grid australia
BACKBONE OF THE NEM

14 May 2010

Mr Tom Leuner
General Manager Markets
Australian Energy Regulator
GPO Box 520
Melbourne VIC 3001

By email: AERInquiry@aer.gov.au

Dear Tom,

Draft Regulatory Investment Test for Transmission and Application Guidelines

Grid Australia makes this submission in response to the AER's Draft Regulatory Investment Test for Transmission (RIT-T) and the Draft RIT-T Application Guidelines (released in March 2010).

Grid Australia's key concern is to ensure that the RIT-T developed by the AER complies with the NER requirement for analysis required under the RIT-T to not be disproportionate to the scale and likely impact of each of the credible options being considered.

TNSPs are the parties responsible for the implementation of the RIT-T, and therefore have a direct interest in ensuring that the analysis they will be required to undertake is of a scale and scope that is appropriate and practical.

In this context, Grid Australia's key concerns in relation to the Draft RIT-T are:

- The proposed treatment of sensitivity tests as additional 'reasonable scenarios' and the requirement to conduct the RIT-T analysis across the full matrix of 'reasonable scenarios'. The resulting computational effort that this entails provides little additional analytical value, and has the potential to decrease the transparency of the analysis that results;

- The proposed requirement to undertake the assessment against a 'base case', even in the case of investments driven by reliability requirements. In this situation the 'do nothing' option does not represent a realistic state of the world, given the obligation on TNSPs to implement an option to ensure that reliability requirements are met; and

- The proposed requirement to undertake a probability-weighting of outcomes under all scenarios, and for all RIT-T assessments, even where there is no material option value.

Grid Australia does not consider that these proposed changes in the Draft RIT-T add value or serve to further the National Electricity Objective. Nor are they required to address any concerns that have been expressed in relation to current practice in applying the regulatory test.

These issues are discussed in more detail in the attached submission along with recommended changes to the Draft RIT-T that would address them, and ensure that the analysis required under the Draft RIT-T is not disproportionate.

In relation to the Draft RIT-T Guidelines, some of the key practical issues that are likely to be encountered in applying the RIT-T in a real-world context are highlighted. Grid Australia provides some suggestions in this submission as to further areas of guidance and worked examples that it considers it would be useful to include within the RIT-T Guidelines.

Grid Australia would be happy to assist the AER further with developing the RIT-T, the RIT-T Guidelines and worked examples.

Yours sincerely,

Rainer Korte
Chairman
Grid Australia Regulatory Managers Group

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Regulatory Investment Test for Transmission

Response to Draft RIT-T and Application Guidelines

14 May 2010

Powerlink Queensland · TransGrid · ElectraNet electricity transmission · TRANSEND · SP AusNet A member of Singapore Power Group

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1. Introduction

Grid Australia makes this submission in response to the AER's Draft Regulatory Investment Test for Transmission (RIT-T), the Draft RIT-T Application Guidelines and the AER's accompanying Explanatory Statement.

The National Electricity Rules (NER) specify that analysis required under the RIT-T is not to be disproportionate to the scale and likely impact of each of the credible options being considered.[1] Grid Australia's key concern is to ensure that the RIT-T developed by the AER complies with this NER requirement. The TNSPs are the parties responsible for the implementation of the RIT-T, and therefore have a direct interest in ensuring that the analysis they will be required to undertake is of a scale and scope that is appropriate and practical.

In this context, Grid Australia's key concerns in relation to the Draft RIT-T are:

- The proposed treatment of sensitivity tests as additional 'reasonable scenarios' and the requirement to conduct the RIT-T analysis across the full matrix of 'reasonable scenarios'. The resulting computational effort that this entails provides little additional analytical value, and has the potential to decrease the transparency of the analysis that results;

- The proposed requirement to undertake the assessment against a 'base case', even in the case of investments driven by reliability requirements. In this situation the 'do nothing' option does not represent a realistic state of the world, given the obligation on TNSPs to implement an option to ensure that reliability requirements are met; and

- The proposed requirement to undertake a probability-weighting of outcomes under all scenarios, and for all RIT-T assessments, even where there is no material option value.

Grid Australia does not consider that these proposed changes in the Draft RIT-T add value or serve to further the National Electricity Objective. Nor are they required to address any concerns that have been expressed in relation to current practice in applying the regulatory test.

In order to address the above issues, and ensure that the analysis required under the Draft RIT-T is not disproportionate, Grid Australia recommends that:

[1] NER, Clause 5.6.5B(c)(2).

- the draft RIT-T (in particular paragraph (16)) be reworded so that sensitivity testing is made distinct from the consideration of reasonable scenarios, and there is no requirement to conduct the RIT-T assessment over all possible combinations of sensitivities and scenarios;

- the draft RIT-T not require the assessment to be undertaken in relation to a base case, where investment is driven by reliability requirements. Alternatively, the RIT-T Guidelines should make clear that in this circumstance the 'base case' can be assigned a value of zero for the purposes of the analysis; and

- the requirement to probability-weight scenario outcomes only apply where there is material option value associated with an investment, rather than to all investments.

These points are expanded on in the remainder of this submission, together with some additional, more minor, observations on the draft RIT-T.

In relation to the Draft RIT-T Guidelines, Grid Australia stresses the potential value of the RIT-T Guidelines in providing a clear starting-point for how certain issues should be addressed under the RIT-T. This helps lessen the potential scope for later dispute of RIT-T assessments, and provides a transparent platform for the analysis. In this context, Grid Australia is concerned that some of the worked examples provided in the draft RIT-T Guidelines do not address some of the key practical issues that are likely to be encountered in applying the RIT-T in a real-world context. Grid Australia provides some suggestions in this submission as to further areas of guidance and worked examples that it considers it would be useful to include within the RIT-T Guidelines. Grid Australia would be happy to assist the AER further with developing the RIT-T Guidelines and worked examples.

2. Analysis Must be Proportionate

The NER explicitly states 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' (clause 5.6.5B(c)(2)).

Grid Australia considers that it would be helpful if this principle was clearly stated in the RIT-T, under the discussion of market benefits. Grid Australia notes that there is a similar provision included in the current regulatory test (as part of the introduction).

Grid Australia considers that there are aspects of the proposed RIT-T which may result in the analysis not being proportionate, specifically:

- The proposed treatment of sensitivity tests as additional 'reasonable scenarios', and the requirement to conduct the RIT-T analysis across the full matrix of 'reasonable scenarios'. The resulting computational effort that this entails

provides little additional analytical value, and the potential to decrease the transparency of the analysis that results;

- The proposed requirement to undertake the assessment against a 'base case', even in the case of investments driven by reliability requirements where the 'base case' does not represent a realistic state of the world; and

- The proposed requirement to undertake a probability-weighting of outcomes under all scenarios and for all RIT-T assessments, even where there is no material option value.

2.1 Reasonable Scenarios and Sensitivity Tests

Paragraph (17) of the proposed RIT-T requires the number and choice of reasonable scenarios to be appropriate to the credible options under consideration. Grid Australia supports this wording, as consistent with the principle that the RIT-T analysis should not be disproportionate.

The RIT-T defines 'reasonable scenarios' as scenarios incorporating both changes in variables that may lead to different 'states of the world' against which the options are assessed (e.g. different forecasts of electricity demand) as well as different sensitivity tests on the key inputs into the analysis (e.g. differences in discount rates applied in the NPV assessment). Under this definition, sensitivity tests conducted under the proposed RIT-T represent discrete 'reasonable scenarios'. The RIT-T Guidelines also include a requirement for the analysis to be conducted across all reasonable scenarios, with the worked examples indicating that this analysis should form a comprehensive matrix across all combinations of these reasonable scenarios.[2]

Grid Australia notes that this approach differs from current practice, where a distinction is drawn between:

- different reasonable scenarios, and the ranking of alternative options across those scenarios (although not across all possible combinations of those scenarios); and

- sensitivity testing to ensure that the rankings remain robust to changes in key input parameters. Such testing is typically conducted in relation to the central scenarios only.

[2] AER, Draft RIT-T Guidelines, p. 17.

2.1.1 Reduction in Transparency

The requirement in the Draft RIT-T to treat all sensitivity analysis as separate reasonable scenarios will significantly increase the matrix of results required to be calculated in the RIT-T analysis. For many sensitivity assessments, the materiality of the additional calculations is relatively trivial. However, by substantially increasing the amount of calculations reported Grid Australia considers that there is a danger of a loss in transparency.

Appendix 1 provides an example drawn from a previous regulatory test application that highlights the increase in calculations implied under the draft RIT-T. The number of NPV figures reported increases from 36 to 324, for an assessment that considered three credible options, three demand scenarios, and sensitivity analysis in relation to capital costs, the discount rate and the cost of losses. The addition of a further option in this assessment would further increase the number of results reported to 405 (ie, a further increase of 81 results).

In this case, the increase in analysis and reporting would not be expected to change the outcome of the assessment; i.e. the ranking of the options.

For situations where 'one-at-a-time' sensitivity testing indicates that the NPV of options becomes close, current practice is to further investigate the robustness of the ranking of options by focussing sensitivity testing on those variables that have the greatest impact on relative rankings. Grid Australia considers that this targeted approach is more proportionate than a requirement to undertake the RIT-T assessment across the whole matrix of reasonable scenarios (including sensitivity tests) and also provides for greater transparency.

Grid Australia notes that one of the benefits cited by the AEMC in outlining the RIT-T rule was the unearthing of a greater number of efficient investment options as a result of the substantial increase in the amount of consultation that is required to be undertaken.[3] An increase in the number of options considered under the RIT-T will itself further increase the extent of analysis required. The approach proposed in the AER's Draft RIT-T would therefore compound that additional analysis still further, by requiring all options to be assessed against a full matrix of scenarios and sensitivities, for no practical benefit.

2.1.2 Increase in complexity of analysis

The proposed approach would also increase the complexity of the analysis as a result of the requirement to consider all possible combinations of reasonable scenarios, in

[3] AEMC 2009, *Regulatory Investment Test for Transmission*, Final Rule Determination, 25 June 2009, p. 6.

cases where this increases the number of different 'states of the world' that need to be considered as part of the RIT-T analysis.

Changes in the variables considered in developing reasonable scenarios that impact on states of the world are:

- forecasts of future electricity demand;
- the form of any market-based regulatory instrument that may be used to address greenhouse and environmental issues (e.g. CPRS);
- the commissioning dates of anticipated projects; and
- the inclusion or exclusion of particular anticipated projects based on their degree of likelihood of being commissioned within the modelling period.

In these cases additional market modelling would be required to estimate the changes in the states of the world as a result of combinations of these reasonable scenarios and each of the credible options.

Grid Australia notes that a reasonable scenario based on the introduction of the CPRS is a factor that may be relevant for many RIT-T assessments. Including the CPRS as one reasonable scenario and then testing this in combination with *all* other reasonable scenarios will mean that market modelling will need to be undertaken to develop 'states of the world' under (for example) low demand growth and the CPRS; medium demand growth and the CPRS; and high demand growth and the CPRS. This is in *addition* to combinations involving the CPRS and other sensitivity tests (e.g. discount rates, capital costs and costs of losses).

As noted above, the TNSPs' current approach is to consider combinations of reasonable scenarios around central cases (e.g. medium demand growth and the introduction of the CPRS; medium demand growth and no CPRS; low demand growth; high demand growth). Where the rankings of the credible options are influenced by these different scenarios then the TNSP would 'drill down' further and expand the combination of scenarios considered. Again, Grid Australia considers that this targeted approach is more proportionate than a requirement to undertake the RIT-T assessment across the whole matrix of reasonable scenarios (including sensitivity tests) and would result in greater transparency.

2.1.3 Recommended amendments to the draft RIT-T

In order to address the above issues, and ensure that the analysis required under the Draft RIT-T is proportionate, Grid Australia recommends that the draft RIT-T be reworded so that sensitivity testing is made distinct from the consideration of reasonable scenarios. Sensitivity tests, by definition, are intended to test the robustness of the ranking of the options. In contrast, reasonable scenarios relate to specific potential future circumstances.

In addition the RIT-T Guidelines should be amended to make clear that there is no requirement to conduct the RIT-T assessment over all possible combinations of sensitivities and reasonable scenarios.[4]

Grid Australia considers that the distinction between reasonable scenarios and sensitivity tests could be achieved by amending the proposed paragraph (16) of the Draft RIT-T and including a separate paragraph which explicitly refers to sensitivity testing, in line with the current regulatory test provisions (i.e. paragraph (23) of the current regulatory test).

Specifically Grid Australia suggests amending paragraph (16) as follows:

> **~~Projects and~~ Reasonable scenarios**
>
> (16) *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, 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, *committed, anticipated* and *modelled* projects including demand-side and generation projects;~~
>
> ~~(c) avoidable unit costs of *committed, anticipated* 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 an environmental target imposed on parties who produce, consume and 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~~

[4] Specifically, the current wording on page 17 of the Draft RIT-T Guidelines under 'Undertaking the comparison across all reasonable scenarios' and the associated worked example would need to be reworded.

~~(ii) approximates of realistic bidding;~~

(i) commissioning dates of *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.

(17) The number and choice of *reasonable scenarios* must be appropriate to the credible options under consideration and reflect reasonable alternative values of ~~any variables that~~ the above variables where these are likely to materially affect the calculation of the *market benefits* of the *credible options*.

Grid Australia suggests the inclusion of a new paragraph in the RIT-T along the following lines:

(17(b)) In addition, the analysis under this test must encompass sensitivity testing on key input variables where these are likely to materially affect the calculation of the *net market benefits* of the *credible options*. Sensitivity testing may be carried out on the following, and should be appropriate to the size and type of the project:

(a) capital and operating costs of alternative *credible options*

(b) discount rate (the lower boundary should be the regulated cost of capital)

(b) efficient unit operating costs of existing, *committed, anticipated* and *modelled* projects including demand-side and generation projects;

(c) avoidable unit costs of *committed, anticipated* and *modelled* projects, including demand-side and generation projects;

(e) the magnitude of a penalty (if any) for failing to meet an environmental target imposed on parties who produce, consume and 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) generation bidding behaviour using:

(i) short run marginal cost; and

(ii) approximates of realistic bidding;

(h) other sensitivity testing determined to be relevant and material to the case at hand.

Grid Australia notes that this proposed new clause differs slightly from paragraph (23) in the current regulatory test, by excluding from the list changes in input variables which may more typically be considered to represent different reasonable scenarios, rather than sensitivity tests, including those relating to changes in demand and the introduction of market based regulatory instruments that may be used to address greenhouse and environmental issues. Consideration of changes in these variables would continue to be required, where material, under the RIT-T paragraph (16).

Grid Australia also notes the current reference in the draft RIT-T to the commissioning dates of committed projects. By their very nature in being considered as 'committed', Grid Australia considers that the commissioning dates of such projects should be taken as fixed inputs into the analysis, rather than variables.

2.2 Inclusion of a Base Case

The draft RIT-T requires the estimation of market benefit to be undertaken in relation to a 'base case'.

Grid Australia questions the need for an assessment to be undertaken against a 'base case' in the case of an augmentation driven by reliability requirements. In this circumstance, the 'base case' reflects a state of the world that will not in reality exist because the TNSP faces an obligation to meet the reliability requirements, so there is by definition no 'do nothing' option. That is, a base case which showed high levels of unserved energy occurring in the absence of any investment does not represent an outcome which will occur, since the TNSP must invest to ensure that such increases in unserved energy do not occur.

Requiring the development of a base case in these circumstances increases the market modelling that needs to be undertaken (by increasing the number of states of the world), and increases the matrix of results reported.

The Draft Guidelines suggest that the need for a base case even for augmentations driven by reliability requirements is 'in order to provide a consistent point of comparison across all credible options.'[5] Grid Australia disagrees that a base case is needed to apply the RIT-T. The RIT-T is essentially a *ranking* of different credible options, to identify the option with the highest net market benefit. This ranking will remain the same whether the options are ranked against each other or in relation to a base case. This is illustrated in Table 2.1.

[5] AER Draft Guidelines, p. 14.

Table 2.1

Addition of Base Case Does Not Change Rankings

	Regulatory Test		RIT-T		
	NPV Result	*Ranking*	*NPV Result*	*Addition over the base case*	*Ranking*
Option 1 275 kV Injection	$36.28m	1	$36.28m	$1,036m	1
Option 2 132 kV Reinforcement	$49.03m	3	$49.03m	$1,049m	3
Option 3 Generation Support	$45.25m	2	$45.25m	$1,045m	2
Base Case	-	-	-$1,000m	-	-

As a result, Grid Australia considers that a requirement to include a base case in the assessment for reliability-driven augmentations serves no purpose under the RIT-T. At the same time it imposes an additional, non-trivial administrative burden, as it would be necessary to derive a 'state of the world' for the base case.

Grid Australia notes the wording in the NER 5.6.5B(c)(1) that the RIT-T must be based on 'a cost-benefit analysis that is to include an assessment of reasonable scenarios of future supply and demand if each credible option were implemented compared to the situation where no option is implemented'.

Given that including an assessment against 'no option' being implemented would require disproportionate analysis and would serve no purpose for reliability-driven augmentations, Grid Australia suggests that the RIT-T Guidelines should make clear that in this circumstance the 'base case' can be assigned a value of zero. The assessment of the market benefit of each credible option would then be undertaken on the basis of a comparison of the state of the world if option 1 were to be implemented with the change in this state of the world if option 2 were to be implemented instead of option 1, and similarly if option 3 were to be implemented instead of option 1, and so on.

2.3 Probability Weighting

The current regulatory test requires that an option must have the greatest net market benefit compared with likely alternative options over the majority of reasonable scenarios.

Under the draft RIT-T, the option which satisfies the RIT-T is the credible option which maximises the net economic benefit compared to all other credible options:

- Where 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 over a range of different cost scenarios; and

- Market benefit is the probability-weighted sum of the present value of the benefits of a credible option, relative to the base case, over a range of reasonable scenarios.

As a result, the outcome of the RIT-T assessment is no longer a matrix of the net benefit of each option against each reasonable scenario, but instead a ranking based on a single net benefit number for each option.

Grid Australia understands that the introduction of probability-weighting was originally intended as a means of including 'option value' within the analysis. As discussed further in section 2.4.3, Grid Australia does not consider that requiring probability-weighting results in option value being addressed. Grid Australia also notes that, even if probability weighting did capture option value, option value will not be material for most RIT-T applications. As a result, the requirement for probability weighting for all RIT-T applications is disproportionate.

The AER notes that where a TNSP has no basis for determining probabilities, it may choose to weight all the benefits equally. Grid Australia considers that this would apply in the case of all sensitivity tests as, by definition, sensitivity analysis is intended to test the robustness of the ranking of the options, rather than necessarily representing specific future circumstances that are expected and to which specific probabilities can be attached. For example, in testing the robustness of the ranking of the results to changes in the discount rate applied in the NPV analysis, the typical approach is to take percentages above and below a central discount rate assumption.

Grid Australia questions the value of explicit probability weighting across all sensitivities, in line with its concerns above in relation to the quantum of analysis and results presented. Consistent with the discussion in section 2.1, Grid Australia suggests that the RIT-T distinguish between reasonable scenario analysis and sensitivity testing, and that there be no requirement to probability-weight the outcome of sensitivity tests. Further, in relation to scenario outcomes, probability weighting is only potentially relevant and should only be required where material option value is a consideration, as discussed further in section 2.4.3.

2.4 Other Issues

This section discusses a number of other, more minor, issues relating to the draft RIT-T.

2.4.1 Requirement to Undertake Dispatch Modelling

Paragraph (12) of the Draft RIT-T requires that the TNSP must use market dispatch modelling, unless the TNSP can provide reasons why this methodology is not relevant in the project assessment draft report (or in the project specification consultation report, in cases where the TNSP is exempt from producing the project assessment draft report).

Grid Australia supports the proposed drafting in the RIT-T because not all classes of market benefit require market dispatch modelling. For example, a transmission augmentation to support the distribution network may not have any impact on the wholesale market (and therefore dispatch modelling is not relevant). Such an augmentation may change the losses on the network, and this class of market benefit would be quantified on the basis of load flow modelling (rather than dispatch modelling).

A requirement to use market dispatch modelling in these circumstances would be inconsistent with the NER principle that the RIT-T should not require a level of analysis that is disproportionate.

2.4.2 Least Cost Market Modelling

The Draft RIT-T (paragraph 20) requires that market development modelling must be undertaken on a 'least-cost' basis, and, if appropriate, also undertaken on a 'market driven' basis.

Grid Australia has previously noted that the requirement to undertake least cost modelling is potentially onerous, depending on what is intended by 'least cost modelling' and in particular whether there are changes to minimum reserve levels over the period. In this context Grid Australia notes that the AER comments in its Explanatory Statement that the reserve margin developed by AEMO can be treated as an exogenous input into a least-cost market development model.[6] The Draft RIT-T Guidelines confirm this approach.

Grid Australia continues to consider that the approach to market modelling should not be prescribed by the RIT-T, but that the TNSP should be able to select the approach which is most suitable in the circumstances in order to avoid unnecessary duplication of modelling approaches. However, if the requirement to undertake market modelling on a least cost basis is retained then Grid Australia notes that the ability to treat the reserve margin as exogenous is important in ensuring that the analysis remains proportionate.

6 AER, Explanatory Statement, p. 18.

2.4.3 Option Value

Grid Australia supports the proposed wording in the draft RIT-T (paragraph (5)(i)) which leaves it open for the TNSP to estimate additional option value which is not already captured in other classes of market benefit, where material.

The 'core' value of a transmission investment can be defined as the difference in net market benefit between choosing that alternative or choosing the "do nothing" status quo case,[7] estimated on a net present value (NPV) basis over the entire forecast period (e.g. 15 years). In determining this core value, the investment alternative is considered to be fixed; that is, a commitment is made at the beginning of the forecast period and the alternative is implemented without variation over time.

The additional 'option' value of a transmission investment can be defined as the difference in net market benefit between committing to the fixed alternative for the entire forecast horizon (as discussed above) and the net market benefit of committing to the alternative for only a portion of the forecast period before considering switching to another alternative.

Not all transmission investments have the same potential for significant option value. In an investment planning context, there are three necessary conditions for positive option value:

1. First, there must be uncertainty. Without uncertainty, there is no need to consider the possibility of switching alternatives in the future. The future is known and the best decision under certainty can be made now.

2. Second, there must be learning; that is, the state of information regarding future uncertainty must change. With uncertainty but without learning, the future may not be known but that state of (un)knowledge remains constant. There is no reason to postpone any decision-making and the best decision under uncertainty can be made now.

3. Third, there must be flexibility associated with at least one of the investment alternatives being considered. With learning but without flexibility, there is no ability to take advantage of that learning and switch alternatives.

Generally, the greater the uncertainty, the greater the learning and the greater the flexibility, then the greater the potential option value. Given this, option value analysis would not be suitable for most RIT-T applications.[8] Grid Australia considers

[7] Or, in the case of an investment for which the identified need is to meet reliability obligations, an alternative investment.

[8] In line with the NER requirement that the RIT-T must not demand a level of analysis that is disproportionate to the scale and likely impact of each of the credible options being considered (NER 5.6.5B(c)(2).

that there would be merit in the RIT-T guidelines explicitly setting out the conditions that need to be met for there to be potential option value (i.e. that there must be uncertainty, learning and flexibility).

Grid Australia is also of the view that where option value is calculated it would require some additional analysis beyond both the standard 'scenario' practice to date in applying the regulatory test, and the AER's suggested 'probability-weighted' approach under the draft RIT-T. By itself, the AER's probability-weighted approach does not capture option value, as it does not encompass the 'learning' that takes place as market conditions unfold.

3. Draft RIT-T Guidelines

In relation to the draft RIT-T Guidelines, Grid Australia stresses the potential value of the Guidelines in providing a clear signal as to how certain issues should be addressed under the RIT-T. This in turn lessens the potential scope for later dispute of RIT-T assessments, and provides a transparent and consistent platform for the analysis. In this context, Grid Australia is concerned, based on its significant experience in applying the Regulatory Test, that the worked examples provided in the draft Guidelines do not address some of the key practical issues likely to be encountered in applying the RIT-T in a real-world context.

Grid Australia provides some suggestions below as to further areas of guidance that it considers it would be useful to include within the RIT-T Guidelines, including some suggested additional worked examples. Grid Australia would also be happy to assist the AER further with developing the RIT-T Guidelines, including by providing further worked examples.

3.1 Credible Options

The Draft RIT-T Guidelines provide a worked example of the 'commercial feasibility' of an option in the context of the TNSP wishing to pursue a more expensive option.

The RIT-T Guidelines should also provide clear guidance as to when an option may not be considered 'economically feasible' as a result of being too expensive. This is important in the context of NER 5.6.5C (2) which requires the RIT-T to be applied in all cases where there is an option that is technically and economically feasible above $5m. Given that it is always possible to conceive of an extremely high-cost option for addressing an identified need, it is important that there is clear guidance on when an option is so expensive as to be considered no longer economically feasible.

Grid Australia proposes the following guidance in this context: 'An option is generally only economically feasible if its cost is comparable to other potential credible options to address the identified need. The exception is where a significantly higher cost option is considered economically feasible because it has materially higher net market benefits than the other credible options'.

Grid Australia also notes that both the terms 'commercial feasibility' and 'economic feasibility' are used in the RIT-T and the corresponding NER. The RIT-T Guidelines should clarify that an option that is assessed as commercially feasible is also economically feasible (and vice versa).

3.2 Reference to External Documents

Grid Australia considers that it would be appropriate for the AER Guidelines to reference external sources which could be taken as the relevant starting point for assumptions in the RIT-T analysis.

These documents include work that AEMO publishes as part of its development of the National Transmission Network Development Plan (NTNDP) such as reports of:

- generator costs (capital costs, fuel costs, SRMC and LRMC), and assumptions regarding demand response to spot prices; and
- estimates of emissions factors for various fuel and carbon price forecasts.

These reference sources should not preclude a TNSP from making a case for adopting alternative assumptions in specific circumstances, but would form a useful and transparent starting point for the RIT-T analysis.

3.3 Guidance on When Market Benefits are Not Material

The draft RIT-T Guidelines provide several examples of the assessment of market benefits under the RIT-T.

Grid Australia considers that it would be helpful for the Draft RIT-T Guidelines to also provide guidance and a worked example relating to situations where market benefits are not likely to be material, and therefore where they can be excluded from the RIT-T analysis.

Grid Australia suggests that the question of whether any of the credible options are expected to have an impact on the wholesale market could be used in order to assess whether some market benefits can be screened out as not being material for a specific RIT-T application.

If the proposed investment will not have an impact on the wholesale market, then the following market benefits will not be material and so would not need to be estimated:

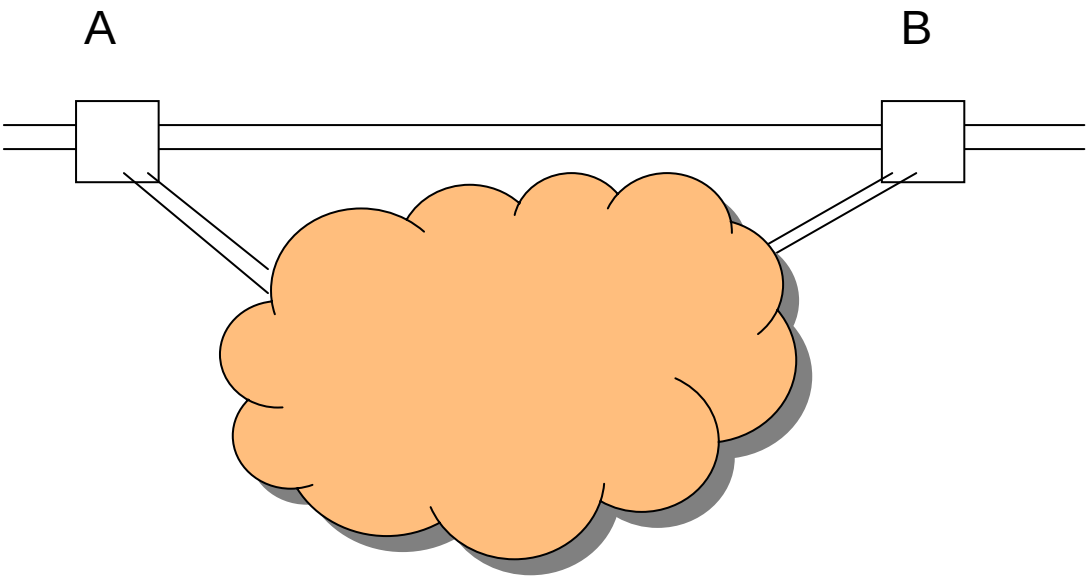
- changes in fuel consumption arising through different patterns of generation dispatch;
- changes in voluntary load curtailment (since there is no impact on pool price);

- changes in costs for parties other than the TNSP, due to differences in the timing of new plant; differences in capital costs; and differences in the operational and maintenance costs;
- changes in ancillary services costs;
- competition benefits, being net changes in market benefit arising from the impact of the credible option on participant bidding behaviour; and
- the negative of any penalty paid or payable (meaning the penalty price multiplied by the shortfall) for not meeting the renewable energy target, grossed-up if not tax deductible to its value if it were deductible.

3.3.1 Proposed Worked Example

Grid Australia proposes the inclusion of the following worked example to illustrate this point, in the RIT-T Guidelines.

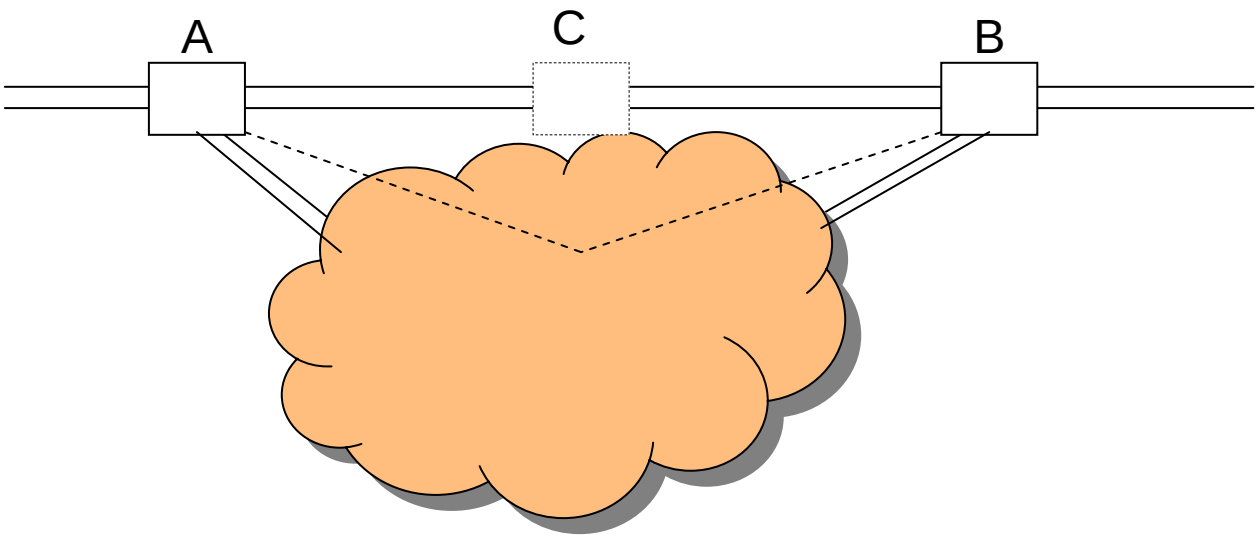
Example XX: A situation where some categories of market benefits are unlikely to be material.



Substations A and B on the transmission network supply a lower voltage distribution network. Due to ongoing demand growth the technical limits of the existing distribution network to supply the demand are being reached. There are no constraints on the market dispatch.

Possible network solutions include:

- Augmenting the distribution network so that additional demand can be supplied from substations A and B. This may also require additional transformer capacity at the existing substations; or
- Establish a new substation C, between substations A and B that supplies into the existing distribution network.



As the network limitation is not constraining the market dispatch, and neither of the possible network solutions changes that situation, the wholesale market investment and operation will be the same under all options. There will be a small change in network losses which can be included as a market benefit, but there will be no change in other classes of market benefits such as voluntary load shedding (as spot prices are not affected), generator investment patterns, competition benefits etc.

For this typical situation there is no requirement for market dispatch modelling.

3.4 Market Benefits for Non-Network Options

For many RIT-T applications, there are likely to be no material market benefits associated with changes in wholesale market outcomes (e.g changes in fuel costs) arising from any of the network options. In particular, as discussed above, where all generation investment and dispatch occurs upstream of a network limitation, none of the network options will impact on generation investment and dispatch decisions.

In respect of non-network options, whether or not market benefits are material may depend on the form of the non-network alternative. For example, if a demand management or embedded generation option operates only at peak demand times

then there is also unlikely to be any material market benefit from changes in fuel consumption or the deferral of future generation investment.[9]

However, if a demand management option is an energy efficiency measure, or an embedded generation option operates as base load, then the non-network option may generate material market benefits. For example, for these credible options there may be significant savings in fuel consumption across the NEM.

For most cases, full market dispatch modelling would be a disproportionate burden for the purposes of valuing this market benefit. In this example, Grid Australia suggests that the RIT-T Guidelines should make clear that it is acceptable to value the fuel cost savings from the non-network option using a single $/MWh value for all energy involved. This benchmark $/MWh figure would be the average fuel cost across the whole NEM for a whole year. Grid Australia proposes that a worked example based on this approach also be included in section A.1 of the Draft RIT-T Guidelines, in the discussion of estimating variable operating costs.

3.5 Voluntary Load Curtailment

Grid Australia considers that further guidance should be provided in relation to the calculation of changes in voluntary load curtailment.

In circumstances where none of the credible options are expected to have an impact on the wholesale market, and therefore will not change wholesale price outcomes, then there will be no change in voluntary load curtailment. This is consistent with the discussion in section 3.3 above.

In circumstances where there is expected to be a change in wholesale market prices, it will be difficult for TNSPs to estimate the change in voluntary load curtailment, given the confidential nature of load curtailment contracts. In this context Grid Australia notes that the worked example included in section A.2 of the AER's Draft RIT-T Guidelines assumes that the TNSP will know the quantity of voluntary load curtailment that may be expected at different price levels (i.e. 40 MW at $30/MWh; 0MW at $10/MWh). In reality the TNSP will not have access to this information, which relates to confidential contracts.

Therefore, the RIT-T Guidelines should make it clear that in the absence of more specific information that it appropriate for the TNSP to use more generally available data such as the indicative data on voluntary load curtailment which forms part of AEMO's dataset for the NTNDP analysis.

[9] The fuel cost of any embedded generation would be included in the cost of the option itself.

3.6 Value of Customer Reliability

Whilst a default VCR should not be mandated, the RIT-T Guidelines should make clear that the VCR used by AEMO for network planning purposes in Victoria (currently $55,000/MWh) is also a reasonable estimate to apply for jurisdictions other than Victoria, in the absence of other specific jurisdictional estimates.

3.7 Changes in Ancillary Services Costs

Grid Australia considers that further guidance should be provided in relation to the calculation of changes in ancillary services costs. The current worked example given in section A.7 of the Draft RIT-T Guidelines does not provide guidance as to when changes in ancillary services costs are likely to be material (and therefore require quantification) or how they should be quantified. The worked example assumes a reduction in ancillary service costs (from $0.35/MWh to $0.20/MWh) without any explanation of how these cost estimates are arrived at.

Grid Australia considers that changes in ancillary services costs are not likely to be material for many RIT-T assessments. In particular, changes in the costs of Frequency Control Ancillary Services (FCAS) are likely to be quite rare, as it is only when an option will materially change the quantity of FCAS procured by AEMO that there will be a material market benefit. One situation where there may be an FCAS saving is construction of a third interconnection circuit in addition to an existing double circuit line, so that additional FCAS requirements during single circuit outages or reclassifications can be avoided.

In addition, the cost of FCAS provision is inherently quite small, measured in cents/MW/Trading Interval, and therefore changes in this cost are unlikely to be of an order of magnitude sufficient to change the ranking of options under the RIT-T assessment. As with energy prices, prices for ancillary services in excess of the cost of provision represent a wealth transfer, and so a reduction in these prices by itself is not a market benefit.

In relation to estimating the magnitude of ancillary services costs, Grid Australia considers that explicitly modelling the ancillary services markets would result in a disproportionate level of analysis. Grid Australia considers that alternative estimation approaches would be more proportionate, and proposes the following worked example in the case of estimating the cost of reactive power ancillary services.

3.7.1 Proposed worked example

Example: Estimating the cost of reactive power ancillary services.

For reactive power ancillary services, the replacement cost may be represented by the annual cost of a capacitor bank:

If a 50 MVAr 132kV capacitor bank costs $1.5 million, then the equivalent annual cost is approximately $150,000/annum.

The potential market benefit from changes in reactive power ancillary services requirements is then:

150,000/50/8760/2 = $0.17/MVAr/TI

If the reactive power ancillary services requirement is reduced by 100 MVAr for the top 100 hours of demand each year then the market benefits are:

100 MVAr x 100 hrs x 2 TI's/hr x $0.17/MVAr/TI = $3,400/annum.

Appendix

A. Comparison of Draft RIT-T with Current Practice

This Appendix sets out the changes in the analysis implied under the proposed approach to sensitivity analysis and the treatment of reasonable scenarios in the Draft RIT-T as compared with current practice.

In summary:

- the assessment under the RIT-T is a ranking of alternative options. As a result it is the *relativity* of the NPV values for one option compared to another that is important for outcomes under the RIT-T, rather than the absolute level of the NPV values themselves;
- assessing investment under the draft RIT-T compared to current practice results in a significant increase in the number of calculations required, as a result of:
  - the treatment of sensitivities as reasonable scenarios, and the requirement to undertake the assessment across the full matrix of potential combinations of reasonable scenarios (including sensitivities);
  - the requirement to include a base case (in the case of a reliability-driven augmentation).
- if any of the parameters used to develop different reasonable scenarios affect the wholesale market, then the complexity of the additional calculations will be substantive, as additional 'states of the world' need to be developed across the whole matrix of possible combinations;
- for other sensitivity tests the additional calculations, while more straightforward, will increase the matrix of results reported, with a resulting potential decrease in transparency; and
- increasing the number of options included in the RIT-T analysis (which is expected as a result of the increased consultation requirements incorporated in the RIT-T process) will already increase the matrix of results. The proposed change to the treatment of sensitivities compounds this increase;
- the requirement to probability-weight the outcomes of the sensitivity analysis does not provide any additional information to inform the RIT-T assessment, since sensitivity tests would all be given an equal probability weighting.

The discussion in this Appendix uses the example of a previous regulatory test undertaken by ElectraNet to illustrate the difference in the analysis.[10]

A.1 Regulatory Test Analysis

The Regulatory Test was conducted by ElectraNet in 2010 on the Templers Supply Augmentation under the reliability limb of the Regulatory Test. The assessment covered three options:

- Option 1 – Templers West 275/132 kV Substation;
- Option 2 – Capacitor banks at Templers followed by 132 kV reinforcement; and
- Option 3 – Generation support followed by 275/132 kV injection at Templers West

The present value analysis under the Regulatory Test for each of these options was presented as follows in the Final Report:

Table A1.1 Results of PV Analysis under Regulatory Test[11]

	Ranking	NPV Result
Option 1 275kV Injection	1	$36.28m
Option 2 132kV Reinforcement	3	$49.03m
Option 3 Generation Support	2	$45.25m

ElectraNet undertook a 'one-at-a-time' sensitivity analysis in relation to the above results based on demand growth; capital costs; discount rates; and the cost of losses. This sensitivity analysis tested whether the ranking of the options was robust to changes in key parameters.

[10] ElectraNet, *Templers Supply Augmentation Regulatory Test – Final Report,* January 2010.

[11] Note: This is reproduced from ElectraNet, *Templers Supply Augmentation Regulatory Test – Final Report,* February 2010.

Table A1.2 Results of Sensitivity Analysis under the Regulatory Test[12]

Parameter	Range over which the parameter was varied	Option 1 275kV Injection		Option 2 132kV Reinforcement		Option 3 generation Support	
		PV Cost	Rank	PV Cost	Rank	PV Cost	Rank
Growth rate	Low	$33.29m	1	$47.09m	3	$39.32m	2
	Medium	$36.28m	1	$49.03m	3	$45.25m	2
	High	$40.57m	1	$54.08m	3	$52.40m	2
Capital Cost	80%	$29.21m	1	$38.91m	3	$36.98m	2
	100%	$36.28m	1	$49.03m	3	$42.25m	2
	120%	$43.35m	1	$59.14m	3	$53.51m	2
Discount rate	8.50%	$41.07m	1	$55.49m	3	$51.70m	2
	10%	$36.28m	1	$49.03m	3	$45.25m	2
	12%	$31.06m	1	$41.94m	3	$38.28m	2
Cost of losses ($/MWh)	$20	$36.98m	1	$49.71m	3	$45.54m	2
	$36	$36.28m	1	$49.03m	3	$45.25m	2
	$50	$35.66m	1	$48.43m	3	$45.00m	2

- Sensitivity analysis was undertaken on the parameters of demand growth rates (low, medium and high), capital costs (80%, 100% and 120% of estimates), discount rates (8.5%, 10% and 12%) and costs of losses ($20, $36 and $50)
  - Sensitivity analysis is undertaken on a 'one-at-a-time' basis;
  - When changing one of the parameters, all the other parameters are assessed at the central value of the parameter range (ie, the medium demand growth rate; 100% capital costs; 10% discount rate; and $36 cost of losses).

[12] Note: This is reproduced from ElectraNet, *Templers Supply Augmentation Regulatory Test – Final Report,* February 2010.

- Although the NPV results change as the parameters change, the absolute ranking of options does not change; i.e. the option that satisfies the regulatory test doesn't change and sensitivity testing confirms that the ranking of options is robust.

- Overall the analysis required ElectraNet to calculate 36 NPV values in total – one for each sensitivity for each option (the sensitivity results include the results presented in Table A1.1).

A1.1 Re-presenting the results

The above Regulatory Test analysis could be re-presented to separate out the reasonable scenario analysis (Table A1.3) and the sensitivity analysis (Table A1.4).

Table A1.3 Results of Reasonable Scenario Analysis based on Demand Growth

	Low Growth Rate		Medium Growth Rate		High Growth Rate	
	Ranking	**NPV Result**	**Ranking**	**NPV Result**	**Ranking**	**NPV Result**
Option 1 275kV Injection	1	$33.29m	1	$36.28m	1	$40.57m
Option 2 132kV Reinforcement	3	$47.09m	3	$49.03m	3	$54.08m
Option 3 Generation Support	2	$39.32m	2	$45.25m	2	$52.40m

Table A1.4 Results of Sensitivity on Medium Growth Rate

Parameter		**Option 1 275kV Injection**		**Option 2 132kV Reinforcement**		**Option 3 Generation Support**	
		PV Cost	**Rank**	**PV Cost**	**Rank**	**PV Cost**	**Rank**
Capital Cost	80%	$29.21m	1	$38.91m	3	$36.98m	2
	100%	$36.28m	1	$49.03m	3	$45.25m	2
	120%	$43.35m	1	$59.14m	3	$53.51m	2
Discount Rate	8.50%	$41.07m	1	$55.49,	3	$51.70m	2
	10%	$36.28m	1	$49.03m	3	$45.25m	2
	12%	$31.06m	1	$41.94m	3	$38.28m	2
Cost of losses ($/MWh)	$20	$36.98m	1	$49.71m	3	$45.54m	2
	$36	$36.28m	1	$49.03m	3	$45.25m	2
	$50	$35.66m	1	$48.43m	3	$45.00m	2

A.2 Draft RIT-T Analysis

Under the Draft RIT-T, sensitivities are to be included as separate reasonable scenarios. This implies that results must be presented across all combinations of options, scenarios and sensitivities[13].

Undertaking the Draft RIT-T approach on the above ElectraNet investment would result in the matrix of results shown in Table A1.5 needing to be calculated.

- Table A1.5 would require 324 numbers to be estimated – one for each combination of sensitivities for each option plus a base case.[14] This compares with 36 values estimated above, ie, an increase of 288 calculations compared with current practice.
- This increase in results is *before* considering the draft RIT-T requirement to also probability-weight the results for each credible option. The issue of probability-weighting is discussed further in section A.2.2
- Of these numbers, 81 are related to the requirement to include a base case. As this is a reliability investment, a base case reflects where reliability standards are not met and so inclusion of a base case (which itself is not a credible option) does not add any relevant information to the analysis, but results in additional calculations.

[13] In the Draft RIT-T Guidelines an example is given where an interconnector is assessed against 2 alternative credible options and a base case (ie, 4 options); and 2 discount rates, 2 sets of costs, 3 demand forecasts, and 2 bidding approaches. This results in 96 states of the world being estimated (4 (options) x 2 (discount rates) x 2 (sets of costs) x 3 (demand forecasts) x 2 (bidding approaches) = 96).

[14] 81 results must be generated for each option, given the 9 reasonable scenarios which are being assessed (ie, a 9x9 matrix); and there are 3 options plus the base case for which these 81 results need to be generated (ie, 4x81= 324).

Table A1.5 Matrix of Results Required Under Draft RIT-T Analysis[15]

Reasonable Scenario	Option 1 275kV Injection	Option 2 132kV Reinforcement	Option 3 Generation Support	Base Case	Probability
GRL;CC1;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR2;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC1;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR2;CL2	$33.29m	$47.09m	$39.32m	$[xx]m	0.0111
GRL;CC2;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC2;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR2;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRL;CC3;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRM;CC1;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR2;CL2	$29.21m	$38.91m	$36.98m	$[xx]m	0.0148
GRM;CC1;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC1;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC2;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC2;DR1;CL2	$41.07m	$55.49m	$51.70m	$[xx]m	0.0148
GRM;CC2;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC2;DR2;CL1	$36.98m	$49.71m	$45.54m	$[xx]m	0.0148
GRM;CC2;DR2;CL2	$36.28m	$49.03m	$45.25m	$[xx]m	0.0148
GRM;CC2;DR2;CL3	$35.66m	$48.43m	$45.00m	$[xx]m	0.0148
GRM;CC2;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC2;DR3;CL2	$31.06m	$41.94m	$38.28m	$[xx]m	0.0148
GRM;CC2;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148

[15] Note: Each of the reasonable scenarios corresponds to a combination of the following: Growth Rate Low (GRL); Growth Rate Medium (GRM); Growth Rate High (GRH); Capital Cost 80% (CC1); Capital Cost 100% (CC2); Capital Cost 120% (CC3); Discount Rate 8.5% (DR1); Discount Rate 10% (DR2); Discount Rate 12%

GRM;CC3;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR2;CL2	$43.35m	$59.14m	$53.51m	$[xx]m	0.0148
GRM;CC3;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRM;CC3;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0148
GRH;CC1;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR2;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC1;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR2;CL2	$40.57m	$54.08m	$52.40m	$[xx]m	0.0111
GRH;CC2;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC2;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR1;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR1;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR1;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR2;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR2;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR2;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR3;CL1	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR3;CL2	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111
GRH;CC3;DR3;CL3	$[xx]m	$[xx]m	$[xx]m	$[xx]m	0.0111

The additional work that would be required to estimate the extra 288 values in this particular example is relatively straightforward, as it takes the form of changing numbers in a spreadsheet and so is not computationally difficult. However, the additional work would become more complex for RIT-T assessments which include market benefits relating to changes in the wholesale market (as discussed in section A.2.1)

In addition, Table A1.5 is not easily transparent or accessible to end-users due to the large matrix of results presented.

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(DR3); Cost of Losses $20 (CL1); Cost of Losses $36 (CL2); and Cost of Losses $50 (CL3). The abbreviations given here correspond to the abbreviations used above.

Ultimately, the outcome of the analysis (i.e. the option that passes the RIT-T) would be the same as under the earlier approach; i.e. the additional analysis would not change the results:

- The ranking of the options would only change in the above matrix, where combinations of sensitivity tests together resulted in sufficient change to alter the relative NPVs;
- From the results in Table A1.2, options 2 and 3 may potentially change their rankings if sensitivity tests for which the NPV results become close are combined:
  - i.e. 80% capital cost (where the difference in NPVs between option 2 and option 3 is $1.93m); *plus* high growth rate (where the difference in NPVs between option 2 and option 3 is $1.68m).
  - even if the order of options 2 and 3 were reversed for these particular combinations, these form only a small proportion of the overall matrix of sensitivities;
- However, the ranking of option 1 as the preferred option would not change.

Grid Australia notes that for situations where 'one-at-a-time' sensitivity testing indicates that the NPV of options becomes close, TNSPs' current practice is to further investigate the robustness of the ranking of options through further sensitivity testing focusing on those variables that have the greatest impact on relative rankings. Grid Australia considers that this targeted approach is more proportionate than a requirement to undertake the RIT-T assessment across the whole matrix of reasonable scenarios (including sensitivity tests).

A.2.1 Computational complexity would increase for scenarios relating to wholesale market developments

The requirement to consider all possible combinations of reasonable scenarios proposed in the Draft RIT-T would also increase the computational complexity of the analysis, in cases where this increases the number of different 'states of the world' that need to be considered as part of the RIT-T analysis. This is because additional market modelling would be required for each new 'state of the world', reflecting the impact of each option on that new state of the world. As a result, for RIT-T assessments where market benefits are material the additional assessment required under the Draft RIT-T becomes more onerous.

The parameters under the RIT-T which would affect wholesale market outcomes (and therefore the 'states of the world') are:

- the form of any market-based regulatory instrument that may be used to address greenhouse and environmental issues (e.g. CPRS);

- commissioning dates of anticipated projects; and
- inclusion or exclusion of particular anticipated projects based on their degree of likelihood of being commissioned within the modelling period

Where the TNSP determines that changes in these parameters are important to ensure that the ranking of credible options are robust across reasonable scenarios, this would require significant additional analysis if the full matrix of possible combinations of these variables is required to be considered.

For example, including a reasonable scenario reflecting the introduction of the CPRS will mean that additional market modelling would need to be undertaken to develop 'states of the world' with:

1. low demand growth and the CPRS;
2. medium demand growth and the CPRS; and
3. high demand growth and the CPRS.

For each of these cases, further states of the world would need to be derived relating to the impact of each credible option on the base state of the world. For comparison, currently only the second of these states of the world would be developed, and the impact of each option on this state of the world assessed.

In *addition,* values would need to be calculated involving all combinations of the CPRS and the sensitivity parameters (eg, discount rates, capital costs and costs of losses).

To return to the ElectraNet example:

- If an additional reasonable scenario were to be included reflecting the introduction of the CPRS was to be included in the above Templers example, this would increase the number of values needing to be estimated by 81 to a total of 405.[16]

The CPRS is likely to be a key reasonable scenario for RIT-T assessments only where market benefits associated with the impact of credible options on the wholesale market are relevant.

[16] In reality, for this example there would be no market benefits relating to changes in wholesale market outcomes, and so a CPRS scenario would not be relevant in this case. However the point is to illustrate the potential increase in the matrix of results.

A.2.2 Probability Weighting

The draft RIT-T requires each of the reasonable scenarios to be probability weighted, in order to arrive at a single NPV number for each credible option. This differs to the current regulatory test, where options are ranked under each scenario, with the option which satisfies the test being the one that has the highest ranking across the majority of scenarios.

In the above example, we have assumed for illustrative purposes a probability associated with each demand growth rate: 40% for medium; and 30% for each of high and low. We have then assumed that the probability of reasonable scenarios relating to each sensitivity test under each demand growth scenario will be the same (ie, equally weighted), and derived probability weights accordingly:

- For example, there are 27 sensitivity parameters under the low demand growth scenario. The probability associated with each of these is the 30% associated with the low demand growth scenario divided by 27 ie, 30% / 27 = 1.11%.

- This is in accordance with the AER's Draft Guidance that where a TNSP has no material evidence for assigning a higher probability for one reasonable scenario over another, then they may weight all reasonable scenarios equally.

Table A1.6 shows the form of the final outcome.

Table A1.6 Final NPV Analysis

	Ranking	Probability Weighted NPV
Option 1 275kV Injection	x	$(xx.xm)
Option 2 132 kV Reinforcement	x	$(xx.xm)
Option 3 Generation Support	x	$(xx.xm)

Sensitivity testing is undertaken to test the robustness of the rankings of options for various changes in key input parameters. In the context of the RIT-T the sensitivity analysis is not to see whether the NPVs change but rather whether the ranking of options changes. Sensitivity testing is therefore typically carried out on more extreme values of the parameter that was used in the analysis to see if this affects the ranking, rather than being based on specific forecasts of 'high' and 'low' outcomes.

As a result, for the majority of sensitivity tests there is no likely reason why one outcome is more likely to occur than another, and so assigning probabilities on an equal basis (as above) is reasonable. If probabilities are assigned equally then there

is little reason to believe that the ranking of results would change, which in turn suggests that there is little to be gained through probability weighting sensitivities.

Grid Australia understands that the introduction of probability-weighting was originally intended as a means of including 'option value' within the analysis. As discussed in the main part of this submission, Grid Australia does not consider that requiring probability-weighting in fact results in option value being addressed. However, even if probability weighting did capture option value, option value will not be material for most RIT-T applications. As a result, the requirement for probability weighting for all RIT-T applications is disproportionate.

A.2.3 Increasing the number of options further increases the matrix

One of the benefits cited by the AEMC in outlining the RIT-T rule change was the unearthing of a greater number of efficient investment options as a result of the substantial increase in the amount of consultation that is required to be undertaken.[17] An increase in the number of options considered under the RIT-T will itself further increase the extent of analysis required. The approach proposed in the Draft RIT-T would therefore compound that additional analysis still further, by requiring all options to be assessed against a full matrix of scenarios and sensitivities.

If another option was considered in the above ElectraNet example, the matrix of results would increase by a further 81, ie, a total of 405 values would need to be estimated if five options were considered. If six options were considered, 486 values would need to be estimated.

A.3 Conclusion

Assessing investment under the draft RIT-T compared to current practice results in a significant increase in the number of calculations required, as a result of:

- the treatment of sensitivities as reasonable scenarios, and the requirement to undertake the assessment across the full matrix of potential combinations of reasonable scenarios;
- the requirement to include a base case (in the case of a reliability-driven augmentation); and
- the requirement to probability-weight the outcomes for each option across all relative scenarios (including sensitivities).

[17] AEMC 2009, *Regulatory Investment Test for Transmission*, Final Rule Determination, 25 June 2009, p. 6.

The complexity of the additional calculations will be substantive where different reasonable scenarios reflect different factors influencing the wholesale market, as additional 'states of the world' need to be developed. Even for cases where the additional calculations are more straightforward, there will be an increase in the matrix of results reported, which potentially lessens transparency.