The RIT–T proponent can then discuss the plausibility of those values and analyse this risk.

~~3.4.3~~3.4.2 Value of customer reliability

The value of customer reliability (VCR), typically reported in dollars per kWh, is an important parameter for estimating classes of market benefits that relate to reliability, such as changes in voluntary and involuntary load curtailment. ~~When considering what VCR to apply, a RIT–T proponent should:~~

- ~~Consider whether~~ A RIT–T proponent should use the ~~selected~~ VCR ~~is representative of the reliability preferences of the range of customers that the credible options in question will affect.~~
- ~~Have regard to the factors that cause the VCR to vary. These include outage length, width of affected area, and customer type.~~
- ~~Use~~ estimates that ~~an independent expert has made publicly available, are up-to-date, fit for purpose, and based on a transparent methodology. This is where a transparent methodology should provide sufficient detail for interested stakeholders to follow what has been done. As an example:~~
    - ~~The VCRs that AEMO derived from 2013–14 NEM-wide VCR study should meet a number of these criteria.~~[18] ~~To the extent that a RIT–T proponent is considering options to address potential network outages that cannot be reasonably derived~~

[18] ~~https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Value-of-Customer-Reliability-review~~

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using the AEMO VCR results, this may require adjustments to the VCR values or the use of an alternative VCRs which are more fit for purpose. If a RIT–T proponent proposes to do this, it should be transparent about the methodology used to derive the VCR and consult with stakeholders.

- The VCR estimates we will publish and update annually from 31 December 2019. This follows a rule change in July 2018 that gave us the responsibility of determining VCR estimates in the NEM and Northern Territory. We are an independent, expert source. We will derive VCR estimates and a mechanism for annual updating using a transparent methodology on which we have publicly consulted and will review at least once every five years. In developing the methodology and deriving VCR estimates, we will have regard to the current and potential uses of VCRs.

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RIT–T proponents should use VCR calculations based on an accepted estimate such as those produced by AEMO, or by us from 31 December 2019. When estimating VCRs, we must take into account the VCR objective, which requires that the VCR methodology and values be fit for purpose for any current or potential uses of VCR that we consider relevant.[19] We consider that the application of the VCR to network planning, and in particular the RIT–T, is one of the core applications of the VCR and we will develop published VCR values that are fit for this purpose. Therefore any deviation from or adjustment of our published VCR values (for example, to reflect a specific mix of customers or HILP event that is already captured in our VCR estimates) must be clearly justified, setting out why it would not be appropriate to apply, or why it would be appropriate to make adjustments to, our published values. In coming to a decision to apply separate VCRs, RIT–T proponents should consult directly with both us and the customers to whom the VCR applies.

We note that the primary issues involved with VCRs, which accepted VCR estimates should generally already take into account (although may warrant some adjustments if there is clear supporting evidence), are:

- Consideration of customer types in the supply area under consideration — that is, different customer types place different values on reliability and on different aspects of reliability. For example, residential VCRs would reflect the general inconvenience attached to an outage. In contrast, for industrial customers, the VCR reflects lost sales and productivity, as well as stand down, shut down and start-up costs.
- VCRs should reflect the weighted mix of customers that the option affects. Weighting based on actual or projected customer types and on the reliability value of those customer types should be used in economic analysis.
- A customer's VCR for a particular outage may be influenced by factors such as outage duration and outage frequency, and some customers may be more influenced by momentary outages than others. The VCR should reflect the reliability preferences of the affected customers, and the nature and type of reliability issue it is modelling.

Since, like the discount rate, the VCR is an important metric, we expect a RIT–T proponent to explore:

[19] NER cl. 8.12(a).

- ~~Whether as part of its scenario analysis, there is reason to include reasonable scenarios with different VCRs. If it includes a scenario with a higher than expected VCR, it would also be reasonable to explore a scenario with a lower than expected VCR. The expected VCR should have a basis in an independent estimate (such as values that AEMO uses, or that we will provide from 31 December 2019).~~

VCRs used in RIT–T applications should reflect the weighted mix of customers that the option affects, and if applicable, the nature and type of reliability issue being modelled (for example, whether there is a widespread and long duration outage).

- When sensitivity testing the outcome of its cost–benefit analysis, if applicable, we expect a RIT–T proponent to illustrate 'boundary values' for VCRs at which the preferred option changes. The RIT–T proponent can then discuss the plausibility of those values and analyse this risk. For a more general discussion on sensitivity analysis, see section 3.8.

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~~For a more general discussion on scenario analysis and sensitivity analysis, see section 3.8.~~

3.5 Valuing costs

In the RIT–T, costs are the present value of a credible option's direct costs. These must include the following classes of costs:

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- costs incurred in constructing or providing the credible option;
- operating and maintenance costs over the credible option's operating life; and
- costs of complying with relevant laws, regulations and administrative requirements (see section 3.5.1).

There may be material uncertainty regarding the costs of a credible option when the RIT–T proponent undertakes the RIT–T assessment. See section 3.9 for guidance and worked examples on dealing with this uncertainty.

Particularly for, but not limited to, asset replacement projects or programs, there are costs resulting from removing and disposing of existing assets, which a RIT–T assessment should recognise. RIT–T proponents should include these costs in the costs of all credible options that require removing and disposing of retired assets. For completeness, the RIT–T proponent would exclude these costs from the 'BAU' base case, which section 3.3 defines.

3.5.1 The cost of complying with laws and regulations

In some cases, a RIT–T proponent may have a choice as to how it complies with a law, regulation or administrative requirement. For example, the RIT–T proponent may lawfully choose to pay a financial amount rather than undertake some other action (which is otherwise necessary to comply with the relevant law, regulation or ~~administrative requirement).~~legal instrument). If the financial amount is smaller than the costs of undertaking some other action, the RIT–T proponent may treat the financial amount as part of that credible option's costs.

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A RIT–T proponent must exclude from its analysis, the costs (or negative benefits) of a credible option's harm to the environment or to any party that is not ~~expressly~~ prohibited ~~or penalised~~ under the relevant laws, regulations or ~~administrative requirements~~legal instruments. This places the onus on policy makers to prohibit certain activities or to value various types of harm and impose financial penalties accordingly. The RIT–T has no role in prohibiting or penalising activities that policy does not prohibit or penalise.

To the extent that market participants in the NEM may be required to pay ~~penalties~~a tax, levy or other payment for non-compliance with a renewable energy target (RET) scheme, or any other government policy in a particular state of the world ~~(such as a National Energy Guarantee),~~ the RIT–T will capture this in a credible option's market benefits, rather than in a credible option's costs.

Example 6 demonstrates how compliance costs ~~of a credible option on~~can internalise costs that would otherwise be unpriced externalities.

Example 6: Costs of a credible option

Un-priced externality

To meet an identified need, a RIT–T proponent identifies as a credible option the development of a local gas-fired peaking generator in close proximity to an existing hotel. The present value of the generator's expected construction and operating costs is $120 million. The RIT–T proponent expects that developing the generator will reduce the hotel's earnings due to a loss of visual amenity – the present value of this loss is $5 million. There are no planning standards, consents or other requirements to protect the hotel against this loss.

In the absence of any planning standards, consents or other requirements hindering its development, the costs of the credible option remain $120 million. The 'negative externality' created by the generator's development and borne by the hotel is not regulated or legislated by any relevant law, regulation or administrative requirement and hence does not form part of the costs of the credible option.

Penalised externality

Continuing from above, assume that a regulatory body allows development of the credible option contingent on the developer of the generator paying for landscaping to conceal the generator and reduce the harm to the visual amenity of the hotel's guests. The present value of this landscaping is $5 million.

In this case, the costs of the credible option would be 120 + 5 = $125 million. The $5 million is now included as part of the costs of the credible option since a relevant regulatory body required the generator's development be contingent on this expense.

3.5.2 The treatment of land

Given that the cost of land may be a cost incurred in constructing or providing a credible option[20], the value of land should be included as part of a RIT–T assessment. The purpose of the RIT–T is to identify the credible option that maximises the present value of the net economic benefit to all those who produce, consume and transport electricity in the market. Therefore, the RIT–T proponent should assess all credible options at present values. The RIT–T proponent should therefore use the market value of land when assessing the costs incurred in constructing or providing credible options.

For clarity, strategic land purchases (that is, acquiring an easement in advance of making an investment decision to build on that land) need not trigger a RIT–T. However, the market value of land should be included in a RIT–T that explores building on a previously acquired easement (that is, land should not be treated as a sunk cost, to the extent that it can otherwise be sold).

3.6 Market benefit classes

The ~~meaning of~~RIT–T instrument defines market benefit and sets out the classes of benefits to include when applying the RIT–T ~~are set out in paragraphs 4 and 5 of the RIT–T.~~to projects that are not actionable ISP projects.[21] Section 3.7 and appendix A provide guidance on calculating market benefits. For instance, appendix A provides guidance and worked examples on calculating the classes of market benefits listed in NER section 5.~~16.1(c~~15A.2(b)(4), which include:

- changes in fuel consumption arising through different patterns of generation dispatch;
- changes in voluntary load curtailment;
- changes in involuntary load shedding, with the market benefit to be considered using a reasonable forecast of the value of electricity to consumers;
- changes in costs for parties, other than the RIT–T proponent, due to differences in: the timing of new plant, capital costs, and operating and maintenance costs;
- differences in the timing of expenditure;
- changes in network losses;
- changes in ancillary services costs;
- competition benefits; and
- any additional option value (where this value has not already been included in the other classes of market benefits) gained or foregone from implementing that credible option with respect to the likely future investment needs of the market.

This section provides guidance on:

- when a class of market benefit is material and should be quantified in ~~included in the~~a RIT–T application; and
- how an additional class of market benefit can be added to the classes defined above.

[20] NER, cl. 5.~~16.1(c~~15A.2(b)(8)(i).

[21] AER, *Draft RIT–T*, March 2020, paragraphs 7 and 11.

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3.6.1 Material classes of market benefits

Under ~~NER clauses 5.16.1(c)(5)–(6),~~the RIT–T instrument, a RIT–T proponent must include all classes of market benefits unless:[22]

- it can provide reasons for why a particular class of market benefit is ~~not likely~~unlikely to materially affect the outcome of the ~~assessment of the~~ credible options assessment; or
- it expects the cost of undertaking the analysis to quantify the market benefits will be disproportionate to the scale, size and potential benefits of the credible options.

The classes of market benefits that a RIT–T proponent should consider will depend on the circumstances surrounding the individual RIT–T assessment and the credible options under consideration. For example, where a credible option is not expected to affect the wholesale market, a number of the classes of market benefit listed in ~~paragraph 5 of~~ the RIT–T, such as competition benefits and changes in fuel consumption arising through different patterns of generation dispatch, will not be material and therefore will not need to be estimated.

3.6.2 Additional classes of market benefits

~~NER clause 5.16.1(c)(4)(x)(A) requires~~Under the RIT–T ~~proponents to~~instrument, a RIT–T proponent must also consider classes of market benefits that:[23]

- ~~The~~the RIT–T proponent determines relevant; and
- ~~We~~we have agreed to in writing before the RIT–T proponent publishes its consultation report.

If a RIT–T proponent quantifies an additional class of market benefit in its RIT–T assessment, we will consider it. However, a RIT–T proponent must receive our approval to include an additional class of market benefit before it makes its consultation report available to other parties.

When determining whether to approve a new class of market benefit, we will consider whether the proposed benefit:

- ~~Should~~should already be reflected in another market benefit class. If it is effectively a component of a pre-existing class of market benefits, there is no need to introduce a new class. In these cases, the RIT–T proponent should consider whether it should perform an additional calculation to add this 'sub-component' into the market benefit class. If it has already captured this benefit indirectly, it should not perform a separate calculation that would result in double counting the value of the market benefit~~.~~; and
- ~~Would~~would accrue to a producer, consumer or transporter of electricity in the market. If the class of benefit falls outside the scope of the market, the RIT–T proponent should not include it in its cost benefit analysis (see section 3.11 for a discussion on externalities).

3.7 Methodology for valuing market benefits

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[22] AER, *Draft RIT–T*, May 2020, paragraphs 12–13 and as required by NER clauses 5.15A.2(b)(5)–(6).
[23] AER, *Draft RIT–T*, May 2020, subparagraph 11(k) and as required by NER clause 5.15A.2(b)(4)(x)(A).

The total benefit of a credible option includes the change in:

- consumer surplus, being the difference between what consumers are willing to pay for electricity and the price they are required to pay; and
- producer surplus, being the difference between what electricity producers and transporters are paid for their services and the cost of providing those services (excluding the costs of the credible option).

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

i. comparing, for each relevant reasonable scenario, the state of the world with the credible option in place ~~with~~against the state of the world in the base case; and

ii. weighting any positive or negative benefit derived in (i) by the probability of each relevant reasonable scenario occurring.

This comparison may reveal that a credible option results in both positive and negative effects on the market. The calculation must therefore reflect a netting-off process, that accounts for the positive and negative effects of a credible option in the market across all the relevant classes of market benefits. This process may result in a credible option having a positive or negative market benefit.

Appendix A provides guidance and worked examples for each class of market benefit referred to in NER clause 5.~~16.1(c~~15A.2(b)(4). In addition, the following sections provide guidance on valuing market benefits **for a given credible option**, which involves three key steps:

~~1.~~9. **deriving** the states of the world with and without the credible option in place in each reasonable scenario;

~~2.~~10. **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

~~3.~~11. **weighting** the market benefits arising in each reasonable scenario by the probability of that reasonable scenario occurring.

3.7.1 Deriving states of the world in each reasonable scenario

For each credible option, a RIT–T proponent must develop 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) for each reasonable scenario. This allows the RIT–T proponent to later derive the market benefits of an option by comparing these states of the world, and then probability weighting those benefits across a range of reasonable scenarios.

Explanatory box 1 explains the difference between a 'state of the world' and a 'reasonable scenario.

Explanatory box 1: States of the world ~~versus~~and reasonable scenarios

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Reasonable scenarios are independent of the credible option, whereas states of the world are dependent on the credible option.

A state of the world is a detailed description of all of the relevant market supply and demand characteristics and conditions likely to prevail in a reasonable scenario 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) should vary depending on which credible option (if any) proceeds. Therefore, each credible option~~— as well as~~ and the base case~~—~~ will be associated with a different state of the world in each reasonable scenario, reflecting different patterns of generation investment and other characteristics and conditions in that 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 following variables should be independent of the credible options and considered as components of each reasonable scenario:

- levels of economic growth and the associated level of base electricity demand;
- level of population growth and the associated level of base electricity demand;
- the unit capital and operating costs of generation plant (in $/MW or $/MWh);
- the value of any environmental penalties; and
- the value of unserved energy.

~~In a particular analysis, it may be appropriate to assess the benefits of a credible option across high, medium and low demand reasonable scenarios.~~

The RIT–T instrument requires the RIT–T proponent to adopt the reasonable scenarios from the most recent IASR unless it provides demonstrable reasons for why adding, omitting or varying these scenarios is necessary and if doing so is consistent with the requirements for reasonable scenarios as set out in the RIT–T.[24]

For the avoidance of doubt, given demand is likely to vary between different scenarios, to the extent that a demand-side option ~~leads to lower~~affects 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 with different levels of demand, because ~~such benefits of~~ the demand-side ~~option~~ option's benefits may vary according to the forecast demand in each scenario.

Notwithstanding the need for probability-weighting market benefits to derive the market benefit of a credible option, RIT–T proponents will continue to provide details of the estimated market benefits of a credible option under each reasonable scenario.

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[24] See AER, *Draft RIT–T*, May 2020, subparagraph 20(b) and paragraphs 20–23.

All assets and facilities that exist during the RIT–T's application 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, a state of the world must capture the future evolution of and investment in generation, network and load. To capture this, the RIT–T instrument requires the RIT–T proponent ~~must derive~~to include appropriate:[25]

- Committed projects: these must form part of all states of the world, consistent with the treatment of existing assets and facilities.
- Actionable ISP projects: these must form part of all states of the world, consistent with the treatment of committed projects unless the level of analysis required to include the actionable ISP project is disproportionate to the scale and likely impact of the credible options under consideration.[26]
- Anticipated projects: the RIT–T proponent must use the ISP, and where absent from the ISP, its reasonable judgement to include these in all **relevant** states of the world.
- Modelled projects: appropriate market development modelling will determine which modelled project to include in a given state of the world. For completeness, where a RIT–T proponent adopts the market modelling from the most recent ISP, ISP projects that are not actionable ISP projects (that is, future ISP projects and ISP development opportunities) will usually be modelled projects.

Explanatory box 2: What is market development modelling in the RIT–T?

Market development modelling forecasts 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.

~~Paragraph 21 of the~~ The RIT–T requires market development modelling, in so far as practicable, be adopted from the most recent ISP, and should in general be on a least-cost/central planning-style basis.[27] This modelling should be 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). It may also treat the reserve margin that AEMO develops as an exogenous input. The RIT–T ~~requires~~ instrument specifies that, in general, market development modelling should be undertaken on a 'least-cost' basis.[28] This is because least-cost market development modelling ~~because it~~ relies on relatively uncontroversial assumptions and methodologies (derived from operations research).

The RIT–T instrument also allows, where appropriate, market development modelling on a private benefit basis ~~as a sensitivity~~ (market-driven market development modelling). ~~It only~~

25 ~~See~~AER, *Draft RIT–T*, May 2020, paragraphs ~~18–20~~25–28. Also see the Glossary of the Draft RIT–T for definitions of committed, anticipated and modelled projects.

26 This is to align with NER cl. 5.15A.2(b)(2), which specifies that the RIT–T must 'not require a level of analysis that is disproportionate to the scale and likely impact of each of the credible options being considered'.

27 AER, *Draft RIT–T*, May 2020, paragraph 29.

28 AER, *Draft RIT–T*, May 2020, subparagraph 29(a).

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~~allows~~[29] RIT–T proponents may choose to undertake market-driven market development modelling as a sensitivity because assumptions regarding plant bidding behaviour and ownership may strongly influence the results.

Market development modelling is important as it helps determine a credible option's market benefits in a given reasonable scenario by RIT–T proponents to derive modelled projects in the presence and absence of a credible option. For example, market development modelling may assist in determining whether—in ~~high, medium or low~~ reasonable scenarios with different demand forecasts—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.

Example 7: Market development modelling modelling—states of the world

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Consider an identified need to meet a mandatory service standard. Assume there are two credible options– a network and a demand-side option.

This will require deriving three states of the world (and consequently, three market development scenarios) ~~in respect of~~for each reasonable scenario. These include where: (1) neither credible option is implemented (the base case), (2) the network option is implemented, and (3) the demand-side option is implemented.

3.7.2 Deriving and weighting market benefits

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Deriving the market benefit of a credible option in a given reasonable scenario entails comparing the state of the world with the option in place with the base case state of the world. Section 3.7.3 describes how to achieve this for each class of market benefit.

A RIT–T proponent will then apply this derivation across all reasonable scenarios, as shown in example 8.

Example 8: Market development modelling—deriving and weighting market benefits across states of the world

This example continues from example 7 where there are two credible options– a network and a demand-side option. ~~Assuming there are~~ Assume the RIT–T proponent demonstrates that three reasonable scenarios ~~(~~from the most recent IASR are relevant (and these scenarios are based around high, medium and low demand), the RIT–T proponent must:

- **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.

[29] AER, *Draft RIT–T*, May 2020, subparagraph 29(b).

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.

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.

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).

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3.7.3 Categories of market benefits

Broadly speaking, the market benefit of a credible option can be obtained from savings in:

- capital costs, including the costs of generation and network assets;
- operating costs, including fuel costs, network losses, ancillary services, as well as voluntary and involuntary load reduction; and
- the costs of meeting environmental targets, such as a ~~renewable energy target (~~RET~~)~~ or similar developments ~~(like a potential National Energy Guarantee or similar).~~

This section provides guidance and worked examples on estimating these categories of savings.

Capital cost savings

A RIT–T proponent can primarily estimate savings in capital costs by comparing the patterns of plant development in different states of the world under a given reasonable scenario. This entails computing capital cost savings by comparing the development pattern of committed, actionable ISP, anticipated and modelled projects under each credible option to that under the base case.

Example 9: Capital costs under different states of the world

Assume that:

- ~~The~~the identified need is to meet a mandatory service standard~~.~~;
- ~~Two~~two credible options exist: a network option and a demand-side option~~.~~;
- ~~The~~the discount rate is 7 per cent~~.~~; and
- ~~There~~the RIT–T proponent can demonstrate that there is only one relevant reasonable scenario, such that there are three states of the world:
    - The base case state of the world where neither credible option is developed and a modelled project is developed in year 5 at a capital cost of $150 million.
    - The demand-side option state of the world, where only the demand-side option is developed, the same modelled project is developed in year 7 at a capital cost of $150 million.
    - The network option state of the world, where only the network option is developed and no modelled projects are developed over the duration of the analysis.

Under these assumptions, the contribution of capital cost savings to the market benefit of each credible option can be calculated as follows:

- ~~Network~~For the network option~~: the capital cost saving is,~~ the benefit of avoiding the $150 million modelled project in year 5 that is otherwise required in ~~year 5 in~~ the base case state of the world. The present value of this avoided cost is $\frac{150}{(1.07)^5} =$ $107 million.

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- ~~Demand~~For the demand-side option~~: the capital cost saving is~~, the benefit of deferring the $150 million modelled project ~~required~~in year 5 under ~~both~~ the base case and demand-side states of the world ~~from year 5~~ to year 7 by:
  - ~~Present~~calculating the present value of modelled project in year 5 = $107 million~~.~~; and
  - ~~Present~~deducting from this the present value of modelled project in year 7 ($\frac{150}{(1.07)^7}$ = $93 million~~.~~
  - ~~Present value of deferring modelled project =~~) to get $107 ~~—~~million – $93 million = $14 million.

In this example, taking into account only the capital cost effects, the network option results in the greatest market benefit.

Note that despite these positive contributions to market benefit, neither credible option may produce positive net economic benefits if the expected costs exceed the expected market benefits.

Operating cost savings

Savings in operating (such as fuel), maintenance and load reduction costs can be obtained by comparing the market dispatch outcomes in different states of the world.

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Example 10: Operating costs under different states of the world

The following example builds on example 9, and makes the following assumptions:

- In the base case state of the world, the present value of:
  - ~~Fuel~~fuel resource costs = $80 million~~.~~; and
  - ~~Unserved~~unserved energy costs = $40 million.
- ~~in~~In the network state of the world, the present value of:
  - ~~Fuel~~fuel resource costs = $100 million~~.~~; and
  - ~~Unserved~~unserved energy costs = $2 million.
- ~~in~~In the demand-side state of the world, the present value of:
  - ~~Fuel~~fuel resource costs = $80 million~~.~~; and
  - ~~Unserved~~unserved energy costs = $26 million.

Under these assumptions, the contribution of operating cost savings to the market benefits of each credible option can be calculated as follows:

- ~~Network~~network option: (80 + 40) – (100 + 2) = $18 million~~.~~; and
- ~~Demand~~demand-side option: (80 + 40) – (80 + 26) = $14 million.

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~~Market dispatch outcomes can be modelled using market or pool dispatch models that simulate or forecast wholesale spot market outcomes in the presence of each credible option, as well as in the base case. Such models should operate using bid-based merit order dispatch so they produce similar results to the dispatch algorithm AEMO uses to dispatch and settle the NEM. Any model used for market dispatch modelling must incorporate realistic treatment of plant and network characteristics and forecast load.~~

~~Where~~The RIT–T instrument requires RIT–T proponents to adopt market development modelling from the ISP, insofar as practicable.[30] This recognises that AEMO's market development modelling is likely to represent best practice, but RIT–T applications that are not exploring actionable ISP projects may not necessarily require this level of market modelling. For instance, where changes in outcomes in the wholesale spot market do not materially affect the market benefits of any credible options under consideration, it may be appropriate to limit the modelling of market benefits to load-flow modelling. Such modelling must incorporate realistic treatments of relevant plant and network characteristics and forecast load.

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Cost savings in meeting mandated targets

Savings in capital and operating costs incurred in meeting any environmental, reliability or other mandated targets (for example, the Australian or jurisdictional RETs or ~~some form of National Energy Guarantee~~Retailer Reliability Obligation) can be calculated by comparing plant development and market dispatch outcomes for a credible option to the base case.

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In the absence of any price caps or penalties, it is reasonable to assume that the market will meet an applicable mandated target, like the RET ~~or ant targets under a future National Energy Guarantee.~~ Using the RET as an example, a RIT–T proponent could assume that the price of a Renewable Energy Certificate (REC) would rise to the level necessary to induce compliance with the target. Therefore, under any state of the world, the benefits from meeting that target will be identical and need not be included in the RIT–T application. Rather, the differences in other capital and operating costs under the RIT–T application will reflect any differences in the resource costs of meeting these targets under different states of the world.

However, it may be that there is a cap on prices (RECs, in the case of the RET) or a penalty for not meeting the relevant target. It would be reasonable to assume that this cap or penalty reflects the maximum per unit benefit to the NEM of providing the relevant service (renewable energy, in the case of the RET). In such a case, it is possible that it will not be net beneficial for the NEM to meet the target as the cost of meeting it could exceed the benefits, as indicated by the level of the cap/penalty. As such, a RIT–T proponent can consider the benefits associated with the target in each state of the world equivalent, even where the target is not met due to it being lower cost to pay the cap/penalty price.

Using the RET as an example, in a state of the world where the RET is not met, the amount of renewable energy short of the target will be valued at the capped price and contribute to the resource costs incurred in that state of the world. Comparing the resource costs in

[30] AER, *Draft RIT–T*, May 2020, paragraph 29.

different states of the world may then make a positive or negative contribution to the market benefits of a credible option.

Under the RET, certificate purchases represent tax deductable business expenses. However, penalties such as those to be imposed on parties who ~~fail to~~ surrender ~~sufficient~~insufficient RECs are generally not tax deductible expenses. Due to the asymmetric tax treatment of permit compared to penalty expenditures, the RET penalty price for the purposes of applying the RIT–T should be 'grossed up' by the applicable company tax rate to ensure that the penalty price is consistent with the post-tax REC price faced by market participants.

For example assuming a company tax rate of 30 per cent and an unadjusted penalty price of $50, the 'grossed up' penalty price for the RIT–T analysis is:

$$Penalty_{GU} = \frac{Penalty}{1-t} = \frac{\$50}{1-0.3} = \$71.42$$

By grossing this price up, the calculation of market benefits in the RIT–T application should reflect direct impacts on those that produce, consume and transport electricity in the market. This means that rational risk-neutral participants will choose to expend up to $71.42/MWh to avoid breaching the target. The value to the market of meeting the target in this example is also $71.42/MWh.

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Example 11: Cost savings in meeting a renewable energy target

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A legislatively imposed ~~renewable energy~~RET scheme exists whereby a certain proportion of electricity generated must come from certified renewable sources.

The scheme uses RECs as an instrument to achieve the ~~renewable energy target.~~RET. One REC represents 1 MWh of renewable generation. A penalty price of $35/MWh is imposed—this means that for each MWh of energy by which the target is not met, a penalty of $35/MWh is incurred (this equates to a grossed-up penalty price of $50/MWh).

The credible option in question is the construction of a transmission link between two regions: a region with abundant, relatively cheap renewable generation and low load (Region A) and a region with limited, relatively expensive renewable generation and high load (Region B).

~~In~~Assume the following occurs in the **base case**~~, the~~:

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- ~~Price~~The price of RECs is $50/MWh~~—~~ (that is, the price of RECs is set at the grossed-up penalty price~~. The~~) and the market 'chooses' to pay the penalty price of $35/MWh and not meet the renewable target.
- ~~Renewable~~The renewable target is 50,000 MWh per year over the period of the analysis.
- ~~Present~~The present value of operating and capital costs over the period of the analysis is $500 million.

- ~~Annual~~Based on these assumptions, the annual cost of not meeting the renewable target is 50,000 MWh*$50 = $2.5 million. ~~The~~If we assume the present value of these costs over the period of the analysis is $17.5 million~~.~~
- ~~Present~~, then the present value of operating, capital and penalty costs in the base case is ~~thus~~ 500 + 17.5 = $517.5 million.

~~With~~Assume the following occurs **with** the credible option~~, the~~:

- ~~Price~~The price of RECs is $40/MWh ~~and~~. Assume the market meets annual renewable targets over the period of the analysis.
- ~~Present~~The present value of operating and capital costs over the period of the analysis is $510 million. This is slightly higher than in the base case (where capital and operating costs sum to $500 million) because of:
  - ~~Higher~~higher capital costs (greater investment in renewable generation occurs~~).~~); and
  - ~~Lower~~lower operating costs (additional renewable generation displaces thermal plant).
- ~~Present~~Based on these assumptions, while the present value of operating~~,~~ and capital ~~and penalty~~ costs over the period ~~of the analysis~~ is slightly ~~lower than in the base case (where these costs sum to $517.5 million) due to penalty costs being avoided if~~higher when the credible option is ~~developed.~~
- ~~The~~ in place, this is more than offset by avoiding penalty costs under the RET. Specifically, the market benefit of the credible option based on ~~these~~ operating, capital and avoided RET penalty costs is ~~thus~~ 517.5 – 510 = $7.5 million.

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Benefits accruing across regions

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NER clause 5.~~16~~15A.2(~~c)(6~~b)(10)(iii) requires the RIT–T to specify acceptable methodologies for estimating market benefits that may occur outside the RIT–T proponent's network. Similarly, the RIT–T application guidelines must include guidance and worked examples on the acceptable methodologies for valuing market benefits that accrue across regions.

The method outlined above for calculating market benefits implicitly includes market benefits arising across all regions in the NEM. For the avoidance of doubt, the RIT–T instruments provides that the methodology for calculating market benefits must capture any market benefits arising in the RIT–T proponent's region as well as all other NEM regions.[31] Given this, our more general guidance on estimating benefits is also applicable to quantifying benefits that accrue in more than one region. RIT–T proponents need not separately quantify benefits that arise in each region of the NEM.

Nevertheless, in calculating benefits that accrue to other regions in the NEM, we expect ~~RIT–T proponents to:~~the most recent ISP to guide RIT–T proponents when evaluating how

[31] AER, *Draft RIT–T*, May 2020, paragraph 16.

different credible options will fit into or affect the broader development of the NEM. Specifically, the ISP will guide RIT–T proponents in this way by providing:

- ~~Liaise~~actionable ISP projects for RIT–T proponents to include in all states of the world wherever relevant/material, consistent with the treatment of committed projects; and
- other ISP projects to include in states of the world as determined by the market modelling used in the ISP.

- To extent that the most recent ISP provides insufficient information to aid the RIT–T proponent in calculating inter-regional benefits, the RIT–T proponent should liaise with producers, consumers and transporters of electricity in other regions of the NEM to inform their understanding of how different credible options will affect them. If the RIT–T proponent is exploring credible options that it expects will 'materially affect' another electricity network, we would expect the RIT–T proponent to instigate a joint-planning project with that other electricity network. In this context, 'materially affect' means it will create an identified need sufficiently large that it will require a RIT–T project or a regulatory investment test for distribution (RIT–D) project to meet it.

- ~~Have regard to AEMO's NTNDP, ISP, or equivalent document to inform their understanding of how different credible options will fit into or affect the broader development of the NEM.~~

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3.8 Reasonable scenarios and sensitivities

This section provides guidance on forming reasonable scenarios, including:

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- ~~Selecting an appropriate number~~general guidance on selecting reasonable scenarios (section 3.8.1);
- using sensitivity analysis to guide the selection of reasonable scenarios~~;~~ (section 3.8.2);
- how reasonable scenarios affect the computational effort (section 1.1.1); and
- ~~Giving consideration to~~how scenario analysis can capture high impact low probability (HILP) events~~.~~ (section 3.8.4).

~~3.8.11.1.1 Testing sensitivities to select reasonable scenarios~~

3.8.1 Selecting reasonable scenarios

The RIT–T instrument requires RIT–T proponents to adopt the reasonable scenarios from the most recent IASR unless:[32]

- the RIT–T proponent demonstrates why it is necessary to vary, omit or add a reasonable scenario to what was in the most recent IASR; and
- the new or varied reasonable scenarios are consistent with the requirements for reasonable scenarios set out in the RIT–T instrument.

[32] AER, *Draft RIT–T*, May 2020, subparagraph 20(b) and paragraphs 21–23.

We expect there will be circumstances where it would reasonable for a RIT–T proponent to a omit an ISP scenario when applying a RIT–T to a RIT–T project that is not an actionable ISP project. Given the RIT–T cost threshold is small relative to many actionable ISP projects[33] and many RIT–T projects will be intra-regional projects (including replacement projects), it is likely that many RIT–T projects will be relatively modest in size and scope compared to ISP projects. This is such that the analysis set out in the ISP might be too comprehensive to be fit for purpose. On this basis, some RIT–T proponents might find the following general guidance useful when selecting a range of reasonable scenarios.

Under the RIT–T instrument, the number and choice of reasonable scenarios must be appropriate to the credible options under consideration. Specifically, the choice of reasonable scenarios must reflect any variables or parameters that are likely to affect:[34]

- the ranking of the *credible options, where the identified need is for reliability corrective action* ~~and therefore~~*, inertia network services or system strength services. In these cases, only the ranking (as opposed to the sign) of credible options' net economic benefits is important; and*
- the ranking or sign of the net economic benefit of any *credible option where the identified need is not for reliability corrective action,* ~~where~~*inertia network services or system strength services. In these cases, the preferred option must* ~~therefore~~ *have a positive net economic benefit.*

~~NER clauses 5.16.1(c)(5)~~The appropriate number and ~~(6) place some limitations~~choice of reasonable scenarios could vary depending on the ~~depth of analysis required for calculating various classes of market benefits~~credible options under ~~the RIT–T. Also,~~consideration. This recognises that NER clause 5.~~16.1(c)(15A.~~2~~) and the RIT–T require~~(b)(2) requires RIT–T proponents to apply the RIT–T to a level of analysis which is proportionate to the scale and likely impact of each credible option. Given this, when considering whether to depart from the scenarios used in the ISP, we recommend RIT–T proponents:

~~These requirements mean that the appropriate number and choice of reasonable scenarios is likely to vary for each set of credible options under consideration. As such, we cannot prescribe these requirements in advance. We do not intend to specify the appropriateness (or otherwise) of a particular number of reasonable scenarios in a given set of circumstances. However, as guidance, when developing reasonable scenarios, we recommend RIT–T proponents:~~

- ~~Use~~use the information provided in the ISP in the first instance (see section 3.4);
- use sensitivity analysis to assist in determining an appropriate set of reasonable scenarios. We describe this approach in ~~the following paragraphs.~~section 3.8.2;
- ~~As~~as a principle, be conscious of the current NEM reforms and relevant policy developments, including:
    - ~~Electricity~~electricity pricing reforms~~.~~;

[33] This threshold was $6 million at the time of drafting. Under clause 5.15.3 of the NER, we must review RIT–T cost thresholds every three years for changes in input costs.

[34] AER, *Draft RIT–T*, May 2020, paragraph 23.

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- ~~The~~the development of new markets and products, such as demand response markets and products that allow consumers to select their own price-reliability preference~~.~~; and
- ~~Policies~~policies relating to features of the NEM, such as those concerning carbon emissions, renewable energy, reliability, energy security and other factors. For example, if evidence supports there being a reasonable possibility of a policy change (including introducing a new policy or altering/withdrawing a current policy) that could affect the ranking and/or sign of credible options ~~(or just the ranking, if the identified need was for reliability corrective action),~~, the RIT–T proponent should include a reasonable scenario where this policy change occurs~~.~~; and

- ~~Construct~~construct scenarios that are genuinely reasonable, in that they comprise of internally consistent parameters so that they can define a reasonable range of plausible states of the world.

3.8.2 Testing sensitivities to select reasonable scenarios

- ~~Where appropriate, have regard to AEMO's work in developing modelling forecasts, scenarios and assumptions, such as the information provided in the ISP (see~~This section ~~3.4.1 for more information on using information that AEMO publishes).~~

~~The following paragraphs further explain the first dot point above—that is,~~explains how ~~the development of additional~~ developing reasonable scenarios ~~involves~~can involve a process of applying sensitivity analysis to key ~~input variables~~ inputs that will likely affect the performance of credible options. Such inputs might ~~include those relating~~relate to technology costs, fuel costs, distributed generation and storage growth.

~~It may be that~~If a reasonable change to ~~the value of~~ a parameter ~~changes~~/variable affects the ranking or sign ~~(for reliability corrective action) or ranking~~ of credible options by net economic benefit~~. In such cases, the RIT–T proponent should explore states of the world under~~ , this would provide a demonstrable reason to include a reasonable scenario that is consistent with that ~~different, yet reasonable,~~ change in parameter/variable value.

For example, sensitivity analysis might show that the relative performance of credible options changes if there are lower than expected technology costs. ~~On this~~ This would provide a basis~~, a~~ for the RIT–T proponent ~~should explore different states of the world under~~to include a reasonable scenario ~~that is consistent with~~based on lower than expected technology costs.

Explanatory box 3: Sensitivity analysis versus scenario analysis

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This section of the RIT–T application guidelines ~~recommends using~~explains how sensitivity analysis ~~as a tool to~~can assist in selecting ~~the appropriate~~reasonable scenarios to use when performing scenario analysis. As such, it is beneficial to distinguish these concepts.

Sensitivity analysis entails varying one or multiple inputs to test how robust the output of an analysis or model is to its input assumptions. For example, we suggest that if the results of the analysis in one reasonable scenario appear to be sensitive to a particular

input (say, forecast electricity demand), this provides a strong basis to explore reasonable scenarios that incorporate different levels of that input more holistically. For example, this might include adopting a range of scenarios where there is particularly high or low load growth.

It is worth noting that we do not recommend limiting the use of sensitivity analysis to selecting reasonable scenarios. After identifying the preferred option, the RIT–T proponent should illustrate 'boundary values' for important input assumptions (such as the discount rate and VCR) at which the preferred option changes. The RIT–T proponent can then discuss the plausibility of that value and evaluate the risk of that credible option.

Scenario analysis focuses on describing different sets of states of the world that reflect common values of particular parameters that are relevant to the investment decision. For example, a reasonable scenario will reflect a common set of values for the rate of demand growth, fuel costs, technology costs and environmental target(s).

Under the RIT–T, the use of scenario analysis to assess a credible option entails:

- ~~Developing~~developing/describing different scenarios based on a range of parameters, which the RIT–T refers to as 'reasonable scenarios'; and then
- ~~Exploring~~exploring how different projects (credible options) produce different outcomes (states of the world) under a range of different reasonable scenarios.

Through this, RIT–T proponents gain a comprehensive understanding of what states of the world could arise with and without a credible option in place under different sets of external circumstances. For a given credible option, a RIT–T proponent then probabilistically weights the outcomes (the states of the world under that option relative to the base case) across the different reasonable scenarios to derive that option's expected net market benefit.

To elaborate on the above guidance, ~~using~~ sensitivity analysis ~~to~~can guide ~~what~~ RIT–T proponents to explore reasonable scenarios ~~to explore can limit what~~ where changes in variables ~~a RIT–T proponent reflects in additional reasonable scenarios.~~are material. This ~~approach limits these~~is where material changes ~~to~~are those ~~expected to~~that would affect the ranking of credible options ~~by net economic benefits (~~, and where relevant, the ~~identified need is reliability corrective action), or the ranking or~~ sign (positive or negative) of ~~the~~ net economic benefits ~~of any of the credible options (in the case of investments motivated by other needs).~~. This entails undertaking the following steps:

1. For each variable or parameter forming part of a reasonable scenario, take the most probable value or values that also provide an internally consistent or plausible scenario. Combining these probable values will generate one or more reasonable scenario, as a 'central reasonable scenario'. Under the central reasonable scenario, the net economic benefits of each credible option can be determined by comparing the state of the world **with** the credible option in place to the base case.
2. Undertake sensitivity analysis on those parameters or values that could reasonably change the ranking or sign (where the investment is not motivated by reliability corrective action) of the net economic benefits of any of the credible options, determined under a

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central reasonable scenario. Then, the net economic benefits of a credible option are calculated and compared under:

- a central reasonable scenario; and
- a reasonable scenario based on the same central reasonable scenario but with a change to one of the parameters or values in that central reasonable scenario (referred to as a 'modified central reasonable scenario').

3. Adopt additional reasonable scenarios that reflect variations in that parameter ~~or value~~/variable where a change to a parameter ~~or value~~/variable in a central reasonable scenario yields a change to the~~:~~ ranking or sign[35] of the net economic benefits of any of the credible options.
   - ~~ranking of credible options by net economic benefits (where the identified need is reliability corrective action); or~~
   - ~~ranking or sign (positive or negative) of the net economic benefits of any of the credible options.~~

Example 12 provides a simple stylised example to assist RIT–T proponents in applying this approach.

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Example 12: Stylised example on selecting reasonable scenarios

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Consider where the RIT–T proponent is assessing two credible options. ~~The RIT–T proponent considers~~Assume that the most ~~probable reasonable~~likely ISP scenario comprises of a:

- medium base forecast electricity demand;
- discount rate of 8 per cent;
- medium capital, operating and ancillary services costs for existing, committed, anticipated and modelled projects; and
- realistic bidding based on a Nash Equilibrium approach.

~~This becomes the~~The RIT–T proponent uses this ISP scenario as its central reasonable scenario and ~~the RIT–T proponent~~ calculates the net economic benefit of the two credible options under this scenario.

The RIT–T proponent then applies sensitivity analysis to each of the key variables in the central reasonable scenario. This could involve the RIT–T proponent calculating the net economic benefit of each credible option under a modified central reasonable scenario that varies one of the variables in the central reasonable scenario—such as the level of forecast base electricity demand—while holding the other variables constant.

In some cases, the ranking, or ranking/sign (whichever relevant) of credible options' net economic benefits calculated under, for example, a demand modified central reasonable scenario might differ significantly from that calculated under the associated central

[35] That is, whether net economic benefits are positive or negative. This sign is less relevant when the preferred option can have a negative net economic benefit (e.g. reliability corrective action).

reasonable scenario. In such cases, the RIT–T proponent should include an additional set of reasonable scenarios that reflect varying levels of forecast electricity demand. The RIT–T proponent should then apply the same approach to the other elements of the central reasonable scenario.

In addition to the stylised example above, example 13 and example 14 provide two worked examples showing how RIT–T proponents could apply this approach in practice.

~~It is worth noting that the impact of sensitivity analysis on the number and choice of reasonable scenarios used to assess a particular set of credible options will vary according to the circumstances surrounding the RIT–T assessment. Further, there may be other approaches for deriving the appropriate number and choice of reasonable scenarios for each set of credible options under consideration. Whatever approach is taken, the requirements of the RIT–T (noted above) will apply.~~

Example 13: Demand sensitivity

This example shows how a RIT–T proponent could undertake a sensitivity analysis of forecast demand.

Assume there are two credible options:

- Augment a transmission line between Region A and Region B at a present value cost of $60 million~~.~~ (augmentation option).
- Establish a local generator in Region B~~.~~ (generation option).

Region A has more plentiful generation capacity and lower generation costs than Region B. Over the period of the analysis under its central reasonable scenario, the RIT–T proponent:

- ~~Forecasts~~forecasts that energy and peak demand in Region A will grow by 2 per cent~~.~~;
- ~~Forecasts~~forecasts that energy and peak demand in Region B is will grow by 6 per cent~~.~~; and
- ~~Assumes~~assumes a discount rate of 7.5 per cent.

The major modelled projects in the state of the world **with** the augmentation ~~credible~~ option are the development of ~~a~~:

- a 200 MW plant in Region A in year 5 of the analysis~~.~~; and
- a 600 MW plant in Region B in year 8 of the analysis.

In the **base case,** the major modelled projects are ~~a~~the development of:

- a 200 MW plant ~~is developed~~ in Region A in year 10 of the analysis~~.~~; and
- a 600 MW plant ~~is developed~~ in Region B in year 2 of the analysis.

The market benefits of the augmentation ~~credible~~ option in the central reasonable scenario include the following:

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- Decreased dispatch costs—cheaper generation in Region A displaces more expensive generation in Region B.
- Increased capital costs—the 200 MW plant in Region A is brought forward by 5 years (from year 10 to year 5).
- Decreased capital costs—the 600 MW plant in Region B is delayed by 6 years (from year 2 to year 8).

~~The~~ Assume the present value market benefit of the augmentation ~~credible~~ option is calculated to be $75 million. The present value net economic benefit under these assumptions is 75 – 60 = $15 million.

Assume that the same process carried out for the generation ~~credible~~ option, which yields a present value net economic benefit of $10 million.

A sensitivity analysis is now run on the assumption regarding growth in energy and peak demand in Region B.

Under this modified central reasonable scenario, growth in energy and peak demand in Region B will be 10 per cent over the period of the analysis instead of 6 per cent.

Under these demand growth assumptions, the major modelled projects in the state of the world **with** the augmentation ~~credible~~ option are the development of a:

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- 300 MW plant in Region A in year 4 of the analysis~~.~~; and
- 900 MW plant in Region B in year 9 of the analysis.

In the **base case, a:**

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- 200 MW plant is developed in Region A in year 10 of the analysis~~.~~; and
- 900 MW plant is developed in Region B in year 1 of the analysis.

The present value of the market benefit of the augmentation ~~credible~~ option under these assumptions includes the following:

- Decreased dispatch cost: cheaper generation in Region A displaces more expensive generation in Region B.
- Increased capital costs: the plant in Region A is larger (300 MW instead of 200 MW) and is brought forward by 6 years (from year 10 to year 4).
- Decreased capital costs: the 900 MW in Region B is delayed by 8 years (from year 1 to year 9).

Due to the change in the type and timing of the modelled projects under the revised demand growth assumption, assume that the present value ~~of the~~ market ~~benefits~~benefit of the augmentation ~~credible~~ option is ~~calculated to be~~ $85 million. The present value net economic benefit under these assumptions is 85 – 60 = $25 million.

Assume that the same process carried out for the generation ~~credible~~ option in the modified central reasonable scenario yields a present value net economic benefit of $20 million.

The analysis shows that, in the event that growth in energy and peak demand in Region B is higher than forecast, both credible options will have a higher net economic benefit than forecast. However, since the ranking of net economic benefit between the two credible options has not changed~~. Therefore~~, it may not be necessary for the RIT–T proponent to develop additional reasonable scenarios with varying levels of forecast demand in its assessment of the credible options.

Example 14: Lower generation capital cost sensitivity

The following example builds on example 13 to show how a RIT–T proponent could undertake a sensitivity analysis of generation capital costs.

The credible ~~option is~~options are the same ~~credible option from~~as in example 13.

~~Under~~Assume that under the central reasonable scenario~~,~~:

- growth in energy and peak demand is the same as initially assumed—2 per cent in Region A and 6 per cent in Region B~~.~~; and
- ~~Generation~~generation capital costs ~~in the central reasonable scenario~~ are ~~assumed to be~~ 'medium'.

As in example 13, these assumptions result in the following outcomes for the augmentation ~~credible~~ option:

- A 200 MW plant being developed in Region A in year 5 of the analysis in the state of the world with the ~~credible~~augmentation option, and in year 10 of the analysis in the base case.
- A 600 MW plant being developed in Region B in year 8 of the analysis in the state of the world with the ~~credible~~augmentation option, and in year 2 of the analysis in the base case.

~~The~~As per example 13, the present value net economic benefit of the augmentation ~~credible~~ option is ~~75 – 60 =~~ $15 million. The present value net economic benefit of the generation ~~credible~~ option is $10 million.

A sensitivity analysis is now run on the assumption regarding generation capital costs. The new modified central reasonable scenario assumes generation capital costs are 'low'. Under this assumption the major modelled projects in the state of the world **with** the augmentation ~~credible~~ option are the development of:

- A 300 MW plant in Region A in year 3 of the analysis.
- A 700 MW plant in Region B in year 7 of the analysis.

In the **base case**~~, the same~~:

- the same 300 MW plant is developed in Region A in year 8 of the analysis~~.~~; and
- the same 700 MW plant is developed in Region B in year 1 of the analysis.

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Due to the change in the type, timing and costs of the modelled projects, assume the present value market benefit of the augmentation ~~credible~~ option ~~under these assumptions~~ is ~~calculated to be~~now $70 million. The present value net economic benefit under these assumptions is 70 – 60 = $10 million.

Assume that the same process carried out for the generation ~~credible~~ option, which now yields a present value net economic benefit of $20 million.

The sensitivity analysis shows that where generation capital costs are lower than forecast, the credible options will have different levels of net economic benefit than forecast. In addition, the ranking of net economic benefit between the two credible options has changed. Therefore, it may be necessary for the RIT–T proponent to develop additional reasonable scenarios with varying levels of generation capital costs in its assessment of the credible options.

~~3.8.2 Modelling and analysis required under the RIT–T~~

~~The discussion above showed how we can use sensitivity analysis to formulate the appropriate number and choice of reasonable scenarios for a RIT–T assessment. Once a RIT–T proponent has formulated an appropriate number and choice of reasonable scenarios, it will need to calculate the market benefits of each credible option arising under each reasonable scenario. These market benefits would then need to be probability-weighted to derive the relevant market benefits of each credible option.~~

3.8.3 ~~In this context, it is important to note that the~~Reasonable scenarios and computational effort

The number of reasonable scenarios and credible options used in a particular RIT–T assessment will have a major influence on the extent of modelling and analysis that the RIT–T proponent must undertake. This is valuable to consider given NER clause 5.15A.2(b)(2) requires RIT–T proponents to apply the RIT–T instrument to a level of analysis which is proportionate to the scale and likely impact of each credible option.

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~~Assume~~As an example, assume that a RIT–T proponent ~~(having undertaken appropriate sensitivity analysis), reasonably chooses to assess~~is assessing a $50 million ~~investment in a~~ network ~~asset~~option to increase network transfer capability to accommodate expected load growth:

- against one alternative credible option;
- using a single discount rate;
- based on a single set of capital, operating and ancillary services costs for existing, committed, anticipated and modelled projects;
- based on two alternative demand forecasts; and
- using both competitive bidding and a ‘realistic’ bidding approach.

This analysis would necessitate the development of:

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- four reasonable scenarios—encompassing two different demand levels (high and low) and two different bidding approaches (competitive and realistic); and
- 12 states of the world—encompassing one set of reasonable scenarios for each of the two credible options and the base case.

It will often, but not always, be necessary for a RIT–T proponent to model a separate market development path for each state of the world. For example, it would be appropriate to model how plant expansion paths change with different levels of demand and with or without different credible options. However, there may be some parameters for which it would be infeasible or unnecessary to model separate plant expansion paths as those parameters were varied. Such parameters could include discount rates and bidding behaviour. For example, it may be unnecessary to develop separate market expansion paths under different bidding assumptions, as it may be infeasible to determine how bidding behaviour affects the pattern of plant development.

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In the present case, only six market development modelling paths may be required. That is, there might be a different path for the high and low demand reasonable scenarios, for each the two credible options plus the base case: 2*(2 + 1) = 6. Table 1 illustrates this.

Table 1: Modelling and analysis required under the RIT–T

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Reasonable scenario	Credible option	Market development path	State of the world
1: High demand, competitive bidding	Base case	1	1
1: High demand, competitive bidding	Option 1	2	2
1: High demand, competitive bidding	Option 2	3	3
2: High demand, strategic bidding	Base case	1	4
2: High demand, strategic bidding	Option 1	2	5
2: High demand, strategic bidding	Option 2	3	6
3: Low demand, competitive bidding	Base case	4	7
3: Low demand, competitive bidding	Option 1	5	8
3: Low demand, competitive bidding	Option 2	6	9
4: Low demand, strategic bidding	Base case	4	10
4: Low demand, strategic bidding	Option 1	5	11
4: Low demand, strategic bidding	Option 2	6	12

If we varied the input assumptions further, the number of reasonable scenarios, market development paths and required states of the world in applying the RIT–T analysis would multiply. ~~In practice, additional variations in input assumptions might entail using alternative~~

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~~values of unserved energy or using a market-driven market development modelling approach to assess more alternative credible options.~~

~~3.8.3~~3.8.4 High impact, low probability events

A RIT–T can ~~appropriately~~ capture the economic impacts of HILP events using scenario analysis, which entails following these RIT–T application guidelines in:

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- ~~Exploring~~exploring reasonable scenarios where relevant HILP events occur. For guidance on selecting reasonable scenarios, see section 3.8.1~~.~~;
- ~~Costing~~costing the impact of that HILP event occurring. In costing this event, we would expect the RIT–T proponent to include ~~the~~ market ~~benefit categories,~~benefits related to changes in ~~involuntary and voluntary~~ load shedding. In valuing these ~~changes in~~ market benefits, the RIT–T proponent should use a VCR that is ~~appropriate to the range and duration of customers that the HILP event would affect. If the appropriate VCR for the HILP event requires a departure from or adjustment to an accepted estimate such as those produced by AEMO, or by us from 31 December 2019~~consistent with our guidance in section 3.4.2. For example, if and where applicable, the RIT–T proponent ~~should have supporting evidence to clearly justify this departure or adjustment. In coming to such a decision, we would expect the RIT–T proponent to consult directly with both us~~might find it is suitable to apply a VCR associated with widespread and long duration outages; and ~~the customers to whom the VCR applies. For guidance on selecting VCR inputs, see section 3.4.3.~~
- ~~Weighting~~weighting the economic impact of the event by a reasonable estimate of its probability of occurring. ~~For clarity, weighting these events differently to their probability of occurring would likely distort the RIT–T outcome and undermine transparency.~~ For more information on weighting reasonable scenarios, see ~~section~~sections 1.1.1 and 3.9~~).~~.

A RIT–T proponent can also use sensitivity testing to explore the robustness of different credible options to risks, including HILP events.

When exploring the economic impacts of HILP events, RIT–T proponents should:

- ~~Explore~~explore the viability and effectiveness of non-network options in managing or responding to the effects of HILP events~~.~~;
- ~~Recognise~~recognise the different factors influencing the impact of certain HILP events. For instance, RIT–T proponents should have regard to AEMO's role in determining new 'protected events' when considering the impact of HILP events~~.~~; and
- ~~Avoid~~avoid skewing the results. This can be achieved by assuming that:
    - ~~The~~the HILP event occurred in the context of reasonable BAU actions~~.~~; and
    - ~~The~~the industry responded responsibly and efficiently to the HILP event.

~~3.8.4 Whole-of-network planning in the RIT–T~~

~~The RIT–T allows for the assessment of options whose market benefits are complementary to and/or substitutable by other network and non-network options that may be pursued in~~

other NEM regions. For example, through joint planning, two transmission businesses in adjacent regions may come to the view that it would only be economic for the first transmission business to pursue a network upgrade if the second transmission business undertook a network augmentation, and vice versa. This could occur in relation to a particular notional interconnector that exhibited thermal capacity limits at different points along its length, with each region containing at least one of those points.

In such cases, the relevant transmission businesses can jointly propose a credible option comprising network options in separate regions.[36] An expansive approach to the choice of network credible options should be accompanied by a similarly expansive approach to the choice of non-network alternative credible options and the selection of reasonable scenarios.

More frequently, transmission businesses may pursue augmentation or renewal projects outside of joint planning arrangements and without specific regard to projects with interdependent benefits being planned or contemplated in other regions. Alternatively, certain projects in other regions may be partially or wholly funded by governments or quasi-government bodies and hence their commissioning may not turn on RIT-T outcomes. In either of these cases, RIT-T proponents should include key potential projects nominated for their own or other regions in at least some reasonable scenarios used to assess the market benefits of their proposed credible options.

Example 16 shows how the RIT-T supports a 'whole-of-network' perspective in planning and assessing regulated network and non-network options.

Example 16: Whole of network planning in a RIT-T

A jurisdictional transmission business in a small region with a high and growing penetration of intermittent renewables (wind and solar) (Region A) is considering developing a new 500 kV AC interconnector. The identified need of the new interconnector is to help avoid unserved energy in region A when intermittent generation output is low and to help meet peak demand in region B at a lower variable cost than otherwise — that is, to produce net market benefits. The interconnector will connect to an adjoining bigger region with a peaky demand profile and a high proportion of thermal generation (Region B).

At the same time, a new DC interconnector between Region B and another small region with a large storage hydroelectric generator (Region C) might proceed with the aid of government funding. The new interconnector between Regions C and B will:

- Offer complementary benefits to the proposed 500 kV AC A-B interconnector. This is because the storage hydro in Region C could act as a battery to store excess intermittent renewable generation output from Region A for use at times when intermittent generation is low or demand in one of the regions is high.
- Be a partial substitute for the proposed 500 AC kV A-B interconnector. This is because by helping to serve peak demand in the large Region B, a new DC interconnector between Regions C and B would reduce the benefits of supplying more excess renewable generation via a new 500 kV interconnector between Regions A and B.

[36] The NER 5.15.2(a) allows a credible option to comprise a group of options.

These interactions will need to be assessed through plant development and market modelling. However, given that (by assumption) the DC interconnector between Regions C and B is not yet committed, the transmission business in Region A who is proposing the 500 kV AC interconnector between Regions A and B will need to consider reasonable scenarios that include the DC interconnector, as well as those that exclude it. The proponent Region A transmission business will also need to consider other variables in developing suitable reasonable scenarios, such as the rate of demand growth, the future cost trajectory of renewable plant in Region A (relative to renewable plant costs elsewhere), and different emissions reduction targets.

For simplicity, assume that the proponent Region A transmission business reasonably chooses to assess the merits of a new 500 kV AC interconnector from Region A to Region B:

- Against one alternative credible option of a new large gas-fired generator in Region A – with both options compared to a 'do nothing' base case;
- Using a single discount rate;
- Using a single demand forecast;
- With two different relative cost trajectories for renewable plant in Region A – 'fast decline' and 'slow decline';
- With two 2050 emissions reduction targets of:
    - A 50% reduction on 2005 levels – '50% reduction'; and
    - Zero net emissions – 'net zero emissions'; and
- With a mooted new DC interconnector between Regions C and B:
    - Proceeding – 'New C-B DC'; or
    - Not proceeding – 'No new C-B DC'.

This would necessitate the development of:

- Eight reasonable scenarios – encompassing all the 2^3 combinations of:
    - Different paces of relative cost declines of renewable energy plant in Region A (fast decline and slow decline);
    - Different 2050 emissions targets (50% reduction and net zero); and
    - New DC interconnector between Regions C and B proceedings and not proceeding (New C-B DC and No new C-B DC); and
- 24 states of the world – encompassing one state of the world for each reasonable scenario for each of the two credible options and the base case.

It is likely that in deriving the 24 states of the world, the proponent transmission business will need to model separate market development paths for each one. For example, it would be appropriate to model how plant expansion paths change with different rates of renewable plant cost declines, different emissions targets and with or without the commissioning of a new DC interconnector between Regions C and B. This will help

generate a series of market benefit values for each credible option in each reasonable scenario.

The proponent will then need to attribute a probability to each reasonable scenario occurring. For example, it may be that the probabilities of a:

- Fast decline in Region A renewables costs is 0.6 and slow decline is 0.4.
- 50% reduction in emissions target is 0.5 and net zero emissions target is 0.5.
- New C-B DC interconnector proceeding is 0.3 and not proceeding is 0.7.

Further, assume that these probabilities are independent of one another.

The probabilities allow the market benefit outcomes for the two credible options under the eight reasonable scenarios to be appropriately weighted. The costs of each credible option can then be subtracted from the weighted average market benefits to arrive at the net economic benefits of each credible option.

Table 2 illustrates this process using stylised market benefit and cost values.

Table 2: RIT–T modelling and analysis from a whole of network perspective

State of the world	Reasonable scenario		Credible option	Market benefit ($m)	Probability
1	1	Fast decline, 50% reduction, New C-B DC I/C	Base case	-	0.09
2	1	Fast decline, 50% reduction, New C-B DC I/C	A-B 500 kV I/C	450	0.09
3	1	Fast decline, 50% reduction, New C-B DC I/C	Large gas generator	300	0.09
4	2	Fast decline, 50% reduction, No new C-B DC I/C	Base case	-	0.21
5	2	Fast decline, 50% reduction, No new C-B DC I/C	A-B 500 kV I/C	300	0.21
6	2	Fast decline, 50% reduction, No new C-B DC I/C	Large gas generator	450	0.21
7	3	Fast decline, net zero emissions, New C-B DC I/C	Base case	-	0.09
8	3	Fast decline, net zero emissions, New C-B DC I/C	A-B 500 kV I/C	900	0.09
9	3	Fast decline, net zero emissions, New C-B DC I/C	Large gas generator	150	0.09

10	4	Fast decline, net zero emissions, No new C-B DC I/C	Base case	-	0.21
11	4	Fast decline, net zero emissions, No new C-B DC I/C	A-B 500 kV I/C	600	0.21
12	4	Fast decline, net zero emissions, No new C-B DC I/C	Large gas generator	200	0.21
13	5	Slow decline, 50% reduction, New C-B DC I/C	Base case	-	0.06
14	5	Slow decline, 50% reduction, New C-B DC I/C	A-B 500 kV I/C	100	0.06
15	5	Slow decline, 50% reduction, New C-B DC I/C	Large gas generator	900	0.06
16	6	Slow decline, 50% reduction, No new C-B DC I/C	Base case	-	0.14
17	6	Slow decline, 50% reduction, No new C-B DC I/C	A-B 500 kV I/C	50	0.14
18	6	Slow decline, 50% reduction, No new C-B DC I/C	Large gas generator	1200	0.14
19	7	Slow decline, net zero emissions, New C-B DC I/C	Base case	-	0.06
20	7	Slow decline, net zero emissions, New C-B DC I/C	A-B 500 kV I/C	600	0.06
21	7	Slow decline, net zero emissions, New C-B DC I/C	Large gas generator	600	0.06
22	8	Slow decline, net zero emissions, No new C-B DC I/C	Base case	-	0.14
23	8	Slow decline, net zero emissions, No new C-B DC I/C	A-B 500 kV I/C	450	0.14
24	8	Slow decline, net zero emissions, No new C-B DC I/C	Large gas generator	750	0.14

The final step is then to rank the options and identify the preferred option as the option (which may be the base case) with the highest net economic benefit. Table 3 illustrates this step using the values in table 2.

Table 3: Ranking RIT-T credible options from a whole-of-network perspective

Option	Weighted Market benefit ($m)	Cost ($m)	Net economic benefit ($m)	Rank
Base case	-	-		3
A-B 500 kV I/C	422.5	200	222.5	2
Large gas generator	540	300	240	1

3.9 Uncertainty and risk

The future will be uncertain when RIT–T proponents apply the RIT–T. Therefore, the expected costs and market benefits of a credible option (and therefore the net economic benefit) should also 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 RIT–T proponent can respond to uncertainty when applying the RIT–T.

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The **range of reasonable scenarios** will primarily reflect where there is material uncertainty over the future market supply and demand conditions and characteristics, as well as where this affects the expected market benefits or costs of a credible option. 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. RIT–T proponents then probability-weight market benefits and costs across a range of reasonable scenarios.

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3.9.1 Uncertainty regarding market benefits

The market benefit of a credible option is the probability-weighted sum of ~~the~~its market benefits ~~of that option arising~~ across all reasonable scenarios. The methodology for assigning probabilities to each reasonable scenario will depend on the methodology for defining the reasonable scenario. ~~For example, where~~Where there is uncertainty about future demand, two different methodologies are possible:

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- Under the first approach, choosing a range of equally spaced values for future demand, and probability weightings for each of these values. Extreme values of future demand will receive a lower probability than values closer to the mean.
- Under the second approach, the RIT–T proponent will then rank different values for future demand, and divide these values into groups (such as quartiles or deciles). It well then select a representative value for demand from each group. The probability assigned to each representative value is the same (such as 25 per cent for quartiles, 10 per cent for deciles). 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.

While either approach is acceptable, the methodology for assigning probabilities to each reasonable scenario must be consistent with the methodology for choosing the reasonable scenarios themselves. Where a RIT–T proponent has no evidence or rationale for assigning a higher probability for one reasonable scenario over another, it may weight all reasonable scenarios equally.

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Moreover, where the RIT–T proponent uses the most recent ISP scenarios as its reasonable scenarios, it must adopt the probability weightings that AEMO used in the most recent ISP.[37] Where the RIT–T proponent only uses some of the ISP scenarios, the probability weightings that AEMO assigns to those scenarios should inform the probability weightings that the RIT–T proponent applies. Example 16 demonstrates how a RIT–T proponent might do this.

Example 15: Probability weighting when using a sub-set of the ISP scenarios

Assume the ISP scenarios (and probability weightings) are Scenario 1 (10%), Scenario 2 (40%), Scenario 3 (20%), Scenario 4 (20%), Scenario 5 (10%).

Assume that Scenario 5 is based around the early retirement of generators in Region A, which only has a material impact on the benefits of projects that run through Region A.

Assume the RIT–T proponent is seeking to address an identified need that involves an intra-regional issue in Region B, and therefore finds that excluding Scenario 5 would have an immaterial impact on its CBA whilst reducing its computational burden. As such, the RIT–T proponent has a demonstrable reason to exclude Scenario 5.

In absence of AEMO indicating what the probability weightings would be in absence of Scenario 5, the RIT–T proponent might use its discretion to re-weight the scenarios to maintain the same relative probabilities as set out in the ISP. To do this, the RIT–T proponent would re-weight each of the remaining scenarios by dividing the probability weightings by 0.9 (1.0 – 0.1).

Alternatively, the RIT–T proponent might have particular information regarding the conditional likelihood of each ISP scenario occurring. For instance, if Scenario 5 is a variation of the most likely scenario (Scenario 2), but with early retirement, it could be preferable to re-weight Scenario 2 to 50% and maintain the probabilities for Scenario 1, Scenario 3 and Scenario 4 that were in the ISP.

Example 16 demonstrates the method for calculating market benefits across a probability-weighted range of reasonable scenarios.

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Example 16: Calculating the expected market benefit

A RIT–T proponent is considering three credible options across four reasonable scenarios. The three credible options are a: network option ~~(Credible option 1),~~ generation option ~~(Credible option 2),~~ and demand-side option ~~(Credible option 3).~~

The four reasonable scenarios are:

- High capital costs; High demand (Scenario 1);
- High capital costs; Low demand (Scenario 2);
- Low capital costs; High demand (Scenario 3); and
- Low capital costs; Low demand (Scenario 4).

[37] AER, *Draft RIT–T*, May 2020, subparagraph 7(b).

The following probabilities of occurrence are assigned to each of the above reasonable scenarios:

- ~~High capital costs; High demand (~~Scenario 1~~)~~ = 10 per cent;
- ~~High capital costs; Low demand (~~Scenario 2~~)~~ = 25 per cent;
- ~~Low capital costs; High demand (~~Scenario 3~~)~~ = 45 per cent; and
- ~~Low capital costs; Low demand (~~Scenario 4~~)~~ = 20 per cent.

Table 2 presents a ranking of these three credible options across each of the four reasonable scenarios according to market benefit relative to a base case.

Table 2: Ranking credible options across reasonable scenarios ($m)

Credible option	Market benefit, scenario 1	Market benefit, scenario 2	Market benefit, scenario 3	Market benefit, scenario 4
Network option	22	5	45	13
Generation option	25	16	40	20
Demand-side option	16	8	6	2

Calculating the (probability-weighted) market benefit across the range of reasonable scenarios requires one more step than the analysis for generating the results in table 2. For each credible option, the market benefit under each reasonable scenario must be weighted by that reasonable scenario's probability of occurrence. This generates one market benefit estimate for each credible option, as outlined in table 3 below.

Table 3: Calculating expected market benefit ($m)

Credible option	Market benefit, ~~scenario 1~~ × weight, S1	Market benefit, ~~scenario 2~~ × weight, S2	Market benefit, ~~scenario~~ 3 × weight, S3	Market benefit, ~~scenario 4~~ × weight, S4	Probability weighted market benefit
Network option	22 × 10%	5 × 25%	45 × 45%	13 × 20%	26.3
Generation option	25 × 10%	16 × 25%	40 × 45%	20 × 20%	28.5
Demand-side option	16 × 10%	8 × 25%	6 × 45%	2 × 20%	6.7

3.9.2 Uncertainty regarding costs

Where there is a material degree of uncertainty in the costs of a credible option, ~~paragraph 2 of~~ the RIT–T instrument requires ~~a~~the RIT–T proponent to calculate the expected cost of the option under a range of different reasonable cost assumptions. The cost of the credible

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option is the probability weighted present value of the direct costs of the credible option under the different cost assumptions.[38]

For the avoidance of doubt, the term 'cost assumptions' is distinct from the term reasonable scenarios used elsewhere in the RIT–T instrument and these RIT–T application guidelines.

The direct costs of a credible option may vary for reasons other than the nature of the relevant reasonable scenario. For example, the direct costs of a credible option may be uncertain because they depend on variables such as exchange rates, the price of copper or the price of thermal coal. Similarly, whether a reasonable scenario reflects high or low demand growth is unlikely to affect the costs of a credible option. This is why a RIT–T proponent must separately undertake a weighted averaging of the direct costs of a credible option as well as the market benefits of a credible option.

Example 17: Calculating the expected cost

The following example continues from example 16. For each of the three credible options, the RIT–T proponent also considered three cost assumptions ('Low', 'Medium' and 'High').

The three cost assumptions and associated probabilities of occurrence for each credible option were:

- Network option:
  - Low (low steel prices; favourable exchange rate) = 15 per cent.
  - Medium (medium steel prices; average exchange rate) = 55 per cent.
  - High (high steel prices; unfavourable exchange rate) = 30 per cent.
- Generation option:
  - Low (low steel prices, low labour costs) = 10 per cent.
  - Medium (medium steel prices; medium labour costs) = 50 per cent.
  - High (high steel prices; high labour costs) = 40 per cent.
- Demand-side option:
  - Low (low implementation and maintenance costs) = 30 per cent.
  - Medium (medium implementation and maintenance costs) = 50 per cent.
  - High (high implementation and maintenance costs) = 20 per cent.

As table 4 outlines, ~~a~~the RIT–T proponent can calculate an expected cost for each credible option by taking a weighted-average across cost assumptions.

Table 4: Calculating expected cost ($m)

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Credible option	Low cost scenario	Medium cost scenario	High cost scenario	Expected cost

[38] AER, *Draft RIT–T*, May 2020, paragraph 6.

Network option	22.5	25	32.5	26.9
Generation option	23	27	29	27.4
Demand-side option	5	6	7	5.9

For completeness, drawing on the probability weighted market benefits derived in example 16, the net economic benefits and ranking of these three options are in table 5 below.

Table 5: Calculating expected net economic benefits ($m)

Credible option	Probability weighted market benefit	Expected cost	Expected net economic benefit	Ranking
Network option	26.3	26.9	-0.6	3
Generation option	28.5	27.4	1.1	1
Demand-side option	6.7	5.9	0.8	2

3.9.3 Option value

~~NER clause 5.16.1(c)(4)(ix)~~The RIT–T instrument requires RIT–T proponents to consider option value as a class of potential market benefit.[39] Option value is a benefit resulting from retaining flexibility where certain actions are irreversible (sunk), and new information may later arise on the payoff from taking a certain action.

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It is important for RIT–T proponents to consider option value because many network investment decisions are partially- or fully-irreversible. In some cases, past decisions are reversible at an increased cost. For example, a RIT–T proponent might purchase land for a substation where land is inexpensive. If it later determines that more land is required but the surrounding areas are fully developed, expanding the substation might remain feasible but significantly costlier.

A RIT–T proponent might expect that information will later become available that affects the net market benefit of a partially- or fully-irreversible action it is deciding to carry out. In such circumstances, there should be value in retaining some flexibility to respond to that new information when it emerges. For example, if demand for a transmission line is uncertain but might increase, ~~a~~the RIT–T proponent might wish to retain the flexibility to expand the capacity of the transmission line at a relatively low cost in the future. If demand for a transmission line is uncertain but might decrease, ~~a~~the RIT–T proponent may prefer to implement a temporary (perhaps a non-network) solution to congestion problems and defer a major sunk investment until the demand for the transmission line is clear.

Capturing option value when applying a RIT–T

[39] AER, *Draft RIT–T*, May 2020, Subparagraph 11(j) and as required under NER clause 5.15A.2(b)(4)(ix).

Where the future is uncertain, the RIT–T proponent may consider investment options that retain some flexibility and allow it to respond to any new information that arises. For example, where there is material uncertainty about future demand growth, the set of credible options could include an option that allows the RIT–T proponent to make a smaller network investment now, but retain flexibility to upgrade the line at a reduced cost later.

RIT–T proponents can make investment decisions that capture these benefits of retaining flexibility, or 'account for option value' by performing scenario analysis consistently with these RIT–T application guidelines, thereby valuing how the net benefits of different credible options vary under different scenarios. In identifying credible options, RIT–T proponents should be considering credible options where the decision maker is able to change its action in response to new information. Where this type of credible option is available (that is, an option that has flexibility built into it), we can see the RIT–T as allowing for two stages: (1) whether to commit to an option with built-in flexibility, and (2) whether to partially- or completely-reverse the earlier decision.

Decision rules and visual aids can assist the RIT–T proponent to value the option it can exercise in stage (2) above. As noted in section 3.2.3, the RIT–T ~~proponents~~proponent can formulate credible options incorporating a decision rule or policy regarding how ~~the RIT–T proponent~~it will respond to certain changes in variables. Visual aids such as 'tree' diagrams can often represent such rules or policies (see figure 11). Example 35 in appendix A provides a worked example of how RIT–T proponents can capture option value ~~when applying RIT–Ts~~ through using such visual aids and decision rules.

For clarity, the RIT–T instrument allows RIT–T proponents to capture option value beyond what they have otherwise captured by probabilistically weighting credible options over reasonable scenarios, as long as it is not double-counted.[40]

3.10 Selecting the preferred option

Under the RIT–T, the preferred option is the credible option that maximises the net economic benefit across the market, compared to all other credible options. The net economic benefit of a credible option is simply the market benefit less the costs of the credible option. ~~Where~~The preferred option may have a net economic cost where an identified need is for reliability corrective action ~~the preferred option may have a net economic cost~~, providing inertia network services under NER clause 5.20B.4, or providing system strength services under NER clause 5.20C.3.

Example 18: Calculating expected net market benefit

This example builds on example 16 and example 17. Combining the information in table 4 and table 5 allows calculation of a single net economic benefit estimate for each credible

[40] Specifically, the RIT–T ~~paragraph (5)(i)~~ provides that market benefit includes the present value of 'any additional option value (meaning any option value that has not already been included in other classes of market benefits) gained or foregone from implementing the credible option with respect to the likely future investment needs of the market'. See AER, *Draft RIT–T*, May 2020, subparagraph 11(i).

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option. The net economic benefit of each of the credible options considered in example 16 and example 17 above is outlined in table 6 below.

Table 6: Calculating expected net market benefit ($m)

Credible option	Market benefits	Costs	Net economic benefit	Ranking
Network option	11.3	11.9	-0.6	3
Generation option	13.5	12.4	1.1	1
Demand-side option	0.9	0.5	0.4	2

The preferred option in this example is the generation option.

3.11 Externalities

Under the RIT–T, externalities are economic impacts that accrue to parties other than those who produce, consume and transport electricity in the market (see NER clause 5.~~16.1(c~~15A.2(b)(9)). As such, externalities are not included in either the costs or market benefits of a credible option and are therefore not included in the determination of net economic benefit.

As virtually all individuals and businesses located in the geographic NEM consume electricity, we recognise that NER clause 5.~~16.1(c~~15A.2(b)(9) may be read as only trivially limiting the scope of costs or benefits to consider under the RIT–T. However, we consider that interpretation would conflict with the intention of clause 5.~~16.1(c~~15A.2(b)(9). Rather, we interpret the qualifier 'consumers of electricity' in NER clause 5.~~16.1(c~~15A.2(b)(9) as referring to costs or benefits incurred or obtained, respectively, by parties in their capacity as consumers of electricity. Thus, RIT–T proponents should exclude costs or benefits that arise but are incidental to parties' electricity consumption from its analysis.

Example 19 provides examples of negative and positive externalities below.

Example 19: Externalities

Negative externality

Assume a credible option is a local gas-fired peaking generator, planned for development in close proximity to an existing hotel. The RIT–T proponent expects the development of the generator will reduce the nearby hotel's annual earnings (due to a loss of visual amenity). The present value of this loss is $15 million.

In this example, the $15 million cost borne by the hotel's proprietor is a negative externality. While the development of the gas-fired peaking generator drives this cost, the generator's developer will not incur the cost. It is therefore not part of the credible option's costs.

Positive externality

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Assume a credible option entails developing a large-scale wind farm located near a small town. The RIT–T proponent expects the development of the wind farm will increase the annual earnings of the town's restaurant during the duration of the wind farm's construction, due to a large number of construction workers temporarily residing in the town. The present value of these increased earnings is $1 million.

In this example, the $1 million benefit to the restaurant's proprietor is a positive externality. The development of the wind farm drives this benefit. However, this is not realised by the wind farm's developer or any other NEM party in their capacity as consumers of electricity. Therefore, this benefit is not part of the market benefits of the credible option.

3.11.1 Externalities and external funding contributions

Our guidance that RIT–T proponents must exclude externalities from their RIT–T ~~assessments~~applications has a bearing on how RIT–T proponents should treat external project funding for a credible option differently depending on whether it has or will be provided by:

- ~~A~~a Registered Participant under the NER or any other party in their capacity as a consumer, producer or transporter of electricity in the market (a Participant)[41]; or
- ~~Any~~any other party (Other Party).

As example 20 illustrates, funds that move between Participants count as a wealth transfer and should not affect the calculation of the final net economic benefit under the RIT–T. This wealth transfer occurs because the benefit gained by the Participant receiving the external funds (that is, the reduction in the required outlay by the RIT–T proponent in providing the credible option) is directly offset by the cost (or negative market benefit) incurred by the other Participant providing the external funds.

As example 21 illustrates, funds from an Other Party to a Participant should increase the net economic benefit of the option. This occurs because the benefit gained by the Participant receiving the external funds (that is, the reduction in the required outlay by the RIT–T proponent in providing the credible option) is not offset by the cost incurred (or negative net market benefit) by the Other Party in providing the external funds. This is because the costs and benefits to the Other Party are outside the scope of RIT–T cost–benefit analysis, which is limited to producers, consumers and transporters of electricity in the ~~NEM~~market. As such, these external funds increase the final net economic benefit calculated under a RIT–T application.

While funds from an Other Party to a Participant in connection with a credible option ~~increases~~increase the net economic benefit of that option, the RIT–T ~~proponents~~proponent should report the expected net economic benefit of different credible options in absence of such funds, as well as after receiving these funds. Doing this will increase the transparency

41 For clarity, by including parties in their capacity as producers and/or transporters of electricity, this definition captures entities such as distributed energy resources suppliers and energy service companies, that may wish to support (and implicitly, discourage) particular credible options from which they benefit in a RIT–T. Such an entity could provide this support directly as a proponent of a non-network option, or indirectly via subsidies to end-use consumers to encourage take-up of non-network options.

of the RIT–T application, allowing stakeholders to understand what is driving the results of the cost–benefit analysis.

Example 20: Funding from a Participant

A large generator in a region wishes to support the development of a new regulated interconnector from its local region to an adjacent region. The interconnector will facilitate increased electricity exports at times of high wholesale spot prices in the adjacent region when the existing interconnector is often constrained. Assume the following:

- The RIT–T proponent estimates that the present value of construction cost and ~~the~~ lifetime operating and maintenance costs of the interconnector are $120 million.
- The RIT–T proponent estimates that the present value of the market benefits of the interconnector are $110 million.
- The generator wishes to provide $10 million to the proponent of the interconnector, being the jurisdictional ~~transmission business~~TNSP in that generator's region because the present value of its expected benefit from the interconnector is $15 million. As such, the generator's decision to contribute $10 million was a rational decision that would allow the project to go ahead so that it is $5 million better off.

As the generator is a Participant and a party who produces electricity in the market, the generator's $10 million contribution to the proponent ~~transmission business~~TNSP does not increase the net benefits of the interconnector option for the purposes of a RIT–T assessment. The generator's $10 million contribution is treated as a voluntary wealth transfer between producers and consumers of electricity. The contribution is therefore ignored in the calculation of market benefits and has no impact on the net economic benefit of the project.

Moreover, if the generator's contribution of $10 million of its expected benefit was a market benefit (say, it allows the generator to sell a greater amount of electricity into the spot market), then this contribution should already be included in the $110 million expected benefit. If that market benefit was not entirely captured in the $110 million (for reasons such as oversight or immateriality), the retailer's proposal to provide the $10 million contribution would be a reasonable basis for the RIT–T proponent to further explore whether it has included relevant and material market benefits in the RIT–T analysis.

Example 21: Funding from an Other party

A jurisdictional government wishes to support the development of a new regulated interconnector from its local region to an adjacent region to facilitate increased production and/or consumption of electricity in its region. The construction cost of the interconnector is $100 million and the present value of its lifetime operating and maintenance costs is $20 million.

The government wishes to contribute $10 million to the proponent of the interconnector, being the jurisdictional ~~transmission business~~TNSP in the government's region.

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As the government is not a Registered Participant and is not making the contribution in its capacity as a producer, consumer or transporter of electricity in the market, the government's $10 million contribution to the proponent ~~transmission business~~TNSP reduces the cost of the interconnector option for the purposes of a RIT–T assessment. That is, the cost of the interconnector option for RIT–T purposes becomes $110 million. The government's $10 million contribution is effectively treated as a reduction in costs borne by those who consume, produce and transport electricity in the market in relation to the interconnector option.

3.12 Suitable modelling periods

The duration of modelling periods should take into account the size, complexity and expected life of the relevant credible option to provide a reasonable indication of the market benefits and costs of the credible option. This means that by the end of the modelling period, the network is in a 'similar state' in relation to needing to meet a similar identified need to where it is at the time of the investment.

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It is difficult to provide definitive guidance on how to implement this principle. However, it is unlikely that a period of less than 5 years would adequately reflect the market benefits of any credible option. In the case of very long-lived and high-cost investments, it may be necessary to adopt a modelling period of 20 years or more. Moreover, RIT–T proponents should also include any relevant and material terminal values into their discounted cash flow analysis, where appropriate – that is, where the expected economic life is longer than the modelling period.

4 Stakeholder engagement process in applying the RIT–T

This part of the RIT–T application guidelines summarises the process ~~a~~that the RIT–T proponent must follow when applying the RIT–T. NER clause 5.16.4 establishes a three-stage process for RIT–T projects that are not actionable ISP projects, as summarised in figure 1. This includes consulting on a:

- consultation report;
- project assessment draft report (draft report); and
- conclusions report.

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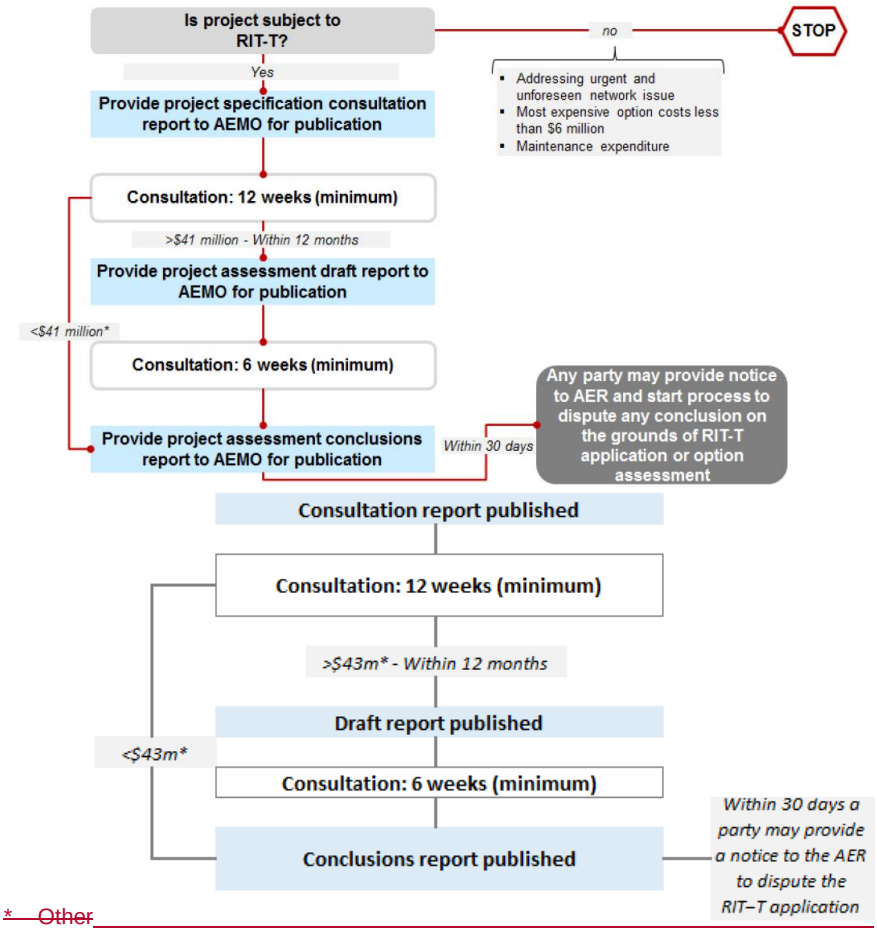
Figure 1: RIT–T assessment and consultation process



~~* Other~~

* Cost threshold at the time of drafting. Under clause 5.15.3 of the NER, we must review RIT–T cost thresholds every three years for changes in input costs. In addition to the cost threshold, other requirements ~~are~~to skip publishing the draft report include: no material market benefit, the ~~transmission business~~TNSP has identified its preferred option in the consultation report, and submissions on the consultation report did not identify any additional credible options which could deliver a market benefit.

~~Source: AEMC, *Rule determination: National Electricity Amendment (Replacement expenditure planning arrangements) Rule 2017*, July 2017, p. 65.~~

4.1 Consumer and non-network engagement

The NEO requires network businesses to operate their networks in the long~~-~~term interests of electricity consumers. Accordingly, network businesses should engage with their consumers so they can provide services that align with their long term interests. While the NER ~~is~~are not prescriptive on consumer engagement, it is best practice for the RIT–T proponent to describe in each of the three RIT–T reports how they have:

- engaged with consumers, as well as other stakeholders; and
- sought to address any relevant concerns identified as a result of that engagement.

Taking a best practice approach to consumer and non-network engagement should help RIT–T proponents to:

- ~~Identify~~identify the preferred option, by allowing a broad spectrum of credible options to be considered and by providing additional scrutiny to the analysis to ensure it is robust~~.~~; and
- ~~Apply~~apply the RIT–T in a way that is credible, which reduces the scope for misunderstandings and disputes, and increases the AER's ability to fast-track further regulatory assessments on expenditure related to that project.

In general, to better understand the views of consumers and other stakeholders when applying a RIT–T, proponents may wish to do the following:

- Undertake early engagement with consumers, non-network businesses and other key stakeholders. Early engagement with stakeholders on an investment proposal can occur before a RIT–T application has formally commenced, particularly through consultation on the RIT–T proponent's annual planning reports. Proactive early engagement will likely involve doing more than just fulfilling the minimum RIT–T consultation requirements in NER clause 5.16.4. However, such initiatives might minimise the effort required during the RIT–T application process. For example, early engagement might equip prospective non-network proponents to propose more suitable or effective credible options. Early consultation can also support RIT–T proponents in commencing their analysis with ~~sound inputs and~~ a well-framed identified need. Achieving this can facilitate a faster, smoother and less controversial RIT–T ~~processes~~process, reducing the scope for disputes.
- Focus on providing transparent, user-friendly data to stakeholders. We respect the need for network businesses to protect commercially sensitive information, but note that the effectiveness with which other credible options may be proposed for a RIT–T application is maximised when stakeholders have access to all of the relevant information to appropriately contextualise an investment proposal.

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- Make efforts to understand broader consumer views, recognising that the consumers who do not actively participate in consultation with network businesses can be those most affected by investment decisions. As an example, for large RIT–T projects, such efforts might include convening a consumer reference group.
- Recognise that making submissions during the RIT–T application process takes considerable time and effort on the part of consumers. We encourage RIT–T proponents to give adequate weight to the suggestions made and perspectives offered by consumers in their submissions. We also encourage RIT–T proponents to be aware of demands placed on stakeholders when there are multiple consultation processes on foot. For instance, strategies such as early engagement or being flexible to consider suggestions made outside written submissions might prove beneficial.

Our 'consumer engagement guideline for network service providers' states our expectations of how network businesses should engage with their consumers—that is, their 'end users'.[42] We encourage best practice consumer engagement in line with these guidelines in general, as well as when applying a RIT–T and in other aspects of network planning, such as when providing information in annual planning reports.

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4.2 Project specification consultation report

The RIT–T proponent must prepare a consultation report setting out certain information about the proposed transmission investment. A RIT–T proponent is not required to make the consultation report separately available if it includes the consultation report as part of its annual planning report.

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Information required for consultation report

The consultation report must set out ~~the following~~:

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- ~~The~~the identified need for the investment;
- ~~Assumptions~~assumptions used in identifying the identified need. Where reliability corrective action is required, the RIT–T proponent must include reasons why this action is necessary;
- ~~The~~the technical characteristics of the identified need that a non-network option would be required to deliver, such as the size of load reduction or additional supply, location and operating profile;
- ~~A~~a description of all credible options that the RIT–T proponent ~~-~~considers would address the identified need; and
- ~~For~~for each credible option identified, information about:
    - the technical characteristics of the credible option;
    - whether the credible option is likely to have a material inter-regional impact;
    - the classes of market benefits that the RIT–T proponent considers are unlikely to be material and reasons why they are unlikely to be material;

[42] For these guidelines, see AER, *Better Regulation, Consumer Engagement Guideline for Network Service Providers*, 2013.

- the estimated construction timetable and commissioning date; and
- to the extent practicable, the total indicative capital and maintenance costs.

In describing an identified need for reliability corrective action, it is often useful for a RIT–T proponent to specify:

- ~~The~~the maximum demand in MW and energy ~~in~~ MWhs at risk. This should include expectations regarding the timing of any expected breach of a reliability standard and by how much;
- ~~Specific~~specific details on the planning criteria applied (for example specific clause and section references to the legislation or other regulatory instruments that apply); and
- ~~In~~in an 'n–x' reliability assessment[43], any assumptions the RIT–T proponent has made in developing 'x' (including for example information regarding generator and interconnector availability).

~~In addition~~ It will also be beneficial for the consultation report to ~~the material RIT–T proponents must publish under NER clause 5.16.4(b)(6), it may~~ include additional information to assist non-network proponents ~~to propose~~in proposing alternative credible options ~~if the consultation report also specifies (where~~. Where relevant~~)~~:, this information could include:

- how any proposed augmentation credible option links to asset refurbishment or replacement plans on the transmission network; and
- information regarding future generation and demand assumptions.

Consultation process

The RIT–T proponent must make the consultation report available to all registered participants, AEMO and interested parties.[44] Below is a summary of the important stages in the consultation process:

- Within five business days of finalising the consultation report, the RIT–T proponent must provide a summary of the report to AEMO. AEMO will publish the summary on its website within three business days of receiving the summary.
- Upon request, ~~a~~the RIT–T proponent must make their consultation report available to an interested party within three business days.
- While not required in the NER, we consider it best practice for ~~a~~the RIT–T proponent to publish its consultation report (possibly alongside the summary of the report) and the closing date and requirements for submissions on its website.
- ~~A~~The RIT–T proponent must seek submissions from registered participants, AEMO and interested parties on the credible options presented and the issues addressed in the consultation report.

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[43] That is, an assessment towards meeting a deterministic reliability standard where the network is able to withstand, at all times, an unexpected failure or outage of 'x' number of system components.

[44] Registered participant and interested party are defined in chapter 10 of the NER.

- The period for submissions must be at least 12 weeks from the date AEMO publishes the summary on its website.

4.3 Project assessment draft report

If ~~a~~the RIT–T proponent decides to proceed with the proposed transmission investment, it must prepare a draft report within:

- 12 months after the consultation period on the consultation report[45]; or
- a longer period agreed to by the AER in writing.

NER clause 5.16.4(m) allows ~~a~~the RIT–T proponent to include its draft report as part of its annual planning report. However, it must publish its annual planning report within 12 months after the consultation period on the consultation report (unless the AER agrees to a longer period).

Information required for the draft report

The draft report must include the following information:

- a description of each credible option assessed;
- a summary of, and commentary on, the submissions received;
- a quantification of the costs (including a breakdown of the operating and capital expenditure) and classes of material market benefits for each credible option;
- where relevant, the reasons for why a class of market benefit is not material;
- a detailed description of the method used to quantify each class of material market benefit and cost;
- ~~the identity of~~what (if any ~~class of~~) market benefit class is estimated to arise outside the RIT–T proponent's region and a quantification of the value of such benefits (in aggregate across all regions);
- the results of ~~a~~the net present value analysis ~~of~~for each credible option and accompanying explanatory statements regarding the results; and
- the proposed preferred option and details on its technical characteristics, estimated construction timetable and commissioning date and a statement and analysis that the preferred option satisfies the RIT–T.

Where ~~a~~the RIT–T proponent has undertaken market modelling, the draft report should also ~~include a description of~~describe any assumptions made in this modelling. If the RIT–T proponent based its market modelling on the most recent ISP, it could simply make this statement. Otherwise, the RIT–T proponent might demonstrate why it varied, omitted or added to any modelling assumptions that form the most recent IASR, or explain how it simplified the modelling adopted in the most recent ISP.

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45 NER cl. 5.16.4(g) states that the consultation period on the consultation ~~paper~~report must be no less than 12 weeks from when AEMO publishes the summary of the consultation report on its website.

While not explicitly required under the NER, we consider it best practice to publish the following documentation along with the draft report:

- Relevant documents that show detailed modelling, inputs and assumptions used for the RIT–T assessment. The RIT–T ~~proponents~~proponent should ~~use their~~undertake best endeavours to address potential confidentiality concerns that might prevent ~~them~~it from making data or modelling information available. For example, the RIT–T ~~proponents should~~proponent could explore whether ~~they~~it can aggregate, anonymise or redact that information, or share it with requesting parties on a confidential basis.
- Submissions received in response to the consultation report, unless marked confidential. In the case of confidential submissions, ~~a~~the RIT–T proponent should explore with the submitting party whether ~~to~~it can make a redacted or non-~~controversial~~confidential version public.

Consultation process

The RIT–T proponent must make the draft report available to registered participants, AEMO and interested parties. Below is a summary of the important stages in the draft report process:

- Within five business days of finalising the draft report, the RIT–T proponent must provide a summary of the report to AEMO. AEMO will publish the summary on its website within three business days.
- Upon request, ~~a~~the RIT–T proponent must make ~~their~~its draft report available to an interested party within three business days.
- While not required in the NER, it is best practice for ~~a~~the RIT–T proponent to also publish its draft report (or the summary of the report) and the closing date and requirements for submissions on its website.
- ~~A~~The RIT–T proponent must seek submissions from registered participants, AEMO and interested parties on the preferred option presented and the issues addressed in the draft report.
- The period for submissions must be at least ~~6~~six weeks from the date AEMO publishes the summary on its website.
- An interested party, a registered participant or AEMO (each known as a relevant party) may request a meeting with the RIT–T proponent within four weeks of the end of the consultation period. However, ~~a~~the RIT–T proponent is only required to hold a meeting if at least two relevant parties request a meeting. The RIT–T proponent may meet with a relevant party if, after considering all submissions, it considers that the meeting is necessary.

Exemption from preparing a draft report

Under clause 5.16.4(z1) of the NER, RIT–T proponents are exempt from providing a draft report if all of the following conditions are met:

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- the estimated capital cost of the preferred option is less than $~~41~~43 million (we must review this threshold every three years~~);~~)[46];
- the RIT–T proponent has identified in its consultation report its preferred option, its reasons for that option and noted that it will be exempt from publishing the draft report for its preferred option;
- the RIT–T proponent considers that the preferred option and any other credible options do not have a material market benefit (other than benefits associated with changes in voluntary load curtailment and involuntary load shedding); and
- the RIT–T proponent forms the view that submissions on the consultation report did not identify additional credible options that could deliver a material market benefit.

4.4 Project assessment conclusions report

As soon as practicable after the consultation period for the draft report, the RIT–T proponent must make available its conclusions report to all registered participants, AEMO and interested parties.[47] NER 5.16.4(t) requires the RIT–T proponent publish the conclusions report, which requires making the conclusions report available to registered participants electronically.[48]

Where ~~a~~the RIT–T proponent is exempt from preparing a draft report, it must make the conclusions report available within 12 months of publishing the consultation report.

~~A~~The RIT–T proponent is not required to make the conclusions report separately available if it includes the conclusions report as part of its annual planning report.

Information required for project assessment conclusions report

The conclusions report must set out:

- the matters required in the draft report (see section 4.3); and
- a summary of, and the RIT–T proponent's response to, submissions received from interested parties regarding the draft report. If ~~a~~the RIT–T proponent is exempt from preparing a draft report, the conclusions report must address any issues raised during its consultation on the consultation report.

Where ~~a~~the RIT–T proponent has undertaken market modelling, the draft report should also ~~include a description of~~describe any assumptions made and inputs used in ~~that~~this modelling.

If the RIT–T proponent based its market modelling on the most recent ISP, it could simply make this statement. Otherwise, the RIT–T proponent might demonstrate why it varied, omitted or added to any modelling assumptions or inputs that form the most recent IASR, or explain how it simplified the modelling adopted in the most recent ISP. While not explicitly

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46 ~~For further details see footnote 1.~~ This cost threshold became $43 million on 1 January 2019, which we will therefore update on 1 January 2022. See AER, *Final determination: Cost thresholds review*, November 2018.

47 Registered participant, interested party and AEMO are defined in chapter 10 of the NER.

48 See the definition of publish/publication in chapter 10 of the NER.

required under the NER, it is best practice to publish the following documentation along with the conclusions report:

- Relevant documents that show detailed modelling, inputs and assumptions used for the RIT–T assessment. The RIT–T ~~proponents~~proponent should ~~use their~~undertake best endeavours to address potential confidentiality concerns that might prevent ~~them~~it from making data or modelling information available. For example, the RIT–T ~~proponents should~~proponent could explore whether ~~they~~it can aggregate, anonymise or redact that information, or share it with requesting parties on a confidential basis.
- Submissions received in response to the consultation report and the draft report, unless marked confidential. In case of confidential submissions, ~~a~~the RIT–T proponent might explore ~~making the~~ with the submitting party whether it can make a redacted or non-~~controversial versions~~confidential version public.

Publishing the conclusions report

Below is a summary of the stages for publishing and making the conclusions report available to registered participants, AEMO and interested parties:

- Within five business days of finalising the conclusions report, the RIT–T proponent must provide a summary of the report to AEMO. AEMO will publish the summary on its website within three business days.
- Upon request, ~~a~~the RIT–T proponent must make ~~their~~its conclusions report available to an interested party within three business days.
- The RIT–T proponent must ~~also~~ publish the conclusions report by making it available to registered participants electronically.
- While not required in the NER, it is best practice for ~~a~~the RIT–T proponent to also publish the conclusions report on its website as well as the date that this report was published. The RIT–T proponent may also note on its website that a process exists for resolving RIT–T disputes and the timeframes for lodging a dispute notice with the AER.

4.5 Reapplication of the RIT–T

Clause 5.16.4(z3) of the NER sets out that if a material change in circumstances means that, in the reasonable opinion of the RIT–T proponent, the preferred option identified in the conclusions report is no longer the preferred option, the RIT–T proponent must re-apply the RIT–T to the RIT–T project.

~~A~~NER clause 5.16.4(z4) clarifies that a material change in circumstances may include, but is not limited to, a change in the key assumptions (such as assumptions concerning demand forecasts, major policies, plant closures, etc.) used in identifying:

- the identified need described in the conclusions report; or
- the credible options assessed in the conclusions report.[49]

[49] ~~NER, cl. 5.16.4(z4).~~

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Since RIT–T proponents should be applying the inputs, assumptions and scenarios from the most recent IASR (see section 3.4), if changes to key inputs, assumptions or scenarios trigger an ISP update, the RIT–T proponent should actively consider whether there has been a change in circumstances that materially affects its RIT–T project.

We can make a determination to exclude RIT–T proponents from this clause, where appropriate. In making this determination, NER clause 5.16.4(z5) specifies that we must have regard to:

- the credible options (other than the preferred option) identified in the conclusions report;
- the change in circumstances identified by the RIT–T proponent; and
- whether a failure to promptly undertake the RIT–T project is likely to materially affect the reliability and secure operating state of the transmission network, or a significant part of that network.[50]

We expect that situations requiring a re-application of the RIT–T under NER clause 5.16.4(z3) will be exceptional. Similarly, circumstances where we make a determination to exclude RIT–T proponents from this clause are also likely to be exceptional. For this reason, we will consider these situations on a case-by-case basis on whether such a determination would be appropriate.

4.5.1 Cancellation of the RIT–T

NER clause 5.16.4(z3) describes when a RIT–T proponent must re-apply a RIT–T. This must occur if a material change in circumstances means that, in the reasonable opinion of the RIT–T proponent, the preferred option identified in the conclusions report is no longer the preferred option.[51]

However, it is also reasonable that a material change in circumstances may lead to the identified need no longer existing, even mid-way through the RIT–T application process. This may lead ~~a~~the RIT–T proponent to cancel its RIT–T assessment before completing the RIT–T process. For example, ~~a~~the RIT–T proponent may publish a consultation report, only for its customers to later advise that, due to a material change in circumstances, the identified need no longer exists.

While not explicitly required under the NER, in circumstances mentioned above, we expect that the RIT–T proponent would clearly set out the reasons that led to the cancellation of the particular RIT–T assessment. It is also a best industry practice to keep stakeholders informed as soon as the RIT–T proponent becomes aware of the material change of circumstances around the identified need.

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~~50 NER, cl. 5.16.4(z5).~~
~~51 NER, cl. 5.16.4(z3-z5).~~

5 Dispute resolution

Clause 5.~~16.5~~16B of the NER sets out a dispute resolution process for disputing the conclusions that a RIT–T proponent has made in its conclusions report. This part of the RIT–T application guidelines summarises the process that ~~a~~the disputing party, ~~a~~ RIT–T proponent and ~~the~~ AER must follow during a RIT–T dispute resolution ~~as~~ process.[52] It provides information on who may dispute a RIT–T assessment, what matters can be disputed, how to lodge a dispute, and the process that we, ~~a~~the RIT–T proponent and disputing parties must follow in resolving a dispute.

We are responsible for resolving all disputes relating to certain conclusions in the conclusions report. Eligible parties may apply to us for a finding on the disputed conclusion.

~~Moreover, clause 5.16.6(a) of the NER also allows a RIT–T proponent to apply to us to determine whether a preferred project satisfies the RIT–T, even if no one has raised a dispute.~~

5.1 Who can make a RIT–T dispute

In the NER and these RIT–T application guidelines, a 'disputing party' refers to a person or party disputing a conclusion in the conclusions report. Only the following parties can lodge a dispute:[53]

- Registered Participants;
- Australian Energy Market Commission (AEMC);
- Connection Applicants;
- Intending Participants;
- AEMO; and
- interested parties.

In the context of RIT–T disputes, an interested party is:[54]

> ...a person including an end user or its representative who, in the AER's opinion, has the potential to suffer a material and adverse National Electricity Market impact from the investment identified as the preferred option...

For the purpose of this clause, material and adverse NEM impacts include impacts on:

- a network operator or other stakeholders such as aggregators or energy service companies in the NEM that:
  - ~~constrains~~constrain the network operator's ability to fulfil functions mandated under the NER; or

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52 For completeness, as the National Transmission Planner, AEMO acts as RIT–T proponent in Victoria. Since the NER permit AEMO to raise a RIT–T dispute, it can also be a disputing party.

53 For definitions of these eligible dispute parties, see chapter 10 of the NER and/or the glossary in appendix B.

54 NER, cl. 5.15.1.

- ~~undermines~~undermine the stakeholder's ability to perform its operations to the extent that it can no longer operate or perform a particular function. This may result from physical obstruction or a substantial reduction in profitability; or

- an electricity consumer, in their role as a consumer of electricity that ~~reduces~~reduce the quality or reliability of their electricity supply below what is required under the NER or ~~reduces~~reduce the sum of consumer and producer surplus.

A stakeholder cannot be an interested party for the purposes of NER clause 5.15.1 if its potential to suffer material and adverse impact relates to an externality rather than a NEM impact (see section 3.11 for a discussion on externalities). Given this, material and adverse NEM impacts do not relate to personal detriment or personal property rights.

The following examples demonstrate impacts relating to personal detriment and property rights to provide guidance on how we would apply NER clause 5.15.1.

Example 22: Material and adverse impacts

Impacts relating to personal detriment

A RIT–T proponent has identified a non-network option as its credible option. Part of this program will entail procuring network support services from back-up diesel generators. The RIT–T proponent expects this will defer its need for network augmentation and reduce the costs of electricity to end-users overall.

The RIT–T proponent also expects that some of its consumers will claim that the preferred option would cause detriment by increasing health-related costs due to the diesel generators increasing air pollution.

The negative impacts of this program on some consumers would constitute an impact relating to personal detriment. Therefore, we would not consider these consumers as interested parties on this basis.

Impacts relating to personal property rights

~~The~~A RIT–T proponent has identified a network option as its credible option. Under this option, the RIT–T proponent will build poles and wires. This network infrastructure will run through several different properties. Some of the property owners consider that this action will devalue their property.

This would constitute an impact relating to personal property rights. Therefore, we would not consider these property owners as interested parties.

5.2 What can be disputed

The disputing party can only dispute conclusions that a RIT–T proponent made in the conclusions report regarding:

- the application of the RIT–T;
- the basis on which the RIT–T proponent ~~has~~ classified the preferred option as being for reliability corrective action; or

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- the RIT–T proponent's assessment about whether the preferred option will have a material inter-network impact in accordance with any criteria for a material inter-network impact that is in force at the time of preparing the conclusions report.

A dispute may not be raised about any issues outlined in the conclusions report which:

- are treated as externalities by the RIT–T; or
- relate to an individual's personal detriment or property rights.

For further guidance and examples on the matters that ~~are treated~~the RIT–T treats as externalities ~~by the RIT–T~~, see section 3.11.

5.3 Lodging a dispute and information required

Within 30 days of the RIT–T proponent publishing the conclusions report, the disputing party must:

- give notice of the dispute in writing setting out the grounds for the dispute to us; and
- at the same time, provide a copy of the dispute notice to the relevant RIT–T proponent.

The dispute notice should include the following information:

- the disputing party's name, a contact officer, address, email and telephone number;
- the ground/s for the dispute;
- any submissions the disputing party made regarding the consultation report, the draft report and conclusions report (if applicable);
- the RIT–T proponent's reply to any submissions made by the disputing party regarding the conclusions report (if applicable);
- details of any meetings held by the RIT–T proponent with the interested party (if applicable); and
- the details of any other known parties involved in the matter.

5.4 Procedure for a dispute

The AER, RIT–T proponents and disputing parties all have different obligations under clause 5.~~16.5~~16B of the NER to ensure the timely resolution of disputes. Figure 2 summarises the process for resolving RIT–T disputes.

Timeframe for resolving disputes

We must either reject the dispute or make and publish a determination:

- within 40 days of receiving the dispute notice, or
- within a period of up to an additional 60 days where we notify interested parties that the additional time is required to make a determination because of the complexity or difficulty of the issues involved.

Extension of timeframe – request for additional information

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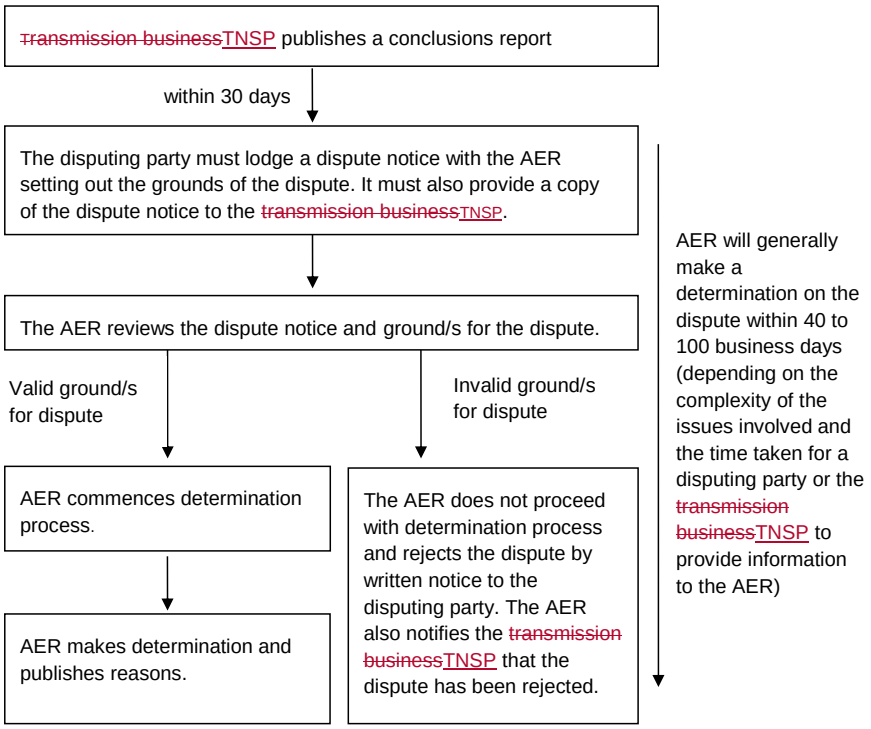
We may also extend the time for making our determination if we have requested further information regarding a dispute from the disputing party or the RIT–T proponent, provided:

- we make the request for the additional information at least seven business days prior to the expiry of the period for making our determination; and
- the RIT–T proponent or disputing party provides the additional information within 14 business days of receipt of the request.

Under these circumstances, we may extend the time for making our determination by the time it takes the disputing party or RIT–T proponent to provide our requested information.

Figure 2: Dispute resolution process



AER determination

After considering the dispute notice and any other relevant information, we must either reject the dispute or make and publish a determination.

If we reject the dispute, we must:

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- reject the dispute by written notice to the disputing party if we consider the grounds for the dispute are misconceived or lacking in substance; and
- notify the RIT–T proponent that the dispute has been rejected.

If we do not reject the dispute, we must make and publish a determination: **Formatted:** Body Text

- stating that, based on the grounds of the dispute, the RIT–T proponent will not need to amend its conclusions report; or
- directing the RIT–T proponent to amend the matters set out in its conclusions report.

Scope of AER determination

We may only determine that the RIT–T proponent must amend the matters set out in the conclusions report if ~~a~~the RIT–T proponent has: **Formatted:** Body Text

- incorrectly applied the RIT–T;
- erroneously classified the preferred option as being for reliability corrective ~~action'~~action;
- incorrectly assessed whether the preferred option will have a material inter-network impact; or
- made a manifest error in performing calculations in applying the RIT–T.

Material and advice the AER may consider

We may engage an expert to provide advice. Given the level of technical and engineering detail involved in RIT–T assessments, such experts may include engineers, economists or experts in the electricity industry. We will likely require an engineering consultant to advise us on the engineering/planning aspects where the identified need is for reliability corrective action. Given the complex economic modelling and analysis required, we may also require an economic consultant to assist in resolving disputes regarding the quantification of market benefits. **Formatted:** Body Text

On the ~~martial~~material we may consider in making a determination on the dispute, we:

- must only take into account information ~~and~~ /analysis that the RIT–T proponent could reasonably be expected to have considered ~~or~~ /undertaken at the time it ~~performed~~applied the RIT–T; and
- may disregard any matter raised by the disputing party or the RIT–T proponent that is misconceived or lacking in substance.

The following material is likely to be relevant to our consideration: **Formatted:** Body Text

- the dispute notice;
- the consultation report, the draft report and conclusions report (as applicable);
- AEMO's most recent ISP and IASR;
- any expert advice or reports on the proposed asset;
- relevant transmission annual planning reports~~;~~

- ~~AEMO's NTNDP, ISP or~~ and other relevant planning publications;
- relevant planning criteria, reliability requirements or jurisdictional licensing requirements; and
- relevant regulatory decisions relating to the proposed asset.

Requests for further information

Under clause 5.~~16.5~~16B(f)(3) of the NER, we may also request further information from the disputing party and RIT–T proponent. The disputing party or the RIT–T proponent must provide any additional information we request as soon as reasonably practicable.

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A request for further information will be in writing and the notice will explain that:

- the request is being made under clause 5.~~16.5~~16B(f)(3) of the NER;
- the timeframe within which the RIT–T proponent or disputing party should provide the information (generally 14 business days); and
- under NER clause 5.~~16.5~~16B(i), the clock has stopped for when we must make a determination.

While the NER expressly ~~provides~~provide for us to request information from the RIT–T proponent or the disputing party, we are not prohibited from requesting information from a party that is external to a dispute. We may ask third parties to provide information voluntarily. We can also issue a notice under section 28 of the National Electricity Law (as discussed below).

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Depending on the nature of the information from external parties, and the anticipated use to which the information will be put, we may allow the applicant and/or disputing party an opportunity to comment on the information.

Section 28 notice

Under section 28 of the National Electricity Law, we may issue a compulsory information gathering notice to require a person to provide information or produce documents that we require for the performance or exercise of our functions and powers. The RIT–T dispute resolution process is one of our functions.

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A section 28 notice can require the person providing the information or producing documents within the time specified in the notice. We determine the timeframe within which information must be provided on a case by case basis. In the case of a RIT–T dispute, the notice will likely require that the information be provided within 14 business days.

Section 28(3) provides that a person must comply with a section 28 notice unless the person has a reasonable excuse. Under section 28(4) a person must not, in purported compliance with a relevant notice, provide information that the person knows is false or misleading in a material particular.

A breach of section 28 carries a penalty of up to $2,000 (in the case of a natural person) or $10,000 (in the case of a body corporate).

Publishing a determination on the RIT–T dispute

We must publish our determination and reasons. We will publish this determination on our website ~~and make it available for public inspection at our offices.~~

~~We intend to keep a public register of all determinations we make.[55] Once we publish a determination, we will add it to~~, along with the ~~AER determination register. We will upload the disputing~~dispute notice and all submissions (except those that are confidential) ~~onto this register~~.

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For information regarding our use and disclosure of information, see the current version of the ACCC/AER Information Policy, which is available on our website.[56]

Compliance with AER determination

A determination will generally take effect on the date that we make it, and will specify a reasonable timeframe for the RIT–T proponent to comply with our directions to amend its conclusions report.

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5.5 ~~RIT–T proponent may request~~ Requesting an AER determination on the RIT–T application

~~Under NER clause 5.16.6 where the identified need for a RIT–T proponent's preferred option is not reliability corrective action, the RIT–T proponent may request we make a determination as to whether its preferred option satisfies the RIT–T.~~

~~Requirements for lodging the request~~

~~The request can only be~~ Under NER clause 6A.8.1, revenue determinations can include contingent projects. The expenditure expected for such projects does not form part of the revenue allowance. However, we can later adjust the revenue allowance under NER clause 6A.8.2, if certain conditions (trigger events) occur during the regulatory period. In practice, trigger events can include a determination from us that the project is a preferred option under a RIT–T application (a 'preferred option determination').

Given this practice, this section provides guidance to inform RIT–T proponents on how:

- we will likely approach preferred option determinations; and
- they can work effectively with us when requesting a preferred option determination.

Requesting a preferred option determination

Our preference is that a request for a preferred option determination will be:

- in writing to support our decision making process;

~~55 This register will be located at the AER's website www.aer.gov.au.~~

56 AER, *ACCC and AER Information Policy: collection and disclosure of information*, https://www.aer.gov.au/node/6280, accessed 25 June 2018.

- include any information or reports that may be relevant to our determination. This will facilitate a timely decision making process and reduce or avoid the need for information requests; and
- lodged after the expiry of the 30 day period for disputing a conclusions report~~ and must be in writing.~~, or after any RIT–T dispute has been resolved. A TNSP may lodge a request before the 30 day period. However, if a disputing party raises a valid RIT–T dispute, we will pause our assessment until the dispute resolution process is resolved.

Making a preferred option determination

We will endeavour to make any preferred option determination as quickly as practicable. The ~~RIT–T proponent should also attach any information or reports it considers may be relevant to our determination. Relevant reports include (but are not limited to) the consultation report, draft report and conclusions report.~~

~~Timeframe for AER determination~~

~~Under the NER, we must make and publish a determination (including reasons)~~complexity of the project and the quality of information provided to us will determine the time required to undertake the assessment. However, we expect to complete any assessment within 120 business days of receiving the request~~. We will automatically extent this period by the time a RIT–T proponent takes~~ (excluding any time required for dispute resolution or for the TNSP to respond to ~~our request for further information, provided:~~

- ~~we make the request for the additional information at least seven business days prior to the expiry of the period for making our determination; and~~
- ~~the RIT–T proponent or disputing party provides the additional~~ information ~~within 14 business days of receipt of the request.~~requests).

We will publish the determination, along with our reasoning and any relevant non-confidential material on our website~~ and make it available for public inspection at our offices~~.

Material ~~the AER~~we may consider

In making ~~our~~a preferred option determination, we:

- must use the findings and recommendations in the conclusions report;
- may request further information from the RIT–T proponent; and
- may have regard to any other matter we consider relevant. Other likely relevant information includes expert advice or reports on the proposed asset, any relevant planning publications and regulatory decisions relating to the proposed asset.

We may also engage an expert to provide advice. Such experts may include ~~engineers~~technical advisers, economists or experts in the electricity industry.

5.6 Costs determinations

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Clause 5.15.4(a) of the NER provides that where we engage a consultant to assist in making a RIT–T dispute determination ~~or a determination that a preferred option satisfies the RIT–T~~, we may make a costs determination. Costs determinations are limited to consultancy costs. Relevantly, NER clause 5.15.4 states:

> (b) Where a costs determination is made, the *AER* may:
>
> (1) render the RIT–T proponent or the RIT–D proponent (as the case may be) an invoice for the costs; or
>
> (2) determine that the costs should:
>
> (i) be shared by all the parties to the dispute, whether in the same proportion or differing proportions; or
>
> (ii) be borne by a party or parties to the dispute other than the RIT–T proponent or the RIT–D proponent whether in the same proportion or differing proportions; and
>
> (iii) the AER may render invoices accordingly.
>
> (c) If an invoice is rendered under subparagraph (b)(2)(iii), the *AER* must specify a time period for the payment of the invoice that is no later than 30 *business days* from the date the *AER* makes a determination under paragraph (a).

If we make a costs determination, we will provide an invoice to the appropriate party. The invoice will break down the costs involved. Consistent with the requirements of the NER, payment of the invoice will be required no later than 30 business days from the date of our RIT–T dispute determination or a determination that a preferred option satisfies the RIT–T.

In making a cost determination, we have the discretion to determine the proportion of costs that each party should bear. Where we consider it appropriate for parties to share the costs, we will take into account the circumstances and nature of the dispute to make this decision.

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A Guidance and worked examples on classes of market benefits

Clause 5.16.2(c)(6) of the NER requires we provide guidance and worked examples on acceptable methodologies for valuing the market benefits of a credible option.

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This appendix provides this guidance and worked examples on the following classes of market benefits:

- variable operating costs (specifically, changes in fuel consumption arising through different patterns of generation dispatch) (A.1);
- voluntary load curtailment (A.2);
- involuntary load shedding (A.3);
- costs to other parties (A.4);
- timing of transmission investment (A.5);
- network losses (A.6);
- ancillary services costs (A.7);
- competition benefits (A.8); and
- option value (A.9).

A.1 Variable operating costs

A credible option may lead to a decrease, increase, or no material net change in the variable operating costs of supplying electricity to load. Variable operating costs include fuel consumption, ongoing legal and regulatory compliance costs and variable maintenance costs. For simplicity, this example focuses on fuel costs.

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First, a credible option may lead to a decrease in the cost of fuel consumed to supply electricity to load. For example, a credible option may:

- lead to a direct reduction in generation dispatch (typical for a demand-side reduction option); or
- facilitate the substitution of high-fuel cost plant with low-fuel cost plant (typical for a network option).

Either of these would constitute a positive contribution to the market benefits of the credible option.

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Example 23: Decrease in fuel costs

Load is 200 MW. Local gas-fired generation has a fuel cost of $30/MWh and capacity of 100 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 200 MW.

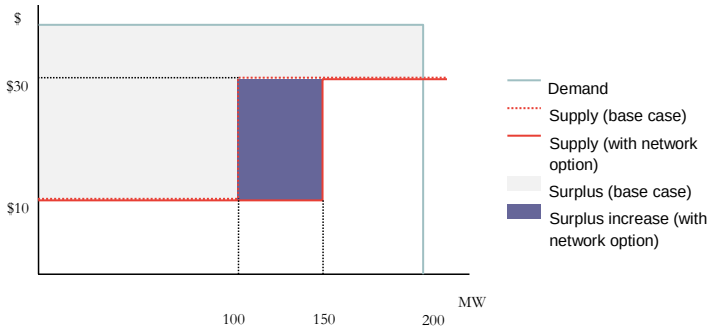
The capacity of the network between the remote generator and the load is limited to 100 MW, whereas the capacity of the network between the local generator and the load is effectively unlimited.

The credible option is to augment the network between the remote generator and the load by 50 MW. This would reduce the fuel costs used in dispatch:

- from: $4,000 per hour (100 MW*$10 + 100 MW*$30);
- to: $3,000 per hour (150 MW*$10 + 50 MW*$30).

Assuming the same conditions over all 8,760 hours in a full year, the total fuel cost saving would be 8,760*$1,000 = $8,760,000 per annum. This would make a positive contribution to the market benefit of the network option.

Figure 3: Decrease in fuel costs



Alternatively, a credible option may lead to an increase in the cost of fuel consumed to supply electricity to load. This may occur if, for example, the credible option is a local generator dispatched in a manner that reduces unserved energy. However, the increase in fuel costs would constitute a negative contribution to the market benefit of the credible option.

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Example 24: Increase in fuel costs

Load is 200 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 200 MW. The capacity of the network between the remote generator and the load is limited to 150 MW.

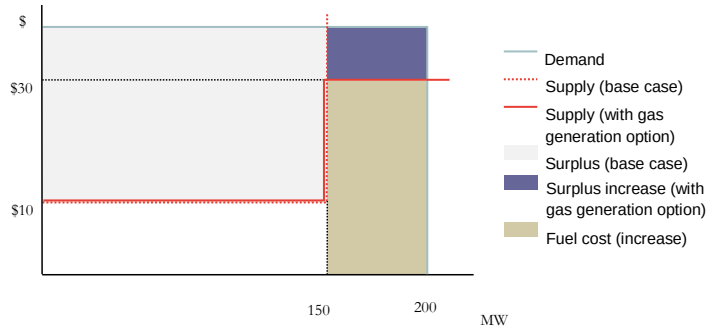
The credible option is to build a 75 MW local gas-fired generator with a fuel cost of $30/MWh. This would increase the fuel costs used in dispatch:

- from: 150 MW*$10 = $1,500 per hour;
- to: 150 MW*$10 + 50MW*$30 = $3,000 per hour.

In doing so, the credible option would reduce unserved energy by 50 MW.

Assuming the same conditions over all 8,760 hours in a full year, the total fuel cost increase would be 8,760*($3,000 – $1,500) = $13,140,000 per annum. This would make a negative contribution to the market benefits of the local generation option.

Figure 4: Increase in fuel costs



Finally, a credible option may have no material net impact on the cost of fuel consumed to supply electricity to load. For example, a network augmentation may both:

- facilitate the substitution of high-fuel cost plant by low-fuel cost plant (which reduces the cost of fuel consumed to supply electricity to load); and
- lead to a reduction in unserved energy (which increases the cost of fuel consumed to supply electricity to load).

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Example 25: No change in fuel costs

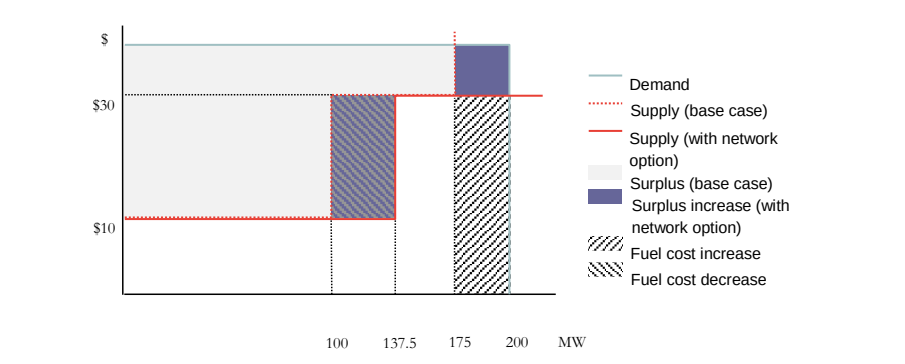
Load is 200 MW. Local gas-fired generation has a fuel cost of $30/MWh and capacity of 75 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 200 MW. The capacity of the network between the remote generator and the load is limited to 100 MW.

The credible option is to augment the network between the remote generator and the load by 37.5 MW. This would have the following effect on the fuel costs used in dispatch:

- from: 100 MW*$10 + 75 MW*$30 = $3,250 per hour;
- to: 137.5 MW*$10 + 62.5 MW*$30 = $3,250 per hour.

The credible option in this case has reduced unserved energy by 25 MW (increasing fuel costs) while simultaneously displacing 12.5 MW of expensive local generation with cheap remote generation (decreasing fuel costs).

Figure 5: No change in fuel costs



A.2 Voluntary load curtailment

A credible option may lead to a reduction in voluntary load curtailment. For example, a network option may facilitate substituting high-fuel cost plant with low-fuel cost plant. In doing so, this option might reduce the spot price of electricity, consequently reducing voluntary load curtailment. This reduction in voluntary load curtailment can be valued as a market benefit by multiplying:

- the quantity (in MWh) of voluntary load curtailment not undertaken due to the credible option; by
- consumers' willingness to pay (in $/MWh) for the electricity that is not voluntarily curtailed due to the credible option.

This positive contribution to the market benefit of the credible option will be partly offset by a negative contribution to market benefit due to the costs of providing the additional electricity that is not voluntarily curtailed as a result of the credible option (see also the discussion of fuel consumption above).

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Example 26: Decreased voluntary load curtailment

Load is 200 MW. Local gas-fired generation has a fuel cost of $30/MWh and capacity of 100 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 250 MW.

The capacity of the network between the remote generator and the load is limited to 150 MW, whereas the capacity of the network between the local generator and the load is effectively unlimited.

Voluntary load curtailment at a spot price of $30/MWh is 40 MW, and is 0 MW at a spot price of $10/MWh is 0 MW.

The credible option is to augment the network between the remote generator and the load by 50 MW. In the base case:

- Demand = Load – voluntary load curtailment = 200 MW – 40 MW = 160 MW.

- The remote generator is dispatched to 150 MW and the local generator is dispatched to 10 MW.
- Spot price = $30/MWh (set by the local generator).
- Value of fuel consumed = 150 MW*$10 + 10 MW*$30 = $1,800 per hour.
- Value of voluntary load curtailment = 40 MW*$30/MWh = $1,200 per hour.

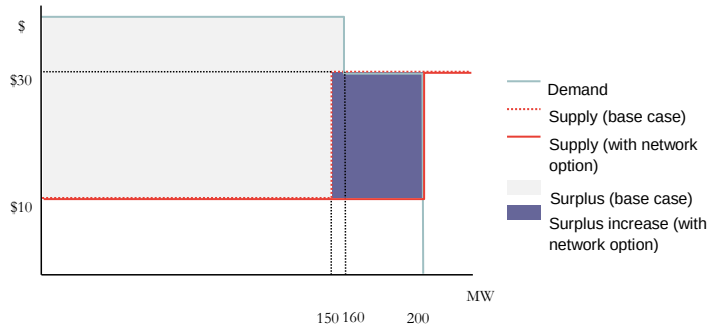
In the state of the world **with** the credible option:

- Demand = Load – voluntary load curtailment = 200 MW – ~~0~~40 MW = ~~200~~160 MW.
- The remote generator is dispatched to ~~200~~150 MW and the local generator is dispatched to ~~0~~10 MW.
- Spot price = $~~10~~30/MWh (set by the ~~remote~~local generator).
- Value of fuel consumed = 200 MW*$10 + 0 MW*$30 = $2,000 per hour.
- Value of voluntary load curtailment = 0 MW*$10/MWh = $0 per hour.

Thus, the contribution to the market benefit of the credible option from a reduction in voluntary load curtailment is $1,200 – $0 = $1,200 per hour. This would be partly offset by the cost of increased fuel consumption of $2,000 – $1,800 = $200 per hour. The net impact on the market benefit of the credible option is $1,000 per hour.

Assuming the same conditions prevail for 100 hours in a year, the annual market benefit due to decreased voluntary load curtailment and the corresponding increased fuel consumption is 100*$1,000 = $100,000 per annum.

Figure 6: Decreased voluntary load curtailment



Alternatively, a credible option (namely, a demand-side reduction option) may lead to an increase in voluntary load curtailment. This would make a negative contribution to the market benefits of the credible option, derived from:

- the quantity (in MWh) of voluntary load curtailment undertaken due to the credible option; multiplied by

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- consumers' willingness to pay (in $/MWh) for the electricity that is voluntarily curtailed due to the credible option.

However, this negative contribution to the market benefits of the demand-side option should be **more than offset** by a positive contribution to market benefit caused by reduced involuntary load shedding that would otherwise occur (see example 27 below).

The RIT–T proponent could then derive the net contribution to the market benefits of the demand-side option from the difference between:

- the value of unserved energy to consumers generally; and
- the value of that energy to those consumers who have voluntarily agreed to consume less as a result of the demand-side option.

For example, assume a demand-side option lead to voluntary load curtailment of 10 MWh of electricity valued by consumers at $30/MWh. If this 10 MWh of electricity displaced the same amount of involuntary load shedding at $30,000/MWh, this would yield a positive contribution to market benefits of ($30,000 – $30)*10 = $299,700.

A.3 Involuntary load shedding

A credible option may reduce involuntary load shedding if it is:

- a local generation option that supplies electricity;
- a demand-side reduction option that leads to voluntary load curtailment and thereby reduces demand for electricity; or
- a network option that enables electricity to be transported from a location where it is relatively plentiful to a location where it is relatively scarce when involuntary load shedding would otherwise occur.

This reduction in involuntary load shedding can be valued as a market benefit by multiplying:

- the quantity (in MWh) of involuntary load shedding not required due to the credible option; by
- a reasonable forecast of the value of electricity to consumers (in $/MWh) not shed due to the credible option (see section 3.4.2 on VCR).

This positive contribution to market benefits would be partially offset by a negative contribution from providing the credible option. For example, a local generation option may reduce involuntary load shedding but will increase the use of fuel to supply electricity.

It is worth noting that a credible option may also lead to involuntary load curtailment in some circumstances. For instance, a credible option might require outages of existing network infrastructure during construction. As above, we would expect this negative contribution would be largely offset by larger positive contributions, such as reduced involuntary load curtailment post-construction.

Example 27: Decreased involuntary load shedding

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Assume load is 201 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 250MW. The capacity of the network between the remote generator and the load is limited to 200 MW. Customers' value of involuntarily curtailed energy is $30,000/MWh.

The credible option is to build a 25 MW local gas-fired generator with a fuel cost of $100/MWh. In the **base case**:

- Demand outstrips supply by 201 MW – 200 MW = 1 MW.
- The value customers place on involuntarily curtailed energy is $30,000/MWh.
- Value of fuel consumed = 200 MW*$10 = $2,000 per hour.
- Value of involuntarily curtailed load = 1 MW*$30,000 = $30,000 per hour.

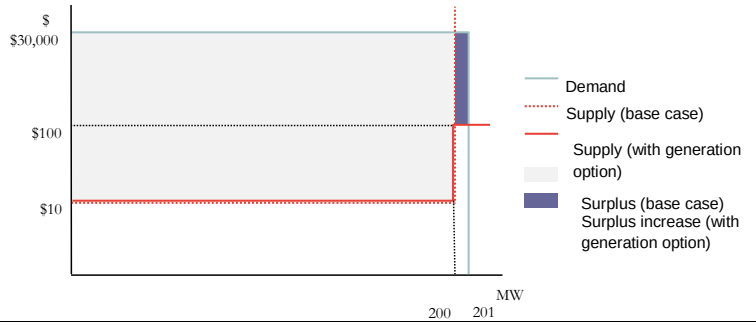
In the state of the world **with** the credible option:

- Output of remote generator = 200 MW, output of local generator = 1 MW.
- The local gas-fired generator has a fuel cost of $100/MWh.
- Value of fuel consumed = 200 MW*$10 + 1 MW*$100 = $2,100 per hour.
- Demand = supply and hence there is no load shedding.

The contribution to the market benefits of the credible option from reduced involuntary load shedding is $30,000 – $0 = $30,000. This would be partly offset by the cost of increased fuel consumption needed to generate electricity, which is $2,100 – $2,000 = $100 per hour.

The net contribution to the market benefits of the credible option (in terms of decreased involuntary load shedding and increased fuel consumption) is thus $29,900 per hour. Assuming the same conditions over 10 hours in a year, the total contribution to the market benefits of the credible option is 10*$29,900 = $299,000 per annum.

Figure 7: Decreased involuntary load shedding



As noted above, a demand-side option may have a negative contribution to the market benefit from increasing voluntary load curtailment, whilst simultaneously having a positive contribution from decreasing involuntary load shedding. However, the net effect on the

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market benefit would almost always be positive, as electricity will usually be worth more to those who are involuntarily curtailed than to those who are voluntarily curtailed.

Example 28: Increased voluntary and decreased involuntary load curtailment

Assume load is 201 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 250 MW. The capacity of the network between the remote generator and the load is limited to 200 MW. In the event demand outstrips supply, load is involuntarily curtailed (load shedding) where customers value this energy at $30,000/MWh.

The credible option is a demand side option where commercial customers agree with a retailer to reduce power demand by 1 MW when requested by the retailer. This will occur when the retailer expects that the spot price would exceed $1,000/MWh in the absence of load curtailment. The $1,000/MWh price reflects the retailer's view of its commercial customers' underlying willingness to pay for electricity.

In the **base case**:

- Demand outstrips supply by 201 MW – 200 MW = 1 MW.
- Price is set at the value customers place on involuntarily curtailed load ($30,000/MWh) and 1 MW of load is involuntarily curtailed to ensure demand = supply.
- Value of voluntary load curtailment = 0 MW*$1,000 = $0 per hour.
- Value of involuntary load curtailment = 1 MW*$30,000 = $30,000 per hour.

In the state of the world **with** the credible option:

- Demand = load – voluntary load curtailment = 201 MW – 1 MW = 200 MW.
- The remote generator sets the price at $10/MWh.
- Voluntary load curtailment under the credible option at a price of $10/MWh is 1 MW.
- Demand = supply and there is no load shedding.
- Value of voluntary load curtailment = 1 MW*$1000 = $1,000 per hour.

The market benefit of the credible option arising from the demand side option is the:

- benefit of decreased involuntary load curtailment = $30,000 – $0 = $30,000; less
- benefit of increased voluntary load curtailment = $1,000 – $0 = $1,000.

The combined contribution to the market benefits of the credible option (in terms of increased voluntary and decreased involuntary load curtailment) is thus $29,000 per hour. Assuming the same conditions over 10 hours in a year, the total contribution to the market benefits of the credible option would be 10*$29,000 = $290,000 per annum.

Figure 8: Increased voluntary and decreased involuntary load curtailment

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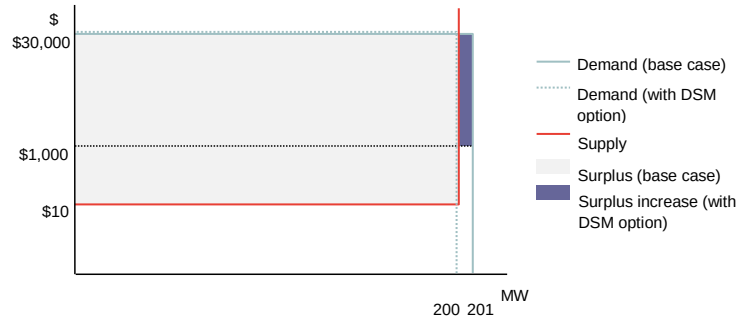

A.4 Costs to other parties

This class of costs captures the impact of a credible option on the plant expansion path of the market. To the extent that a credible option leads to a delay in the commissioning of a new plant (which reduces the present value of the resource costs incurred to meet demand), or to other reductions to other parties' costs, this represents a positive market benefit of the option. The reverse is also the case.

Example 29: Delaying plant commissioning

The credible option is the development of a 1,000 MW interconnection. The development of this interconnection will delay the need for a 450 MW mid-merit gas plant by 3 years. Without the interconnection, the gas plant would be developed immediately (t = 0). With the interconnection, the gas plant would be developed in three years (t = 3). The mid-merit gas plant has a total capital cost of $500 million. The discount rate is 7 per cent.

Based on the above assumptions, the positive contribution to the market benefits of the interconnection option due to the delayed commissioning of the mid-merit gas plant (in terms of delaying capital costs only) can be calculated as follows:

- The present value of the mid-merit gas plant's capital costs in the base case:

$$PV = \frac{\$500m}{(1.07)^0} = \$500m$$

; less

- The present value of the mid-merit gas plant's capital costs with the credible option:

$$PV = \frac{\$500m}{(1.07)^3} = \$408m$$

- The positive contribution to the market benefits of the credible option due to the delayed commissioning of the mid-merit gas plant is 500 – 408 = $92 million.

Example 30: Delaying and accelerating plant commissioning

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The following example builds on example 29. In addition to delaying the need for a mid-merit gas plant, the credible option also leads to the bringing forward of a 450 MW baseload plant in the exporting region. In the base case, the mid-merit gas plant would be developed immediately (t = 0), while the baseload plant would be developed in three years (t = 3). With the credible option, the mid-merit gas plant would be developed in three years (t = 3) while the baseload plant would be developed in two years (t = 2). The baseload plant has a capital cost of $600 million.

Based on the above assumptions, the negative contribution to the market benefits of the credible option due to the accelerated commissioning of the baseload plant (in terms of bringing forward capital costs only) is calculated as follows:

- The present value of the baseload plant's capital costs with the credible option:

$$PV = \frac{\$600m}{(1.07)^2} = \$524m$$

; less

- The present value of the baseload plant's capital costs in the base case:

$$PV = \frac{\$600m}{(1.07)^3} = \$490m$$

The negative contribution to the market benefits of the credible option due to the bringing forward of the commissioning of the baseload plant is 524 – 490 = $34 million.

The combined contribution to the market benefits of the credible option due to (i) the delaying of the mid-merit gas plant and (ii) the bringing-forward of the baseload plant is 92 – 34 = $58 million.

A.5 Timing of transmission investment

A credible option may change the timing (or the configuration) of other investments to be made by (or for) the RIT–T proponent in the future.[57]

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Market benefits from changes in the timing of expenditure should not refer to expenditure on transmission investments that have the same identified need as the set of credible options under consideration. RIT–T proponents derive the market benefits of all credible options by comparison against a common base case without any credible option in place.[58] As such, a RIT–T proponent should view any transmission investments directed towards the same identified need as a (or part of a) competing credible option. The RIT–T proponent will therefore exclude these competing options from the base case.

Therefore, the RIT–T proponent should only account for changes in the timing of transmission investments that address different identified needs to those that the credible option addresses. It is not clear whether or how many investments this category could or would include.

57 Under the NER and the RIT–T, a credible option is an option (or group of options) that, among other things, addresses an identified need.

58 Although, the base case state of the world will vary across the relevant reasonable scenario under consideration. For a discussion on developing states of the world and reasonable scenarios, see section 3.5.

A.6 Network losses

A credible option may lead to a net increase or decrease in network losses. An increase in network losses makes a negative contribution to the market benefits of a credible option, while a decrease in network losses makes a positive contribution to the market benefits of a credible option.

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Example 31: Decreased network losses

Assume load is 500 MW. Remote coal-fired generation has a fuel cost of $10/MWh and capacity of 750 MW. The capacity of the network link between the remote coal-fired generator and the load is limited to 600 MW.

The credible option is the augmentation of the network link between the remote coal-fired generator and the load. The augmentation will involve upgrading the transmission link from a 220 kV to a 400 kV line. The RIT–T proponent expects this augmentation will reduce transmission losses from 10 per cent to 5 per cent when operating at 500 MW.

In the base case:

- The remote coal-fired generator sets the price at $10/MWh.
- Total losses = $10*0.1*500 MW = $500 per hour.

In the state of the world with the credible option:

- The remote coal-fired generator sets the price at $10/MWh.
- Total losses = $10*0.05*500 MW = $250 per hour.

Assuming the same conditions over 8,760 hours per year, the contribution of decreased network losses to the market benefit of the credible option is ($500 – $250)*8,760 = $2,190,000 per year.

A.7 Ancillary services costs

A credible option may lead to a net increase or decrease in ancillary services costs. An increase in ancillary services costs makes a negative contribution to the market benefits of a credible option, while a decrease in ancillary services costs makes a positive contribution to the market benefits of a credible option.

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Example 32: Increased ancillary services costs

Assume load is 300 MW and is flat for all hours of the year. Average network control ancillary services costs across the year are $0.35/MWh.

The credible option is the development of a network element to help stabilise voltage. The RIT–T proponent expects this will reduce average network control ancillary services costs to $0.20/MWh.

Total ancillary services costs are, in the:

- **Base case**, $0.35*8,760*300 MW = $919,800 per year.
- State of the world **with** the credible option, $0.20*8,760*300 MW = $525,600 per year.

Assuming load is flat at 300 MW for all hours of the year, the contribution of reduced ancillary services costs to the market benefits of the credible option is $918,800 – $525,600 = $394,200 per year.

In some circumstances, it may be appropriate to use methods other than market modelling to estimate the net increase or decrease in ancillary services costs. For example, assume a RIT–T proponent is considering an augmentation credible option that will provide reactive power in addition to meeting the identified need. In these circumstances, it may be appropriate for the RIT–T proponent to value the reduction in reactive power ancillary service requirements following the implementation of the credible option as the approximate annual cost of providing a capacitor bank.

Assume that a 50 MVAr capacitor bank has an estimated annual cost of $150,000. Under these assumptions, the potential benefit per trading interval of reduced ancillary service requirements provided by the credible option is $0.17/MVAr. A RIT–T proponent can use this benefit to estimate the overall expected decrease in reactive power ancillary service requirements due to the credible option. Whether this amount will be material depends on how much it expects the credible option will reduce annual reactive power ancillary service requirements.

Whether alternative methods, such as this, are appropriate will depend on the particular circumstances surrounding the RIT–T assessment.

A.8 Competition benefits

Clause 5.~~16.1(c~~15A.2(b)(4)(viii) of the NER requires a RIT–T proponent to consider competition benefits as a class of potential market benefits that could be provided by a credible option.

The ACCC's previous 'Regulatory Test Decision' extensively discussed competition benefits (particularly appendices C, D and E by Dr Darryl Biggar).[59] Our guidance below draws on that decision's discussion on computing market benefits of a credible option that include competition benefits. A modelling process can capture competition benefits when this explicitly takes into account the likely impact of the credible option on the bidding behaviour of generators (and other market participants) who may have a degree of market power relative to the base case. A market participant has a degree of market power in a given dispatch interval if it can, by varying its bid or offer, alter the pricing, dispatch and flow outcomes in the market (including possibly inducing 'clamping') in that dispatch interval in a manner that is profitable for that firm.

~~Paragraph 15(h)(i) of the~~The RIT–T requires a RIT–T proponent to apply competitive short-run marginal cost (SRMC) bidding and provides for approximates of 'realistic' bidding approaches to be used as a reasonable scenario. Where realistic bidding considers the

[59] D Biggar, *Calculating competition benefits: a two town example*, Appendix D to ACCC, *Decision of the review of the regulatory test for network augmentations*, August 2004.

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effects of a credible option, the measured change in overall economic surplus will include competition benefits **by implication**.

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Computing a credible option's market benefits in a given reasonable scenario **will include** competition benefits where the modelling process calculates market benefits as the difference between the following present values of the overall economic surplus:

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- arising with the credible option, with bidding behaviour reflecting any market power prevailing with that option in place; and
- in the base case, with bidding behaviour reflecting any market power in the base case.

We suggest two possible methodologies for identifying that component of market benefits attributable to competition benefits—the 'Biggar approach' and the 'Frontier approach'.

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The Biggar approach (developed by Dr Darryl Biggar) requires a modelling process that allows the bidding behaviour to be ‘held constant’ while the underlying network is changed. This method involves finding the difference between the overall economic surplus arising in a network with the credible option:

- with the bidding behaviour of market participants reflecting any market power they have in a network with that option in place; and
- with the bidding behaviour of market participants reflecting any market power they have in the base case network.

The Frontier approach (developed by Frontier Economics) involves finding the difference between the change in overall economic surplus resulting from the credible option;

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- assuming bidding reflected the prevailing degree of market power both before and after the augmentation; and
- assuming competitive bidding both before and after the augmentation.

We provide worked examples using both these approaches — see example 33 and example 34 below.

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For clarity, both of these approaches involve the same methodology for calculating the overall market benefits of a credible option. The difference between the two approaches is in how to divide the overall market benefits of a credible option between competition benefits and other benefits (also referred to as ‘efficiency benefits’). Both approaches have certain merits.[60] A RIT–T proponent can adopt either approach or another approach in calculating competition benefits, and the RIT–T reflects this intention. However, it is important that there is no double counting of a credible option's competition benefits.

The key requirement in calculating competition benefits is a robust approach to the methodology for determining ‘realistic’ bidding behaviour. We do not wish to prescribe the methodology for determining realistic bidding behaviour other than to suggest it should:

60 Dr Biggar considered that his approach yielded a more intuitive economic interpretation to competition benefits than Frontier Economics' approach. However, he noted that Frontier Economics' approach meant that its measure of efficiency benefits was directly comparable to the definition of market benefits in previous applications under the old regulatory test.

- be based on a credible theory as to how participants are likely to behave in the wholesale spot market over the modelling period; and
- take into account the impacts of other participants' behaviour on the bidding behaviour of any given participant.

Example 33: Competition benefits (Biggar approach)

The following example draws on Biggar (2004).[61] For this example, assume:

- Load is 200 MW.
- There are three generators capable of serving this load:
  - Coal-fired generation with a SRMC of $10/MWh and 120 MW capacity.
  - Mid-merit gas-fired generation with a SRMC of $50/MWh and 100 MW capacity.
  - Peaking oil-fired generation with a SRMC of $100/MWh and 40 MW capacity.
- The credible option entails developing an interconnector with a capacity of 140 MW to a competitive region that supplies electricity at a constant SRMC of $12/MWh.
- The coal-fired generator behaves strategically. That is, it maximises its short-run profit, given by: Quantity*(Price – SRMC).
- The coal-fired generator, due to technical requirements, has a minimum generation level of 60 MW and must offer its capacity in increments of 10 MW.
- All other generators (including the power supplied through the interconnector) behave competitively. That is, they bid their full capacity into the market at SRMC.

In the **base case**:

- The three generators in the region make the following offers:
  - Coal-fired generation offers 90 MW at $10/MWh.[62]
  - Mid-merit gas-fired generation offers 100 MW at $50/MWh.
  - Peaking oil-fired generation offers 40 MW at $100/MWh.
- The peaking generator sets the market price at $100/MWh.
- Total dispatch costs are 90*$10 + 100*$50 + 10*$100 = $6,900 per hour.

In the state of the world **with** the credible option:

- The interconnector enables the supply of 140 MW of electricity at $12/MWh.
- The generators in the region make the following offers:

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61 D Biggar, *Calculating competition benefits: a two town example*, Appendix D to ACCC, *Decision of the review of the regulatory test for network augmentations*, August 2004, p. 99.

62 This maximises the incumbent coal-fired generators short-run profit at 90*(100 – 10) = $8,100 per hour. Offering 100 MW yields 100*(50 – 10) = $4,000 per hour. Offering 80 MW yields 80*(100 – 10) = $7,200 per hour. Offering 60 MW (minimum offer) yields 60*(100 – 10) = $5,400 per hour.

- Coal-fired generation offers 120 MW at $10/MWh.[63]
- Mid-merit gas-fired generation offers 100 MW at $50/MWh.
- Peaking oil-fired generation offers 40 MW at $100/MWh.

- The marginal generator in the adjacent region sets the market price through the interconnector at $12/MWh.
- Total dispatch costs are 120*$10 + 80*$12 = $2,160 per hour.

The Biggar approach calculates the competition benefit of a credible option as the difference between the total dispatch cost in a state of the world:

- **with** the credible option and assuming participants bid strategically in a manner that reflects any market power they have in the presence of the credible option; and
- **with** the credible option but assuming that participants bid as they did in a state of the world **without** the credible option (that is, the base case).

Based on the above data, we can determine the following:

- The total dispatch cost in a state of the world with the credible option and assuming participants bid strategically is: (120 * $10 + 80 * $12) = $2,160 per hour.
- The total dispatch cost in a state of the world **with** the credible option and assuming participants bid as they did in a state of the world **without** the credible option (that is, the base case) is: (90 * $10 + 110 * $12) = $2,220 per hour.
- The competition benefit is thus: $2,220 – $2,160 = $60 per hour.
- The total benefit is $6,900 – $2,160 = $4,740 per hour. This implies that the efficiency benefit is $4,740 – $60 = $4,680.

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Example 34: The Frontier approach to calculating competition benefits

The following example is based on the data used in example 33. The Frontier approach calculates the competition benefit of a credible option as the difference between the change in the total dispatch cost between states of the world with and without the credible option;

- assuming competitive bidding in both states of the world; and
- assuming strategic bidding in both states of the world.

Based on example 33:

- The change in the total dispatch cost between states of the world **with** and **without** the credible option, assuming competitive bidding in both states of the world is: (120 * $10 + 80 * $50) – (120 * $10 + 80 * $12) = $3,040 per hour.

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63 This maximises the incumbent coal-fired generators short-run profit at 120*(12 – 10) = $240 per hour. Offering 110 MW yields 110*(12 – 10) = $220 per hour. Offering 60 MW (minimum offer) yields 60*(12 – 10) = $120 per hour.

- The change in the total dispatch cost between a state of the world with and without the credible option, assuming strategic bidding in both states of the world is:
  (90 * $10 + 100 * $50 + 10 * $100) – (120 * $10 + 80 * $12) = $4,740 per hour.
- The competition benefit is thus: $4,740 – $3,040 = $1,700 per hour.
- The total benefit is the change in total dispatch costs between states of the world with and without the credible option, assuming strategic bidding. From above, this is $4,740. This is the same as under the Biggar approach.
- The total benefit and competition benefit imply an efficiency benefit of $4,740 – $1,700 = $3,040. This is equivalent to the change in total dispatch costs between states of the world with and without the credible option, assuming competitive bidding in both states of the world.

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~~Paragraph 15 of the~~The RIT–T allows a RIT–T proponent to model the effect of 'realistic' generator bidding behaviour. Realistic bidding in this context could include disorderly bidding, where appropriate. Therefore, to the extent a credible option attenuates the incentives for a generator to engage in disorderly bidding, the calculation of that credible option's market benefit could include the market benefit arising from more cost-reflective generator bidding. However, modelling disorderly bidding behaviour is difficult and most RIT–T assessments may not warranted this.

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A.9 Option value

Clause 5.~~16.1(c~~15A.2(b)(4)(ix) of the NER requires a RIT–T proponent to consider option value as a class of potential market benefits that could be provided by a credible option.

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Option value refers to a benefit that results from retaining flexibility where certain actions are irreversible (sunk), and new information may arise in the future on the payoff from taking a certain action. Option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change, and the credible options are sufficiently flexible to respond to that change. For example, option value might be realised through credible options that 'build-in' the option to:

- Expand at minimal cost in response to upside demand risk, such as by building in excess capacity. This action will likely have option value where there are economies of scale and there is a high probability that the high demand scenario will occur.
- An option to withdraw or reduce the scope in response to downside demand risk, such as by selecting smaller, scalable investments such as network support agreements. This action will likely have option value where investments are irreversible and there is a high probability that a low demand scenario will occur.

In our view, a RIT–T proponent should effectively capture option value as a class of market benefit if it preforms scenario analysis in accordance with these RIT–T application guidelines, whilst also exploring credible options that involve staging decisions that result in option value. We note that, as long as it is not double-counted, the RIT–T allows RIT–T

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proponents to capture option value beyond what they have otherwise captured by probabilistically weighting credible options over reasonable scenarios.[64]

We provide more guidance on scenario analysis and option value in sections 3.2.3, 3.7, 3.8 and 3.9. We also provide the worked example below, which extends from example 16 and example 17 earlier on in these RIT–T application guidelines.

Example 35: Flexibility and option value

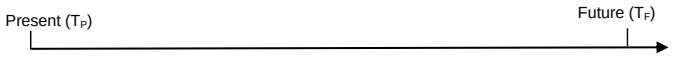
This example extends from example 16 and example 17. Example 16 described three credible options – a network option, a generation option and a demand-side option. It compared the merits of these options across four reasonable scenarios reflecting the potential combinations of future plant capital cost (high or low) and future demand growth (high or low). To simplify this example, assume that plant capital costs are certain to be low and the only uncertainty is demand growth, which may be high or low with equal probability (50% each).

Example 16 assumed that the size of each credible option was fixed and irreversible at the time of the investment decision. There was no scope to either expand or fully- or partially-reverse the option in the future once the RIT–T proponent knew whether actual demand growth was high or low. This example relaxes that restriction.

Example 16 implicitly incorporated two time periods:

- Present (T_P) — the time of the investment decision and commissioning date; and
- Future (T_F) —the time at which:
    - The identity of the true reasonable scenarios becomes apparent. That is, when it becomes known whether future demand growth is high or low); and
    - The time at which the market benefits of the credible option come to fruition.

Figure 9: Example 16 time periods



This example distinguishes between the times when the identity of the true reasonable scenarios becomes apparent from when the market benefits of the credible option come to fruition. Assume the RIT–T proponent can make a follow-up decision (after its initial investment decision) when it knows whether future demand will be high or low (T_I), but before the market benefits of any credible option arise (at T_F).

Therefore, this example incorporates three time periods:

- Present (T_P);
- Intermediate (T_I); and

[64] Specifically, RIT–T paragraph (5~~11~~)(i) provides that market benefit includes the present value of "any additional option value (meaning any option value that has not already been included in other classes of market benefits) gained or foregone from implementing the credible option with respect to the likely future investment needs of the market~~"~~.

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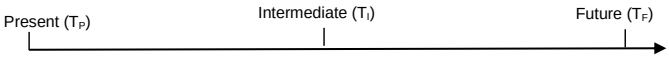
- Future (T_F),

Figure 10: Revised time periods



The ability of the RIT–T proponent to make a follow-up investment decision at T_I when future demand growth is known but has not yet occurred opens up the possibility for it to:

- ~~Develop~~develop a small-scale initial option at T_P; and
- ~~If~~if demand turns out to be high, expand or supplement that option at T_I in time to meet the higher demand at T_F.

In this way, the RIT–T proponent can more efficiently select its initial investment to reduce the risk of unnecessary (or insufficient) expenditure.

Given the opportunity to make a follow-up investment decision at T_I, the RIT–T proponent can undertake an option sufficient to cater for all future demand scenarios, including where there is high demand growth. Alternatively, the RIT–T proponent can undertake a smaller and cheaper option that it can expand if required. This smaller option would be sufficient if future demand growth turned out to be low. However, it would prove to be insufficient if demand growth turned out to be high, requiring a subsequent upgrade or supplementary investment.

To specify each credible option, the RIT–T proponent must specify (a) what action it will take in the short-term at T_P; and (b) in the event that demand turns out to be high at T_I, what further action it will take in advance of T_F. This example assumes any supplementary investment would be a network option or upgrade.

Under these assumptions, the RIT–T proponent estimates the following six credible options:

4. A full-scale network option that satisfies the high-growth scenario, as in example 16.
5. A full-scale generation option that satisfies the high-growth scenario, as in example 16.
6. A full-scale demand-side option that satisfies the high-growth scenario, as in example 16.
7. A small-scale network option that satisfies the low-growth scenario and is upgradable to the level of the full-scale network option should demand turn out to be high. The RIT–T proponent assumes the following:
    - In the low-growth scenario, the benefits of the small-scale and full-scale network options are identical.
    - In the high-growth scenario, the benefits of the small-scale and full-scale network options are identical, because the RIT–T proponent upgrades the

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small-scale network option to the full-scale network option at T_I in time to meet the higher demand at T_F.

- In the low-growth scenario, the costs of the small-scale network option are two-thirds of the costs of the full-scale network option, reflecting the loss of economies of scale involved in network development as well as the costs of building-in upgradeability to the small-scale network option.
- The costs of initially developing the small-scale network option and subsequently upgrading to the full-scale network option at T_I are $5 million greater than the costs of developing the full-scale network option from the outset (at T_P). This reflects the loss of economies of scale and duplication involved in developing a full-scale network option in two stages.

8. A small-scale generation option coupled with the ability to undertake a small-scale network option later should demand growth turn out to be high. The RIT–T proponent assumes the following:
   - In the low-growth scenario, the benefits of the small-scale generation option and the full-scale generation option are identical.
   - In the high-growth scenario, the RIT–T proponent develops the small-scale network option at T_I, in time to meet the higher demand at T_F. The benefits of the small-scale generation option combined with the small-scale network option in the high-growth scenario equal the benefits of the small-scale generation option in the low-growth scenario plus half the benefits of the full-scale network option in the high-growth scenario. This reflects both the smaller size of the small-scale network option and that the (existing) small-scale generation would have otherwise provide some of those benefits.
   - The costs of the small-scale generation option are two-thirds the cost of full-scale generation option, reflecting the loss of economies of scale involved in generation development.
   - The costs of developing the small-scale network option at T_I should demand growth turn out to be high are two-thirds the cost of the full-scale network option due to the loss of economies of scale.
9. A small-scale demand-side option coupled with the ability to carry out a subsequent small-scale network option should demand turn out to be high. The RIT–T proponent assumes:
   - In the low-growth scenario, the benefits of the small-scale and full-scale demand-side options are identical.
   - In the high-growth scenario, the RIT–T proponent will develop the small-scale network option at T_I, in time to meet the higher demand at T_F. The benefits of the small-scale demand-side option combined with the small-scale network option in the high-growth scenario are equal to the benefits of the small-scale demand-side option in the low-growth scenario plus half the benefits of the full-scale network option in the high-growth scenario. This reflects both the smaller size of the small-scale network option and that the (existing) small-scale demand-side option would have otherwise provided some of those benefits.

- The costs of the small-scale demand-side option are two-thirds the cost of the full-scale demand-side option, reflecting the loss of economies of scale involved in arranging demand-side response.
- The costs of developing the small-scale network option at T_I should demand growth turn out to be high are two-thirds the cost of the full-scale network option due to the loss of economies of scale.

For each of these six credible options, there are two reasonable scenarios to consider—a low demand growth scenario and a high demand growth scenario, each potentially with its own market development path. As noted above, a probability of 50 per cent is attributed to each of the high and low demand growth scenarios.

The 'tree' diagram in figure 11 can represent the RIT–T proponent's choices when making an investment decision at T_P without knowing how quickly demand will grow in the longer term. At T_P, the RIT–T proponent can invest in a large option or a small option. The RIT–T proponent will know the rate of growth at T_I, when it will make a supplementary investment if it initially invested in a small option and demand growth appears to be high. It will commission that supplementary investment so it can serve customers by the time the higher demand manifests at T_F.

The tree diagram in figure 11 is a stylised representation of a subset of the choices commonly available to RIT–T proponents. The tree diagram and the analysis will become more complex the more times the RIT–T proponent receives information that it can act on by expanding, supplementing or winding back or down a project. This is because the analysis will need to be to capture all the potential option values.

In this example, the unweighted and weighted market benefits and costs of each of these credible options in each reasonable scenario are set out in table 7 below. In this case, the preferred option is option 4 – the small network option with the scope for upgrading to the large network option should demand growth turn out to be high.

Figure 11

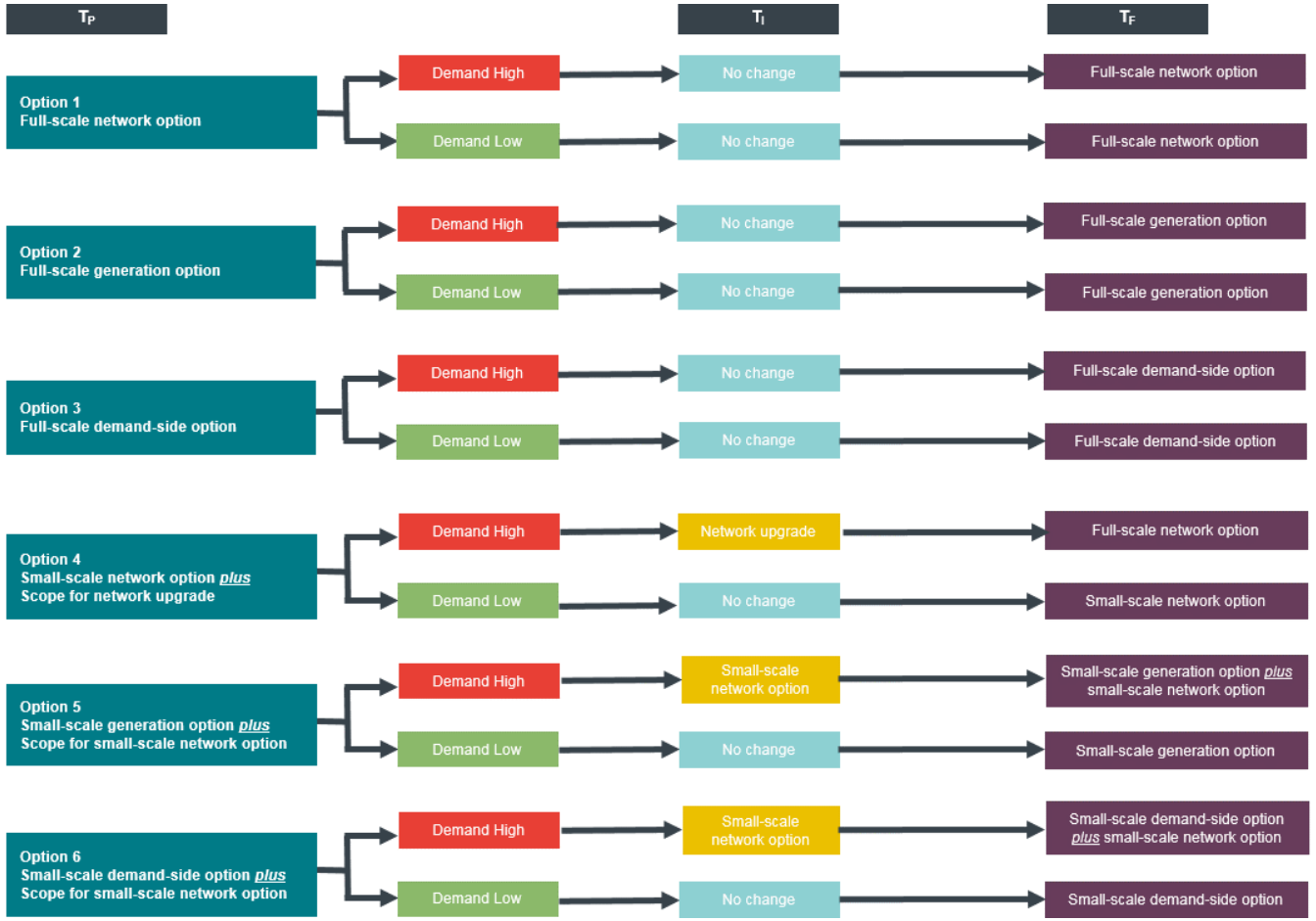

Table 7:

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Option	Description	Market benefits | high demand	Market benefits | low demand	Weighted-average market benefits	Costs | high demand	Costs | low demand	Weighted-average costs	Net economic benefit	Rank
1	Full-scale network option	45	13	29	26.9	26.9	26.9	2.1	4
2	Full-scale generation option	40	20	30	27.4	27.4	27.4	2.6	3
3	Full-scale demand-side option	6	2	4	5.9	5.9	5.9	-1.9	6
4	Small-scale network option with scope for network upgrade	45	13	29	31.9	17.9	24.9	4.1	1
5	Small-scale generation option with scope for small-scale network option	42.5	20	31.3	36.2	18.3	27.2	4.0	2
6	Small-scale demand-side option with scope for small-scale network option	24.5	2	13.3	21.9	3.9	12.9	0.4	5

B Glossary

Term	Definition
actionable ISP project	has the meaning in clause 5.10.2 of the NER.
anticipated project	has the meaning set out in paragraph 19 of the RIT–T.
application guidelines or guidelines	means the regulatory investment test for transmission application guidelines defined in the NER.
base case	has the meaning set out in the RIT–T. This is, where 'a situation in which no option is implemented by, on behalf of the *transmission network service provider*'.
committed project	has the meaning set out in paragraph 18 of the RIT–T.
connection applicant	has the meaning in chapter 10 of the NER. That is, a person who wants to establish or modify *connection* to a *transmission network* or *distribution network* and/or who wishes to receive *network services* and who makes a *connection enquiry* as described in NER clause 5.3.2.
cost	has the meaning set out in paragraph 2 of the RIT–T.
inertia network services	has the meaning in chapter 10 of the NER.
intending participant	has the meaning in chapter 10 of the NER. That is, a person who is registered by *AEMO* as an *Intending Participant* under Chapter 2.
interested party	in respect to RIT–T disputes, this takes the meaning given in NER clause 5.15.1. That is, this means '…a person including an end user or its *representative* who, in the *AER's* opinion, has the potential to suffer a material and adverse *National Electricity Market* impact from the investment identified as the preferred option…'.
market benefit	the term market benefit (not italicised) refers to the incremental benefit of a credible option (over the base case) in a given reasonable scenario. The term *market benefit* (italicised) has the meaning set out in paragraph 4 the RIT–T.
modelled project	has the meaning set out in paragraph 20 of the RIT–T, where this is 'a hypothetical project derived from market development modelling in the presence of absence (as applicable) of the relevant *credible option* or *base case*'.
National Electricity Rules	the rules as defined in the National Electricity Law.

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net economic benefit	has the meaning set out in paragraph 1 of the RIT–T. That is '*net economic benefit* equals the *market benefit* less *costs*'.
Other Party	a party other than a Participant.
Participant	a registered participant under the NER or any other party in their capacity as a consumer, producer or transporter of electricity in the market
reasonable scenarios	has the meaning set out in paragraph 15 of the RIT–T.
RIT–T	the regulatory investment test for transmission defined in the NER.
registered participant	has the meaning in chapter 10 of the NER. That is, a person who is registered by *AEMO* in any one or more of the categories listed in clauses 2.2 to 2.7 (in the case of a person who is registered by *AEMO* as a *Trader*, such a person is only a *Registered Participant* for the purposes referred to in clause 2.5A). However, as set out in clause 8.2.1(a1), for the purposes of some provisions of clause 8.2 only, *AEMO* and *Connection Applicants* who are not otherwise Registered Participants are also deemed to be *Registered Participants*.
renewable energy zone	either the definition: • In the NER, if the NER provides a definition. • In the AEMC's coordination of generation and transmission investment review, if the AEMC provides a definition in this review but has not defined it in the NER. • AEMO uses in connection with the ISP, if neither of the above apply.
state of the world	has the meaning set out in paragraph 17 of the RIT–T.
system strength services	has the meaning in chapter 10 of the NER.

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