

Regulatory investment test for transmission

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Nature and Authority

Introduction

This publication sets out the *Australian Energy Regulator's (AER's) regulatory investment test for transmission (RIT-T)*.

Authority

Clause 5.15A.1(a) of the *National Electricity Rules (NER)* requires the AER to develop and publish the *RIT-T* in accordance with the *transmission consultation procedures*.

Purpose

The purpose of the *RIT-T* is to identify the *credible option* that maximises the present value of *net economic benefit* (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) to the extent that 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.

Application

For a *RIT-T project* that is not an *actionable Integrated System Plan (ISP) project*, the *RIT-T proponent* must apply the *RIT-T* in accordance with clause 5.15A.2:

- a) to the proposed *transmission investment* as required by clause 5.16.3;
- b) in accordance with the requirements relating to the *credible option* set out at clause 5.15.2;
- c) as required by the procedures set out at clause 5.16.4; and
- d) to a level of analysis which is proportionate to the scale and likely impact of each *credible option* being implemented, as set out in clause 5.15A.2(b)(2).

Note: The RIT-T application guidelines provide guidance on the operation and application of, and the process to be followed in applying the RIT-T to projects that are not actionable ISP projects.

For an *actionable ISP project*, the *RIT-T proponent* must apply the *RIT-T* in accordance with clause 5.15A.3:

- a) to the *identified need* associated with the *actionable ISP project* except if, in accordance with clause 5.16A.3(a), the circumstances set out in clause 5.16.3(a) apply to that *actionable ISP project*;
- b) in accordance with the requirements relating to the *credible option* set out at clause 5.15A.3(b)(7)(iii) — and clause 5.15.2 where the *RIT-T proponent* is considering new *credible options* under clause 5.15A.3(b)(7)(iii)(C);
- c) as required by the procedures set out at clause 5.16A.4; and
- d) to a level of analysis which is proportionate to the scale and likely impact of each *credible option* being implemented, as set out in clause 5.15A.3(b)(2).

Note: The cost benefit analysis guidelines provide guidance on the operation and application of, and the process to be followed in applying the RIT-T to actionable ISP projects. The RIT-T proponent must comply with the binding requirements and considerations set out in the cost benefit analysis guidelines when applying the RIT-T to an actionable ISP project.

Definitions and interpretation

In the *RIT-T*,

- a) the words and phrases in italics have the meaning given to them in:
 - i) the *NER*, or
 - ii) if not defined in the *NER*, the glossary;
- b) a reference to a paragraph is a reference to a paragraph in the *RIT-T*; and
- c) a reference to a clause is a reference to a clause in the *NER*.

Process for revision

The *AER* may amend or replace the *RIT-T* from time to time in accordance with the *transmission consultation procedures* and clause 5.16.2(e).

Version history and effective date

A version number and an effective date of issue will identify each version of the *RIT-T*.

1 The regulatory investment test for transmission

1. The *preferred option* is the *credible option* that maximises the *net economic benefit* compared to all other *credible options*.

Where the *identified need* is for *reliability corrective action* or for 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, a *preferred option* may have a negative *net economic benefit* (that is, a net economic cost).

2. If the *RIT-T proponent* is applying the *RIT-T* to an *actionable ISP project*, it:
 - a) must comply with the *cost benefit analysis guidelines*;
 - b) must adopt the *identified need* set out in the *ISP* relevant to the *actionable ISP project*;
 - c) must consider the following *credible options*:
 - i) the *ISP candidate option* or *ISP candidate options*, which may include refinements of an *ISP candidate option*;
 - ii) *non-network options* identified in the *ISP* as being reasonably likely to meet the relevant *identified need*, in accordance with clause 5.22.12(e)(1); and
 - iii) any new *credible options* that were not previously considered in the *ISP* that meet the *identified need* (including any *non-network options* submitted to *AEMO* in accordance with clause 5.22.14(c)(1));
 - d) must adopt the most recent *ISP parameters* unless it decides to vary them. If the *RIT-T proponent* decides to vary or omit an *ISP parameter*, or add a new parameter, then the *RIT-T proponent* must specify the *ISP parameter* that is new, omitted or has been varied and provide demonstrable reasons for why the addition, omission or variation is necessary;
 - e) must assess the *market benefits* with and without each *credible option*;
 - f) must, in so far as practicable, adopt the market modelling from the *ISP*;
 - g) is not required to consider any *credible option* that was previously considered in the *ISP*, but does not form part of the *optimal development path*;
 - h) is not required to consider any non-network options identified in the *ISP* as not meeting the relevant *identified need*, in accordance with clause 5.22.12(e)(2); and
 - i) is not required to request submissions for *non-network options*, or otherwise seek to identify *non-network options* in addition to those assessed in the *ISP* under clause 5.22.12(d) or submitted to *AEMO* in accordance with clause 5.22.14(c)(1).
3. For a *RIT-T project* that is not an *actionable ISP project*, the *RIT-T proponent*:
 - a) must adopt the inputs and assumptions from the most recent *inputs, assumptions and scenarios report* unless it provides demonstrable reasons for why an addition, omission or variation from these inputs and assumptions is necessary;

- b) must base its cost–benefit analysis on an assessment of *reasonable scenarios* for future supply and demand if each *credible option* were implemented compared to the situation where no option is implemented; and
- c) may, in so far as practicable, adopt the market modelling from the *ISP*.

1.1 Costs and benefits

- 4. Any *cost* or *market benefit* (except for the market benefit referred to in paragraph 11(h)) that cannot be measured as a *cost* or *market benefit* to those who produce, consume and/or transport electricity in the *market* must not be included in any analysis under the *RIT-T*. The allocation of *costs* and *market benefits* between electricity and other markets must be based on the *cost allocation principles*.

1.1.1 Costs

- 5. *Costs* are the present value of the direct costs of a *credible option*. In determining *costs*, the *RIT-T proponent* must quantify the following classes of costs:
 - a) costs incurred in constructing or providing the *credible option*;
 - b) operating and maintenance costs in respect of the operating life of the *credible option*;
 - c) the costs of complying with laws, regulations and applicable administrative requirements regarding the construction and operation of the *credible option*; and
 - d) any other costs that the *RIT-T proponent* determines to be relevant and are agreed to by the *AER* in writing:
 - i) for *RIT-T projects* other than *actionable ISP projects*, before the *project specification consultation report* is made available to other parties.
 - ii) for *actionable ISP projects*, before the *project assessment draft report* is made available to other parties.

Note: The RIT-T proponent is not required to separately quantify each class of cost.

- 6. If the *RIT-T proponent* establishes that there is a material degree of uncertainty in the *costs* of a *credible option*, the cost is the probability weighted present value of the direct costs of the *credible option* under a range of different cost assumptions.

1.1.2 Market benefits

- 7. A *market benefit* (except for the market benefit referred to in paragraph 11(h)) must be a benefit to those who consume, produce and/or transport electricity in the *market*, that is, the change in producer plus consumer surplus. A *market benefit* must be the present value of the benefits of a *credible option* calculated by:
 - a) comparing, for each relevant *reasonable scenario*: the *state of the world* with the *credible option* in place to the *state of the world* in the *base case*; and
 - b) weighting the benefits derived in sub-paragraph (a) consistently with the probability weightings in the most recent *ISP parameters*, unless a departure from the most recent *ISP parameters* was necessary as per paragraph 2(d) or 3(a).
- 8. A *market benefit* must not:
 - a) include the transfer of surplus between consumers and producers;
 - b) include the costs that meet the criteria in paragraph 5; nor

- c) include *competition benefits*, any additional option value or benefits from changes in Australia's greenhouse gas emissions, that have already been accounted for in other elements of the *market benefit*.

Market benefit classes to quantify

- 9. When applying the *RIT-T* to an *actionable ISP project*, the *RIT-T proponent* must quantify all classes of *market benefits* identified in the relevant *ISP*, and may consider other classes of *market benefits* in accordance with the *cost benefit analysis guidelines*. Where the *credible option* is for *reliability corrective action*, this quantification will only apply insofar as the *market benefit* delivered by the *credible option* exceeds the minimum standard required for *reliability corrective action*.
- 10. Paragraphs 11 to 13 only apply to *RIT-T projects* that are not *actionable ISP projects*.
- 11. Subject to paragraphs 12 and 13, the *market benefit* must include the following benefits:
 - a) changes in fuel consumption arising through different patterns of *generation dispatch*;
 - b) changes in voluntary *load curtailment*;
 - c) changes in involuntary *load shedding*, with the *market benefit* to be considered using a reasonable forecast of the value of electricity to consumers;
 - d) changes in costs for parties, other than the *RIT-T proponent*, due to:
 - i) differences in the timing of new *plant*;
 - ii) differences in capital costs; and
 - iii) differences in the operational and maintenance costs;
 - e) differences in the timing of *transmission investment*;
 - f) changes in *network losses*;
 - g) changes in *ancillary services costs*;
 - h) changes in Australia's greenhouse gas emissions;
 - i) competition benefits, being net changes in market benefits arising from the impact of the *credible option* on participant bidding behaviour;
 - j) 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*;
 - k) the negative of any penalty paid or payable (meaning the penalty price multiplied by the shortfall) for not meeting any relevant government-imposed instruments (such as the renewable energy target), grossed-up if not tax deductible to its value if it were deductible; and
 - l) other benefits that the *RIT-T proponent* determines to be relevant and are agreed to by the *AER* in writing before the *project specification consultation report* is made available to other parties.
- 12. The *RIT-T proponent* must quantify all classes of *market benefits* that it determines to be material in its reasonable opinion.
- 13. The *RIT-T proponent* must consider all classes of *market benefit* as material unless it can, in the *project assessment draft report* or in respect of a proposed *preferred option*

which is subject to the exemption in clause 5.16.4(z1), in the *project specification consultation report*, provide reasons why:

- a) a particular class of *market benefit* is likely not to affect materially the outcome of the assessment of the *credible options* under the *RIT-T*; or
 - b) the estimated cost of undertaking the analysis to quantify the *market benefit* is likely to be disproportionate to the scale, size and potential benefits of each *credible option* being considered in the report.
14. Where the *credible option* is for *reliability corrective action*, the quantification of the *market benefits* associated with changes in voluntary *load curtailment* and changes in involuntary *load shedding* must only apply insofar as the *market benefit* delivered by the *credible option* exceeds the minimum standard required for *reliability corrective action*. If there is no minimum standard, all of the *market benefits* associated with changes in voluntary *load curtailment* and changes in involuntary *load shedding* for each *credible option* must be quantified.

1.2 Method for estimating the magnitude of market benefits

15. In estimating the magnitude of *market benefits* for:
- a) an *actionable ISP project*, the *RIT-T proponent* must comply with the *cost benefit analysis guidelines* and adopt the market modelling from the *ISP* in so far as practicable.
 - b) a *RIT-T project* that is not an *actionable ISP project*, the *RIT-T proponent* may adopt the market modelling from the *ISP* in so far as practicable. As far as this is not practicable, the *RIT-T proponent* must still, in general, when undertaking market modelling, use a market dispatch modelling methodology that incorporates a realistic treatment of plant characteristics (including for example minimum generation levels and variable operation costs), *network constraints* and network losses. The exception to this general requirement is where the *RIT-T proponent* explains why this methodology is not relevant in the *project assessment draft report* (or in respect of a proposed *preferred option* subject to the exemption in clause 5.16.4(z1), in the *project specification consultation report*).
16. The method for estimating *market benefits* must capture any benefits that occur outside the *region* in which the *RIT-T proponent's network* is located.
17. Where the analysis separately identifies the quantum of any *competition benefits* (either as a proportion or a component of the total *market benefit*), the analysis must identify the methodology used to estimate it.

1.3 Method for determining the discount rate to be applied

18. The *RIT-T proponent* must adopt the discount rate from the most recent *inputs, assumptions and scenarios report* unless it provides demonstrable reasons for 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.

1.4 Reasonable scenarios

20. In developing reasonable scenarios for:

- a) an *actionable ISP project*, the *RIT-T proponent* must adopt the relevant scenario/s for that *actionable ISP project*, as set out in the most recent *ISP parameters* unless it provides demonstrable reasons for why adding, omitting or varying this/these scenario/s is necessary;
- b) a *RIT-T project* that is not an *actionable ISP project*, the *RIT-T proponent* must include any of the *ISP scenarios* in the most recent *inputs, assumptions and scenarios report* that are relevant, unless it provides demonstrable reasons for why adding, omitting or varying a relevant *ISP scenario* is necessary. If no *ISP scenarios* are relevant, the *RIT-T proponent* must form reasonable scenarios consistently with paragraphs 22 and 23

21. If the *RIT-T proponent* decides to vary, omit or add a scenario as per paragraph 20 when developing its *reasonable scenarios*, this variation must be consistent with paragraphs 22 and 23.

22. *Reasonable scenario* means a set of variables or parameters that are not expected to change across each of the *credible options* or the *base case*, and may include the following variables or parameters, appropriate to the *credible option* under consideration:

- a) a reasonable forecast of electricity demand reflecting assumptions regarding economic growth and climatic patterns;

Note: adjustments to demand forecasts or elasticities arising through demand-side options should be reflected in the states of the world for those options rather than the reasonable scenarios.

- b) efficient unit operating costs of existing projects, *actionable ISP projects, committed projects, anticipated projects* and *modelled projects* (including demand-side and generation projects);
- c) avoidable unit costs of *actionable ISP projects, committed projects, anticipated projects* and *modelled projects* (including demand-side and generation projects);
- d) the form of any market-based regulatory instrument that may be used to address greenhouse and environmental issues;
- e) the magnitude of a penalty (if any) for failing to meet government-imposed target or instrument on parties who produce, consume and/or transport electricity in the *market*, grossed up if not tax deductible to its value if it were deductible;
- f) reasonable forecasts of the value of electricity to consumers;
- g) discount rate (the lower boundary should be the regulated cost of capital);
- h) generation bidding behaviour using:
 - i) short run marginal cost; and
 - ii) approximates of realistic bidding;
- i) commissioning dates of *actionable ISP projects, committed projects* and *anticipated projects*; and
- j) inclusion or exclusion of particular *anticipated projects* based on their degree of likelihood of being commissioned within the modelling period.

23. The number and choice of *reasonable scenarios* must be appropriate to the *credible options* under consideration. The choice of *reasonable scenarios* must reflect any variables or parameters that:
- a) where the *identified need* is *reliability corrective action*, are likely to affect the ranking of the *credible options*; and
 - b) for all other *identified needs*, are likely to affect the ranking of the *credible options*, or the sign of the *net economic benefits* of any of the *credible options*.

Note: the 'sign of the net economic benefit' refers to whether the credible option is likely to have a positive or negative net economic benefit.

1.5 States of the world

24. *State of the world* means a reasonable and mutually consistent description of all of the relevant market supply and demand characteristics and conditions that may affect the calculation of *market benefits* over the period of the assessment. This includes a reasonable forecast of:
- a) electricity demand modified where appropriate to take into account demand-side options;
 - b) the sum of efficient operating costs of supplying energy to meet forecast demand from existing projects, *actionable ISP projects*, *committed projects*, *anticipated projects* and *modelled projects* (including demand side and generation projects);
 - c) the sum of avoidable costs of *actionable ISP projects*, *committed projects*, *anticipated projects* and *modelled projects* (including demand side and generation projects) and whether all avoidable costs are completely or partially avoided or deferred;
 - d) the cost of providing sufficient *ancillary services* to meet the forecast demand to support the relevant *credible option*;
 - e) the capital and operating costs of other network augmentations consistent with the forecast demand and generation scenarios; and
 - f) the magnitude of a penalty (if any) for failing to meet government-imposed target or instrument on parties who produce, consume and/or transport electricity in the *market*, grossed up if not tax deductible to its value if it were deductible.
25. A *committed project* must form part of all *states of the world*, consistent with the treatment of existing assets and facilities.
26. An *actionable ISP project* must form part of all *states of the world* unless:
- a) the *actionable ISP project* is for the *RIT-T* being undertaken and must be excluded from each 'base case' *state of the world*; or
 - b) the *RIT-T* is for a project other than an *actionable ISP project* and the level of analysis required to include the *actionable ISP project* is disproportionate to the scale and likely impact of each of the *credible options* being considered.
27. The *RIT-T* proponent must use the *ISP* and, where absent from the *ISP*, its reasonable judgement to include *anticipated projects* in all relevant *states of the world*.
28. Appropriate market development modelling will determine which *modelled project* to include in a given *state of the world*. For completeness, where the *RIT-T proponent* adopts the market modelling from the *ISP*, *ISP projects* that are not *actionable ISP projects* will usually be *modelled projects*.

29. Market development modelling must (for *actionable ISP projects*) or may (for other *RIT-T projects*) be adopted from the *ISP*, insofar as practicable. In general, market development modelling should be:
- a) undertaken on a 'least-cost' basis; and
 - b) if appropriate, undertaken on a 'market driven' basis, where:
 - i) least-cost market development modelling derives *modelled projects* on the basis of a least-cost planning approach akin to conventional central planning. The *modelled projects* derived from such an approach would be those where the net present value of benefits, such as fuel substitution and reliability increases, exceed the costs, subject to meeting any minimum reserve requirements.
 - ii) market-driven market development modelling derives *modelled projects* on the same basis as that of a private developer. The *modelled projects* derived from such an approach would be those where the net present value of generation revenues (from the spot market or contracts) exceeds the net present value of generation costs. The forecasts of price trends should reflect realistic bidding behaviour, with power flows to be those most likely to occur under actual systems and market outcomes.

Glossary

Term	Definition
Anticipated project	a project which does not meet all of the criteria of a <i>committed project</i> as defined in this glossary, and is in the process of meeting at least three of the criteria for a <i>committed project</i> .
Base case	Where the <i>RIT-T</i> applies to: <ul style="list-style-type: none"> an <i>actionable ISP project</i>, a situation in which the <i>credible option</i> is not implemented by, or on behalf of the <i>RIT-T proponent</i>. any other <i>RIT-T project</i>, a situation in which no option is implemented by, or on behalf of the <i>RIT-T proponent</i>.
Committed project	a project that meets the following criteria: <ul style="list-style-type: none"> the proponent has obtained all required planning consents, construction approvals and licenses, including completion and acceptance of any necessary environmental impact statement; construction has either commenced or a firm commencement date has been set; the proponent has purchased/settled/acquired land (or commenced legal proceedings to acquire land) for the purposes of construction; contracts for supply and construction of the major components of the necessary plant and equipment (such as generators, turbines, boilers, transmission towers, conductors, terminal station equipment) have been finalised and executed, including any provisions for cancellation payments; and the necessary financing arrangements, including any debt plans, have been finalised and contracts executed.
Cost	has the meaning set out in paragraph 5.
Market benefit	has the meaning set out in paragraph 7.
Modelled project	a hypothetical project derived from market development modelling in the presence or absence (as applicable) of the credible option. For completeness, modelled projects may vary between <i>states of the world</i> because they are a modelling output that depends on which <i>credible option</i> (if any) and <i>reasonable scenario</i> occurs.
Net economic benefit	The sum of: <ul style="list-style-type: none"> the net economic benefit, other than of changes to Australia's greenhouse gas emissions, to all those who produce, consume or transport electricity in the NEM; and the net economic benefit of changes to Australia's greenhouse gas emissions, whether or not that net benefit is to those who produce, consume or transport electricity in the NEM.

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Term	Definition
Reasonable scenarios	has the meaning set out in paragraph 22.
State of the world	has the meaning set out in paragraph 24.