



## **Decision**

### **South Australia – Victoria (Heywood) Interconnector Upgrade**

**Determination that preferred option satisfies  
the regulatory investment test for transmission**

September 2013

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## Executive summary

ElectraNet submitted a written request to the Australian Energy Regulator (AER) for a determination on whether the 'preferred option' identified for the South Australia – Victoria (Heywood) interconnector upgrade satisfies the regulatory investment test for transmission (RIT-T), under the National Electricity Rules.<sup>1</sup>

Our determination is that the preferred option identified by ElectraNet and the Australian Energy Market Operator (AEMO) in their project assessment conclusions report satisfies the RIT-T.

This determination means ElectraNet can now apply to us for an allowance for the cost of the Heywood interconnector upgrade to be included in charges during the 2013–2018 period. We would review ElectraNet's proposal and decide how much it would be allowed to charge to recover the efficient costs attributable to the upgrade.

### The regulatory investment test for transmission

The RIT-T is an economic cost–benefit analysis to identify the investment option—the preferred option—that maximises net economic benefits and, where applicable, meets the relevant jurisdictional or Electricity Rules based reliability standards.<sup>2</sup> The transmission business must apply the RIT-T to all proposed transmission investment subject to certain exclusions.<sup>3</sup> The RIT-T is intended to promote efficient transmission investment (both network and non-network) in the national electricity market (NEM) and ensure greater consistency, transparency and predictability in transmission investment decision making.

Between October 2011 and January 2013, ElectraNet (the transmission business in South Australia) and AEMO (which is an independent market and system operator, national planner, and transmission investment decision maker in Victoria), jointly conducted a RIT-T to increase the transfer capability of the South Australia to Victoria Heywood interconnector (the Heywood Interconnector RIT-T).<sup>4</sup>

During the assessment process, ElectraNet and AEMO considered a range of investment options that increase market benefits by reducing constraints on the Heywood Interconnector. The two key network constraints that the options sought to address were those associated with the thermal capabilities and voltage stability limits in south-east South Australia, and transformer capacity at the Heywood substation in Victoria.

ElectraNet and AEMO's project assessment conclusions report identified the installation of a third transformer at Heywood, series compensation in South Australia and the reconfiguration of the South Australian 132 kV network between Snuggery-Keith and Keith-Tailem Bend, as the preferred option—called 'option 1b'. This option is expected to increase interconnector capability by about 40 per cent in both directions. The key market benefits associated with the preferred option are the changes in fuel costs arising through different patterns of generation dispatch.

ElectraNet and AEMO found increasing the Heywood interconnector's transfer capability will deliver net market benefits of \$190 million over the long term. The total capital cost of the project is estimated

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<sup>1</sup> National Electricity Rules, clause 5.16.6.

<sup>2</sup> The RIT-T and application guideline is available at: <http://www.aer.gov.au/node/8865>.

<sup>3</sup> National Electricity Rules, clause 5.16.3.

<sup>4</sup> <http://www.aemo.com.au/Electricity/Planning/Regulatory-Investment-Tests-for-Transmission-RITTs/Heywood-Interconnector-RIT-T>.

to be \$108 million, with \$63 million allocated to the South Australia network and \$45 million to Victoria. This cost allocation reflects the necessary investment in each region.

### Assessment approach

The purpose of the RIT-T is to identify the credible option that maximises the present value of net economic benefits to all those who produce, consume and transport electricity in the NEM.<sup>5</sup> Therefore, for the AER to make a determination that the preferred option satisfies the RIT-T, the preferred option identified by the RIT-T proponents must be the credible option that the RIT-T identifies as maximising the present value of the net economic benefit to all those who produce, consume and transport electricity in the NEM.

When applying the RIT-T, ElectraNet and AEMO were broadly required to:

- identify the need for investment
- identify the base case and set of credible options to address the identified need
- identify a set of reasonable scenarios that are appropriate to the credible options under consideration
- quantify the expected costs and market benefits of each credible option
- identify the preferred option—that is, the option with the highest expected net economic benefit.

If the Heywood Interconnector RIT-T satisfies the requirements of each of these steps and there have been no material errors in calculation, then we consider that the credible option identified as the preferred option satisfies the RIT-T.

Our review assesses the Heywood Interconnector RIT-T against the above requirements. If a potential issue was not sufficiently addressed, then we consider whether the issue was likely to affect the rankings of the options.

We engaged an expert consultant to assist us in assessing the Heywood Interconnector RIT-T, Oakley Greenwood. With the help of our consultant, we tested the various modelling assumptions and outcomes in the project assessment conclusions report.

As part of our assessment we considered concerns raised by stakeholders. We received comments from five stakeholders, some of which questioned the underlying assumptions in the Heywood Interconnector RIT-T, the level of data disclosure and other issues. We sought to ensure that ElectraNet addressed the questions raised in stakeholder comments. Stakeholder comments and ElectraNet's response are available on our website.<sup>6</sup>

The scope of our assessment was limited to a qualitative review of whether the preferred option identified in the Heywood Interconnector RIT-T had been correctly identified. It was not in the scope of our assessment to separately undertake a cost–benefit analysis of the potential investment options.

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<sup>5</sup> National Electricity Rules, clause 5.16.1(b).

<sup>6</sup> <http://www.aer.gov.au/node/19916>.

## Concerns raised about modelling assumptions

Stakeholder comments on ElectraNet's application were valuable in highlighting a range of issues for us to consider. One issue raised by Macquarie Generation in particular was about consideration given to intra-regional constraints in the Heywood Interconnector RIT-T. We undertook considerable consultation specifically on this issue.

Macquarie Generation questioned whether ElectraNet and AEMO had considered all the relevant sources of congestion on the Heywood interconnector, and suggested that all of the relevant costs of future network projects that would be needed to reduce congestion to the level assumed had not been factored into the analysis.<sup>7</sup> Macquarie Generation engaged a consultant, Frontier Economics, to independently review and model the 'preferred option' in the revised central scenario.<sup>8</sup>

Frontier Economics identified that assumptions around intra-regional constraints that limit flows on the Heywood interconnector had a significant impact on the market benefits of the options considered by ElectraNet and AEMO. Assuming maximum transfer capacity on Heywood interconnector was available bi-directionally at all times (meaning flows across the Heywood interconnector would not be limited by intra-regional constraints), Frontier found the gross market benefits of the 'preferred option' in the revised central scenario would be around \$24 million (\$2011-12), compared to the finding in the Heywood Interconnector RIT-T of \$284 million.<sup>9</sup> Frontier Economics considered that more detailed information on the assumed configuration of intra-regional constraints, and the resulting patterns of congestion that limit flows, was required to allow stakeholders to assess the reasonableness of the modelled flows and limits and, ultimately, the gross market benefits reported for the 'preferred option'.<sup>10</sup>

The RIT-T requires that in estimating the magnitude of market benefits, a market dispatch modelling methodology must be used and incorporate a realistic treatment of network constraints.<sup>11</sup> Therefore, the modelling of intra-regional constraints by ElectraNet and AEMO must reflect a realistic treatment of those constraints.

We consider that the market dispatch modelling undertaken by ElectraNet and AEMO incorporated a realistic treatment of network constraints. ElectraNet and AEMO outlined the process followed in the formulation of the future network constraints in the RIT-T and stated that the formulation of constraints followed the same processes as those in the actual operation in the NEM. Further, ElectraNet and AEMO provided an internal document outlining the quality checks undertaken during the assessment to ensure the correctness of the market modelling. On this basis, we consider that it was likely that a realistic treatment of network constraints was incorporated. This was validated by our review of the additional information provided by ElectraNet and AEMO about the modelling of intra-regional constraints.

## AER determination

In accordance with clause 5.16.6(b)(2) of the National Electricity Rules, and taking into account stakeholder comments, our determination is that the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T. We consider:

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<sup>7</sup> Macquarie Generation, 8 July 2013, Letter to the AER - Heywood Interconnector Upgrade - AER determination, p. 2.

<sup>8</sup> Macquarie Generation, 31 May 2013, Letter to the AER - Heywood Interconnector Upgrade: Regulatory Investment Test - Transmission (RIT-T), p. 2.

<sup>9</sup> Frontier Economics, May 2013, Market benefits of the Heywood upgrade - a report prepared for Macquarie Generation, p. 17.

<sup>10</sup> Frontier Economics, July 2013, Frontier's response to AEMO/ElectraNet information release, p. 4.

<sup>11</sup> RIT-T, paragraph 11(b).

- The identified need in the Heywood Interconnector RIT-T, to increase the sum of producer and consumer surplus in the NEM,<sup>12</sup> is consistent with the requirements of the RIT-T.
- All the credible options assessed met the definitional requirements of a credible option. The number and range of credible options assessed was appropriate given the magnitude of the likely costs of the credible options.
- The number, choice and weighting of the reasonable scenarios modelled by ElectraNet and AEMO satisfies the requirements of the RIT-T. While there are plausible variations to some of the variables and parameters in the reasonable scenarios (for example, the differential between South Australian and Victorian gas prices may decrease), these variations would not affect the ranking of the credible options.
- The costs of the credible options have been appropriately quantified.
- The selection of material market benefits and the quantification of those material market benefits largely satisfies the requirements of the RIT-T. To the extent that some of the classes of market benefits may not have been appropriately quantified, this would not have affected which credible option is identified as the preferred option.
- 'Option 1b' was correctly identified as the preferred option.

Our determination is consistent with the findings of Oakley Greenwood that:

- the requirements of the RIT-T have been satisfied and that accordingly Option 1b has been correctly identified as the preferred option
- each of the functional steps in undertaking an assessment of market benefits under the RIT-T was performed satisfactorily overall
- the selection of credible options was appropriate—the selection was tested against the range of generic approaches available to enhance market benefits including enhancement and duplication of the existing network, greenfield developments and mitigation (through demand reduction) and found to cover each technique
- classes of market benefits assessed included all classes likely to be significant.<sup>13</sup>

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<sup>12</sup> This means that there must be increase in the welfare of all who produce, consume and transport electricity in the NEM as a whole and not merely transfer wealth from one class in the NEM (i.e. consumers) to another (i.e. producers).

<sup>13</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 1.

# 1 Introduction

This chapter sets out the relevant background information to our determination of whether the preferred option satisfies the RIT-T, including setting out our consultation process.

## 1.1 Who we are and our role in this process

The Australian Energy Regulator (AER) is the economic regulator for electricity transmission and distribution services in the National Electricity Market (NEM).<sup>14</sup> We are an independent authority, funded by the Australian Government. Our electricity-related powers and functions are set out in the National Electricity Law (Electricity Law) and National Electricity Rules (Electricity Rules).

We are responsible for developing, publishing and maintaining the regulatory investment test for transmission (RIT-T) and accompanying RIT-T application guidelines.<sup>15</sup> The RIT-T is an economic cost-benefit analysis that is used to assess and rank different electricity investment options. The purpose of the RIT-T is to identify the credible option<sup>16</sup> which maximises the present value of the net economic benefit to all those who produce, consume and transport electricity in the market (the preferred option).<sup>17</sup> The RIT-T application guidelines provide guidance on the operation and application of the RIT-T, and expand on the principles in clause 5.16.1 of the Electricity Rules.

Transmission businesses must apply the RIT-T to all proposed transmission investment subject to certain exclusions.<sup>18</sup> The RIT-T is intended to promote efficient transmission investment in the national electricity market (NEM) and ensure greater consistency, transparency and predictability in transmission investment decision making.

Following the finalisation of a RIT-T in the project assessment conclusions report and the deadline to dispute conclusions by the RIT-T proponent, a RIT-T proponent may make a written request to the AER to make a determination on whether the preferred option satisfies the RIT-T.<sup>19</sup> The RIT-T proponent can only make this request where the purpose of the investment options in the RIT-T is not to address forecast reliability limitations arising on its transmission network.

## 1.2 Who are ElectraNet and AEMO?

ElectraNet and the Australian Energy Market Operator (AEMO) jointly conducted the Heywood Interconnector RIT-T.

ElectraNet is a transmission business which plans, owns, builds and operates the transmission network in South Australia, comprising 5600 kilometres of high voltage electricity lines. ElectraNet's transmission revenues are regulated by the AER through five year transmission determinations. ElectraNet's current transmission determination commenced on 1 July 2013 and will finish 30 June 2018.

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<sup>14</sup> In addition to regulating NEM transmission and distribution, we also monitor the wholesale electricity and gas markets to ensure suppliers comply with the legislation and rules, taking enforcement action where necessary, and regulated retail energy markets in the ACT, South Australia, Tasmania (electricity only) and New South Wales under the National Energy Retail Law.

<sup>15</sup> The RIT-T and RIT-T application guidelines are available on the AER's website: <http://www.aer.gov.au/node/8865>.

<sup>16</sup> A credible option is defined in clause 5.15.2(a) of the National Electricity Rules as an investment option that addresses the identified need, is commercially and technically feasible and can be implemented in sufficient time to address the identified need.

<sup>17</sup> National Electricity Rules, clause 5.16.1(b).

<sup>18</sup> National Electricity Rules, clause 5.16.3.

<sup>19</sup> National Electricity Rules, clause 5.16.6(a)



The Australian Energy Market Operator (AEMO) is an independent organisation which operates the NEM. They are the market and system operator, responsible for power system security and the national transmission planner in Australia. In Victoria, AEMO is also responsible for transmission planning and directing augmentations of the electricity transmission network.

AEMO does not own, build or operate the Victorian transmission network. In Victoria, there are multiple asset owners who own and operate the Victorian transmission network. SP AusNet, owns and operates the majority of the network. Like ElectraNet, SP AusNet revenues are regulated by the AER through five year transmission determinations.

### 1.3 ElectraNet proposal

On 5 April 2013, ElectraNet submitted a written request<sup>20</sup> to the AER for a determination on whether the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T.<sup>21</sup> ElectraNet considers that the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T.

### 1.4 The Heywood Interconnector RIT-T

The Heywood Interconnector is located between South Australia and Victoria, in the South East of South Australia. The interconnector has been predominantly used to import power into South Australia. With the recent addition of significant amounts of wind generation in South Australia, however, it is increasingly being used to export power from South Australia into Victoria. A key market benefit of the proposed interconnector upgrade is higher use of lower cost generators, such as wind in South Australia and base-load capacity in Victoria. Increases in these sources of generation displace higher fuel cost generation from new and existing generators in South Australia and New South Wales.

The Heywood Interconnector RIT-T was undertaken by ElectraNet and AEMO between 31 October 2011 and 9 January 2013.<sup>22</sup> The purpose of the Heywood Interconnector RIT-T was not to address forecast reliability limitations on either the South Australian or Victorian transmission networks. Rather it sought to increase the sum of producer and consumer surplus in the NEM<sup>23</sup> by identifying and assessing investment options to increase transfer capability across the Heywood Interconnector.<sup>24</sup> The Heywood Interconnector RIT-T assessment considered nine credible investment options.<sup>25</sup> ElectraNet and AEMO identified option 1b, the installation of a third transformer at Heywood, series compensation in South Australia and the reconfiguration of the South Australian 132 kV network between Snuggery-Keith and Keith-Tailem Bend, as the preferred option.<sup>26</sup>

ElectraNet and AEMO estimate that the total cost of the Heywood Interconnector Upgrade will be around \$108 million in its project assessment conclusions report. The total cost of the upgrade is estimated to be \$108 million, with \$63 million allocated to the South Australia network.<sup>27</sup> The total

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<sup>20</sup> ElectraNet's proposal is available on the AER's website at: <http://www.aer.gov.au/node/19916>.

<sup>21</sup> National Electricity Rules, clause, 5.16.6(a).

<sup>22</sup> <http://www.aemo.com.au/Electricity/Planning/Regulatory-Investment-Tests-for-Transmission-RITTs/Heywood-Interconnector-RIT-T>.

<sup>23</sup> This means that there must be increase in the welfare of all who produce, consume and transport electricity in the NEM as a whole and not merely transfer wealth from one class in the NEM (i.e. consumers) to another (i.e. producers).

<sup>24</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 20.

<sup>25</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 22.

<sup>26</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 119.

<sup>27</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 119.

benefits of the investment are estimated at \$271 million, including market benefits associated with changes in fuel costs arising from different patterns of generation dispatch.<sup>28</sup>

## 1.5 Why did ElectraNet request for the AER to make a determination?

An AER determination that the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T is a trigger event for the Heywood Interconnector Upgrade contingent project in ElectraNet's 2013–2018 revenue determination.

In its 2013–18 revenue proposal, submitted to the AER on 31 May 2012, ElectraNet sought to include the Heywood Interconnector Upgrade as a contingent project. Contingent projects are significant network augmentation projects that may arise during the regulatory period but are not yet committed and are not provided for in a capex forecast expenditure. Contingent projects are linked to unique investment drivers and are defined by a unique 'trigger events'.<sup>29</sup>

In the draft decision on ElectraNet's 2013–18 revenue determination, published on 30 November 2013, we considered the Heywood Interconnector Upgrade might satisfy the Electricity Rules requirements to be a contingent project but required a more appropriate trigger event. We proposed in the draft determination additional trigger events for the Heywood Interconnector Upgrade.<sup>30</sup> One of the trigger events proposed was a determination by the AER under clause 5.16.6 that the preferred investment satisfies the RIT-T.<sup>31</sup>

In its revised revenue proposal, submitted to the AER on 16 January 2013, ElectraNet broadly accepted the proposed trigger events for the Heywood Interconnector Upgrade.<sup>32</sup> In our final decision on ElectraNet's 2013–2018 revenue determination, published on 30 April 2013, we approved the Heywood Interconnector Upgrade<sup>33</sup> as a contingent project with the following trigger events:

- successful completion of the RIT-T demonstrating positive net market benefits
- determination by the AER under clause 5.16.6 that the proposed investment satisfies the RIT-T
- ElectraNet Board commitment to proceed with the project subject to the AER amending the revenue determination pursuant to the Electricity Rules.<sup>34</sup>

The completion of the Heywood Interconnector RIT-T on 9 January 2013 satisfied the first trigger event. If we make a determination that the preferred option identified (option 1b) satisfies the RIT-T then the second trigger event will be satisfied.

Once all three trigger events occur in the 2013–2018 regulatory control period, then ElectraNet may submit a contingent project application to the AER under clause 6A.8.2 of the Electricity Rules to amend its 2013–18 revenue determination to account for the cost of the South Australian component of the Heywood Interconnector Upgrade.

The contingent project application is separate from this determination on whether the preferred option satisfies the RIT-T.<sup>35</sup> The former would include a determination by us on the capital and incremental

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<sup>28</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 84.

<sup>29</sup> National Electricity Rules, clause 6A.8.1(c)(5).

<sup>30</sup> AER, 30 November 2012, Draft decision - ElectraNet determination 2013–18, p. 238.

<sup>31</sup> AER, 30 November 2012, Draft decision - ElectraNet determination 2013–18, Appendix C.

<sup>32</sup> ElectraNet, 16 January 2013, 2013–2018 revised proposal, p. 173.

<sup>33</sup> AER, 30 April 2013, Final decision - ElectraNet determination 2013–18, pp. 176–177.

<sup>34</sup> AER, 30 April 2013, Final decision - ElectraNet determination 2013–18, Appendix B.

operating expenditure that is reasonably required by ElectraNet for the purpose of undertaking the Heywood Interconnector Upgrade and the incremental revenue ElectraNet is likely to require as a result. For example, the quantification of costs in the RIT-T does not need to conform to any of the capital and operating expenditure criteria and factors in the Electricity Rules.

## 1.6 Our consultation process

Following the publication of the project assessment conclusions report, the AER received correspondence from the National Generators Forum and Macquarie Generation regarding the Heywood Interconnector RIT-T.

We also received a letter from EnerNOC seeking to raise a formal RIT-T dispute. However, EnerNOC could not raise a RIT-T dispute as it was received after the 30 day deadline for RIT-T disputes to be raised.<sup>36</sup> We have, however, considered the substantive content in EnerNOC's letter in making our determination on whether the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T.

We considered that it was appropriate to take into account the issues raised in the correspondence by stakeholders, including EnerNOC's letter, as part of our assessment to determine whether the preferred option identified satisfies the RIT-T.

Following the receipt of ElectraNet's proposal, we invited stakeholders to provide further comments on ElectraNet's proposal. Although the Electricity Rules do not require us to undertake any stakeholder consultation, we considered it was appropriate to provide stakeholders with an opportunity to provide comments to assist in our determination. Comments were provided from Macquarie Generation, the Major Energy Users and GDF Seuz Australian Energy.

Following the receipt of the stakeholder comments on ElectraNet's proposal and our preliminary analysis, we sent an information request to ElectraNet. This information request sought ElectraNet's response to the issues raised the stakeholder correspondence and by our consultant.

ElectraNet provided a joint response with AEMO to our information request. We provided Macquarie Generation, the Major Energy Users and GDF Seuz Australian Energy with an opportunity to respond to ElectraNet and AEMO's joint response to the AER information request. In response Macquarie Generation and the Major Energy Users both then submitted further comments for consideration by the AER.

After a preliminary review of the further comments submitted by stakeholders, we sought ElectraNet's response on some of the further issues raised by Macquarie Generation. In response to our request, ElectraNet again provided a joint response with AEMO.

As a final step, we conducted a workshop with ElectraNet and AEMO to discuss the modelling issues which had been raised by Macquarie Generation.

Copies of the stakeholder comments, ElectraNet and AEMO joint responses and the minutes of the workshop are available on the AER's website.<sup>37</sup>

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<sup>35</sup> In other words, any future decision on a contingent project application relating to the Heywood interconnector upgrade is a separate decision that will be made independently of the analysis in this determination.

<sup>36</sup> National Electricity Rules, clause 5.16.5(c).

<sup>37</sup> <http://www.aer.gov.au/node/19916>.

## 1.7 Structure of this document

This document sets out our determination on whether the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T, including the reasons for the determination. The decision is structured as follows:

- chapter two sets out our assessment approach
- chapter three sets out our assessment of the application of the RIT-T by ElectraNet and AEMO
- chapter four sets out the AER's determination on whether the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T, including the reasons for the determination.

## 2 Assessment approach

This chapter outlines the AER's assessment approach.

Upon receipt of the written request by the RIT-T proponent to the AER to make a determination whether the preferred option satisfies the RIT-T, the AER must within 120 business days make and publish a determination, including reasons for the determination.<sup>38</sup>

In making the determination, the AER must use the findings and recommendations in the project assessment conclusions report, may request further information from the RIT-T proponent and may have regard to any other matter the AER considers relevant.<sup>39</sup>

The Electricity Rules state the purpose of the RIT-T is to identify the credible option that maximises the present value of net economic benefits to all those who produce, consume and transport electricity in the NEM. This credible option is the preferred option which satisfies the RIT-T.<sup>40</sup> Therefore, to make a determination that the preferred option identified satisfies the RIT-T, we must be satisfied that the identified preferred option is the credible option which would be identified in the RIT-T as maximising the present value of net economic benefits to all those who produce, consume and transport electricity in the NEM.

In determining whether this can be satisfied, we do not consider it is appropriate for us to undertake our own independent RIT-T cost-benefit analysis to confirm the preferred option identified is the credible option that maximises net economic benefits. This would effectively place the AER in the role of a transmission planner.

We also consider it is unnecessary to undertake a quantitative review of the Heywood Interconnector RIT-T. Unless there is a calculation error, a quantitative review, without an assessment of the variables or parameters modelled, would only confirm the outcomes of the Heywood Interconnector RIT-T. This would also be resource intensive and not achievable within the 120 business day timeframe in which we have to make a determination.

As set out in the RIT-T application guidelines, the broad steps involved in applying the RIT-T are:<sup>41</sup>

1. Identify the need for investment (known as the identified need). The identified need may be either for reliability corrective action or to increase the sum of consumer and producer surplus in the NEM.
2. Identify the base case and set of credible options to address the identified need.
3. Identify a set of reasonable scenarios that are appropriate to the credible options under consideration. A reasonable scenario is a set of variables or parameters (i.e. a reasonable forecast of electricity demand reflecting assumptions regarding economic growth and climatic patterns) that are not expected to change across each of the credible options or base case.<sup>42</sup>
4. Quantify the expected costs of each credible option.

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<sup>38</sup> National Electricity Rules, clause 5.16.6(b)(1).

<sup>39</sup> National Electricity Rules, clause 5.16.6(b)(2)-(4).

<sup>40</sup> National Electricity Rules, clause 5.16.1(b).

<sup>41</sup> RIT-T application guidelines, p. 8.

<sup>42</sup> RIT-T, paragraph 18.

5. Quantify the expected market benefits of each credible option. The market benefits of each credible option are calculated by comparing for each reasonable scenario the state of the world with the credible option in place to the state of the world in the base case where no option is implemented, and weighting the benefits derived by the probability of each reasonable scenario occurring.<sup>43</sup> A market benefit must be a benefit to those who consume, produce and transport electricity in the NEM and not include a transfer of surplus between consumers and producers.<sup>44</sup>
6. Quantify the net economic benefit of each credible option and identify the preferred option as the credible option with the highest expected net economic benefit.

If the Heywood Interconnector RIT-T satisfies the requirements of each of the above six steps and there have been no errors in calculation, then the credible option identified as the preferred option the Heywood Interconnector RIT-T satisfies the RIT-T.

Our review assessed the Heywood Interconnector RIT-T against each one of the six steps to determine whether it satisfied the requirements of the RIT-T. This started with a review of the consultation process run by ElectraNet and AEMO. If any potential issues were identified in the course of this assessment, then we conducted a more detailed analysis. This would include seeking further information from ElectraNet and seeking further stakeholder comments.

If a potential issue was not sufficiently addressed, then we would consider whether the issue was likely to affect which credible option was identified as the preferred option in the Heywood Interconnector RIT-T.

## 2.1 **Our expert consultant**

To assist in our review, we engaged a consultant from Oakley Greenwood to undertake an independent qualitative review of whether the Heywood Interconnector RIT-T satisfies the requirements of the RIT-T. In particular, Oakley Greenwood provided expert advice on the market benefits assessment and economic modelling undertaken by ElectraNet and AEMO, and tested the validity of the outcomes of the Heywood Interconnector RIT-T. As part of its review, Oakley Greenwood considered the issues raised in stakeholder comments provided to the AER. Oakley Greenwood's report to the AER, detailing its review of the Heywood Interconnector RIT-T, is available on our website.

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<sup>43</sup> RIT-T, paragraph 4.

<sup>44</sup> RIT-T, paragraph 6.

## 3 AER assessment of RIT-T application

In accordance with the assessment approach outlined in chapter 2 above, this section outlines our assessment of whether the Heywood Interconnector RIT-T satisfies the requirements of the RIT-T. Where the assessment identifies an aspect of the Heywood Interconnector RIT-T which may not satisfy the RIT-T, we have considered whether this will affect the selection of the preferred option. The structure of this section follows the broad steps involved in applying the RIT-T, as set out in section 2 above and in the RIT-T application guidelines.

### 3.1 Identified need

The identified need is the objective which the RIT-T proponent seeks to achieve by investing in its transmission network.<sup>45</sup> As outlined in the RIT-T application guidelines, the identified need is to be expressed as the achievement of a desired end or objective and not simply the means to achieve a desired objective or end.<sup>46</sup> The identified need may consist of meeting reliability standards or an increase in the sum of consumer and producer surplus.<sup>47</sup>

The identified need for the Heywood Interconnector RIT-T is the increase of producer and consumer surplus in the NEM. ElectraNet and AEMO have sought to achieve this by exploring investment options which would alleviate the thermal and voltage stability limitations in South Australia, and/or increase transformer capacity at the Heywood substation to increase export and import interconnection capacity between South Australia and Victoria across the Heywood interconnector.<sup>48</sup>

#### 3.1.1 AER view

The identified need in the Heywood Interconnector RIT-T, the increase in producer and consumer surplus in the NEM, is consistent with the requirements of the RIT-T.

### 3.2 Identification of credible options and the base case

When applying the RIT-T, the proponent must consider all options that could reasonably be considered as credible options<sup>49</sup> taking into account the factors listed in clause 5.15.2 of the Electricity Rules.

A credible option is an option that addresses the identified need, is commercially and technically feasible and can be implemented in sufficient time to address the identified need.<sup>50</sup>

The Heywood Interconnector RIT-T considered nine credible options.<sup>51</sup> Table 3.1 below summaries the credible options considered by ElectraNet and AEMO.

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<sup>45</sup> National Electricity Rules, clause 5.10.2.

<sup>46</sup> RIT-T application guidelines, p. 8.

<sup>47</sup> This means that the investment option must increase the welfare of all who produce, consume and transport electricity in the NEM as a whole and not merely transfer wealth from one class in the NEM (i.e. consumers) to another (i.e. producers).

<sup>48</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 20.

<sup>49</sup> National Electricity Rules, clause 5.15.2(b).

<sup>50</sup> National Electricity Rules, clause 5.15.2.

<sup>51</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 22.

**Table 3.1 Summary of credible options considered**

Description of credible option	
Option 1a	Installation of a 3rd 370 MVA 500/275 kV transformer at Heywood and 500 kV bus tie 100 MVAr capacitor at South East substation and reconfiguration of the 132kV network between Snuggery-Keith and Keith-Tailem Bend (South Australia)
Option 1b	Installation of a 3rd 370 MVA 500/275 kV transformer at Heywood and 500 kV bus tie 275 kV series compensation in South Australia and reconfiguration of the 132kV network between Snuggery-Keith and Keith-Tailem Bend (South Australia)
Option 2a	Construction of a 3rd 160 MVA 275/132 kV transformer at South East substation plus option 1a
Option 2b	Construction of a 3rd 160 MVA 275/132 kV transformer at South East substation plus option 1b
Option 3	Construction of a new Krongart-Heywood 500 kV interconnector and associated 275 kV works between Krongart and Tungkillo (South Australia).
Option 4	Option 1a minus the installation of 3rd 370 MVA 500/275 kV transformer at Heywood
Option 5	Five-year, 200 MW demand management program beginning in 2013 plus option 1b deferred by two years
Option 6a	Control scheme applying to specific wind generation in South Australia and the South East substation and 500 kV bus tie at Heywood
Option 6b	Control scheme applying specific wind generation in South Australia and the South East substation plus option 1b minus the installation of 3rd 370 MVA 500/275 kV transformer at Heywood

Source: Heywood Interconnector RIT-T project assessment conclusions report, executive summary, p. 22.

The Heywood Interconnector RIT-T project assessment conclusions report also considered the potential of alternative options proposed in stakeholder submissions. This included consideration of a stand-alone South East control scheme, an expanded South East 132 kV control scheme, combining option 1a and option 6a, installation of higher rated transformers at Heywood and additional options to address intra-regional issues in South Australia. None of the proposed alternative options were progressed as credible options.<sup>52</sup>

### 3.2.1 Oakley Greenwood view

Oakley Greenwood concluded that the selection of the credible options by ElectraNet and AEMO met the requirements of the RIT-T.<sup>53</sup> Oakley Greenwood outlined the broad approaches that could be considered to remove impediments on the transmission network and increase market benefits. Looking at the credible option assessed by ElectraNet and AEMO, Oakley Greenwood found that each broad approach had been considered.<sup>54</sup> Oakley Greenwood also broadly agreed with ElectraNet

<sup>52</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, pp. 57–62.

<sup>53</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, page 6.

<sup>54</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, p. 7.



and AEMO's consideration and treatment of alternative options proposed by stakeholders in the Heywood Interconnector RIT-T project assessment conclusions report.<sup>55</sup>

### 3.2.2 AER view

We consider that the credible options assessed in the Heywood Interconnector RIT-T satisfied the requirements of the Electricity Rules. All the credible options assessed met the definitional requirements of a credible option.<sup>56</sup> As noted by Oakley Greenwood in its report, the credible options considered addressed all the potential broad approaches to the removal of impediments on the transmission network, and the assessment and treatment of alternative approaches in the project assessment conclusions was reasonable.

## 3.3 Reasonable scenarios considered

The RIT-T requires a RIT-T proponent to model reasonable scenarios to assess the market benefits of the credible options under consideration.<sup>57</sup> A reasonable scenario is a set of variables or parameters of relevant market supply, and demand characteristics and conditions which is not expected to change across each of the credible options or the base case.<sup>58</sup> The number and choice of reasonable scenarios must be appropriate to the credible options under consideration.<sup>59</sup> Therefore, the choice of reasonable scenarios must reflect any variables or parameters that are likely to affect the ranking of credible options or the sign of the net economic benefits of any of the credible options.<sup>60</sup>

A weighting to each reasonable scenario must be assigned that reflects the probability of the reasonable scenario occurring.<sup>61</sup>

The Heywood Interconnector RIT-T modelled four reasonable scenarios: the central scenario, the low scenario, the high scenario and the revised central scenario.<sup>62</sup> A summary of weightings and parameters of each of the reasonable scenarios is outlined in table 3.2 below.

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<sup>55</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, pp. 32–34.

<sup>56</sup> As defined in clause 5.15.2 of the National Electricity Rules.

<sup>57</sup> RIT-T, paragraph 4.

<sup>58</sup> RIT-T, paragraph 15.

<sup>59</sup> RIT-T, paragraph 16.

<sup>60</sup> RIT-T, paragraph 16.

<sup>61</sup> RIT-T, paragraph 4(a)(ii).

<sup>62</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, p. 79.

**Table 3.2 Heywood Interconnector RIT-T reasonable scenarios**

	CENTRAL SCENARIO	LOW SCENARIO	HIGH SCENARIO	REVISED CENTRAL SCENARIO
WEIGHTING (%)	29	13	17	41
ECONOMIC GROWTH	medium	low	high	2012 NEFR medium
DEMAND GROWTH	medium	low	high plus Eyre Peninsula and Olympic Dam	2012 NEFR medium
CARBON PRICE	core Treasury price	high Treasury price	core Treasury price	low carbon price
TECHNOLOGY TIMINGS AND COST	central view of timings for new technologies	timings delayed 2 years (compared with central view)	timing brought forward 2 years (compared with central view)	central view of timings for new technologies
GAS PRICES	business as usual: medium published gas prices as per 2010 NTNDP	surplus domestic supply: low domestic price	high international demand: high domestic prices	business as usual: medium published gas prices as per 2010 NTNDP
WIND CONTRIBUTION TO PEAK DEMAND	2011 National Transmission Network Development Plan	2011 National Transmission Network Development Plan	2011 National Transmission Network Development Plan	2012 National Transmission Network Development Plan
DEMAND-SIDE TECHNOLOGIES	low adoption	no adoption	high adoption	2012 National Electricity Forecast Reporting moderate approach
LARGE-SCALE RENEWABLE ENERGY TARGET	Hard target (moderate uptake of greenpower)	Hard target (low uptake of greenpower)	Hard target (moderate uptake of greenpower)	Hard target (moderate uptake of greenpower)
CLOSURE OF HAZELWOOD	Forced retirement	Forced retirement	Forced retirement	No forced retirement
CONVERSION OF PLAYFORD	Assumed 2012–2013	Assumed 2012–2013	Assumed 2012–2013	No forced conversion

source: Heywood Interconnector RIT-T project assessment conclusions report, table 5-1 and table 5-3.

### 3.3.1 Stakeholder comments

Stakeholder comments to the AER in relation to the reasonable scenarios modelled raised concerns about the demand and carbon price modelled, and the assumption that the differential between Victorian and South Australian gas prices would be held constant.

#### Demand and carbon price modelled

Macquarie Generation stated it had concerns about the magnitude of market benefits modelled in the Heywood Interconnector RIT-T, which stemmed in part from the reasonable scenarios modelled. It

considered only the revised central scenario was realistic, while the other three reasonable scenarios had by mid-2012 become obsolete.<sup>63</sup>

The National Generators Forum noted that the Heywood Interconnector RIT-T modelled a range of future carbon prices. However, without bi-partisan support for a carbon price it considered it would appear reasonable to model a scenario with a zero price on carbon after July 2016.<sup>64</sup>

The National Generators Forum also highlighted that the outcomes of the Heywood Interconnector RIT-T were based on 2011 and 2012 AEMO demand forecasts, which show a strong recovery in electricity demand growth throughout the modelling period. However, the National Generators Forum noted that there is no evidence that the recent history of declining demand will plateau and recover. Should the changes persist, it calls into question the need for further substantial capital expenditure. Ultimately, the National Generators Forum considered it may be prudent to defer a decision on ElectraNet's proposal until more reliable demand forecasts for electricity, gas and carbon prices are available. The delay would have an insignificant impact on the benefits that will accrue.<sup>65</sup>

### *ElectraNet and AEMO response*

ElectraNet and AEMO's response noted that it had considered in the project assessment conclusions report the concerns about the demand forecast and carbon price modelled in the reasonable scenarios. In particular, the project assessment conclusions report:<sup>66</sup>

- a fourth scenario was adopted in response to the apparent shift in consumption patterns and the potential for lower carbon price after the 2012 National Electricity Forecasting Report, as well as submissions from stakeholders.
- the revised central scenario modelled both lower demand forecasts in the 2012 National Electricity Forecasting Report and assumes a low carbon price. The outcomes of the Heywood Interconnector RIT-T show that even under this scenario the preferred option still provides substantial market benefits and is the highest ranked option in this scenario.
- the carbon price was plotted against the net market benefits in the RIT-T analysis and found no linear relationship between the assumed carbon price and the market benefits of the identified preferred option. Further, the RIT-T analysis showed there would still be generation dispatch benefits under lower carbon prices.
- the sensitivity analysis increased the weighting of the revised central scenario.
- the modified central scenario does not assume a recovery in demand and shows substantial market benefits.

Further, ElectraNet noted that it was incorrect to assume further falls in demand as the 2012 Electricity Statement of Opportunities Update showed that there was 1.1 per cent variance between the demand forecast in the 2012 National Electricity Forecasting Report and actual operational demand in the NEM.<sup>67</sup>

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<sup>63</sup> Macquarie Generation, 5 March 2013, Letter to the AER - Heywood Interconnector Upgrade, p. 2.

<sup>64</sup> National Generators Forum, 22 February 2013, Letter to the AER - Heywood Interconnector Upgrade RIT-T determination, p. 3.

<sup>65</sup> National Generators Forum, 22 February 2013, Letter to the AER - Heywood Interconnector Upgrade RIT-T determination, p. 3.

<sup>66</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, pp.5-6.

<sup>67</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 6.

## Differential between South Australia and Victoria gas prices

The National Generators Forum observed that the differential between Victorian and South Australian gas prices was held constant throughout the modelling period. However, gas prices in the east-coast gas markets are expected to increase due to constrained supply and increased demand. Therefore, the National Generators Forum argued that further analysis should be undertaken to assess the likely benefits of the Heywood Interconnector Upgrade in the event that the price differential between Victoria and South Australia narrows.<sup>68</sup>

### *ElectraNet and AEMO response*

ElectraNet and AEMO's response stated that the gas prices modelled were derived using the latest information from ACIL Tasman consultants. These figures had undergone industry consultation and were available at the time of the Heywood Interconnector RIT-T. They also noted that the project assessment conclusions report explained the gas price assumptions, which included a section addressing the treatment of uncertainty and on the cost of gas generation exported into South Australia.<sup>69</sup>

ElectraNet and AEMO noted that the National Generators Forum did not query the assumption about the gas price differential in its submissions to the project specification consultation report and the project assessment draft report.<sup>70</sup>

### 3.3.2 Oakley Greenwood view

Oakley Greenwood concluded that in the circumstances of changing market conditions, the 'reasonable scenarios' modelled were appropriate. Oakley Greenwood found it is plausible that the gas price differential between Victoria and South Australia may decrease. Further, the assumption in the 'reasonable scenarios' that the Large-scale Renewable Energy Target<sup>71</sup> would be achieved may lead to an over-estimation in the level of renewable investment. However, neither was likely to affect either the ranking of the credible options or result in the credible options having a negative net economic benefit.<sup>72</sup>

Oakley Greenwood noted that since the start of the RIT-T process, there had been significant changes in actual market conditions—such as a reduction in demand and changes to the likely level of the carbon price. As a result, the scenarios in the earlier stages no longer covered the full range of 'plausible futures', and ElectraNet and AEMO added a fourth scenario in the project assessment conclusions report with lower demand, lower carbon price and changes to assumptions in relation to the retirement of generation assets. There was little that could be done about changes in market conditions during the course of the RIT-T. In light of the circumstances of the changing environment,

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<sup>68</sup> National Generators Forum, 22 February 2013, Letter to the AER - Heywood Interconnector Upgrade RIT-T determination, p. 2.

<sup>69</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 4.

<sup>70</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 4.

<sup>71</sup> The Large-scale Renewable Energy Target is a scheme which creates a financial incentive for the establishment and growth of large-scale renewable generation sources such as wind, hydro or solar. Large-scale Renewable Energy Target liable entities must ensure that a certain proportion of electricity generation come from certified large-scale renewable energy sources. This is achieved via the purchase of large-scale generation certificates, which are created when a large-scale renewable generators produces electricity. Large-scale Renewable Energy Target liable entities must purchase a set number of large-scale generation certificates each year. A failure to do so will result in a financial penalty being imposed on the Large-scale Renewable Energy Target liable entity. Further information on the Large-scale Renewable Energy Target can be found at: <http://ret.cleanenergyregulator.gov.au/About-the-Schemes/Large-scale-Renewable-Energy-Target--LRET-/about-lret>.

See example 10 on p. 24 of the RIT-T application guidelines on how the Large-scale Renewable Energy Target may impact the assessment of market benefits.

<sup>72</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, p. 22, 24.

Oakley Greenwood found the changes and substance of the scenarios in the Heywood Interconnector RIT-T were reasonable.<sup>73</sup>

Oakley Greenwood observed that a number of stakeholder submissions to the project assessment conclusions report called for the Heywood Interconnector RIT-T process to be paused pending clarification of government policy on the carbon price. It is noted that long term investment planning in many industries is commonly undertaken in the face of uncertainty. A pause in planning would only be warranted where uncertainty is expected to diminish in the short- to medium-term. However, recent history suggests that this is unlikely.<sup>74</sup>

Oakley Greenwood's report also considered whether plausible changes to some of the parameters of the reasonable scenarios considered would likely change the ranking of the credible options, and/or reduce the gross market benefits to the extent that costs of the credible option outweigh the gross market benefits. The key findings of Oakley Greenwood were:<sup>75</sup>

- the differential between gas prices in South Australia and Victoria is a key driver of imports into South Australia, and is likely a determinant of the level of dispatch benefits. It will also influence generation investment schedules. The gas price differential is likely to remain due to higher transportation costs and higher fugitive emissions in South Australia. However, it is plausible that the differential may decrease. Any change in the differential would be common to all credible options and is unlikely to alter the ranking between them. For the costs to outweigh the gross market benefits, there would have to be a significant increase in the carbon price to levels above those considered in the reasonable scenarios.
- the assumption that the Large-scale Renewable Energy Target will be met in full may lead to an over-estimation of the level of investment in renewable generation, especially in the revised central scenario which has the lowest carbon price. However, it is reasonable to expect that while there are factors which would reduce the profitability of Large-scale Renewable Energy Target investment, there are other factors which may counteract this, and on balance any shortfall would be common to all options and be unlikely to affect the ranking.
- the use of minimum generation levels for coal plant by ElectraNet and AEMO in the modelling to stimulate the effect of expected voluntary cycling of some units at low demand is reasonable.
- the assumptions about the retirement of Hazelwood power station and the conversion of Playford Power Station to open cycle gas turbine technology was not material to the outcomes of the Heywood Interconnector RIT-T.

### 3.3.3 AER view

We consider that the number, choice and weighting of the reasonable scenarios modelled by ElectraNet and AEMO satisfies the requirements of the RIT-T.

The number of reasonable scenarios was appropriate to the credible options considered by ElectraNet and AEMO. The variables and parameters of the four reasonable scenarios modelled reflect an appropriate range of future demand characteristics and conditions, which were updated by ElectraNet and AEMO to account for the changes to market conditions during the course of the RIT-T.

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<sup>73</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, p. 8,

<sup>74</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, p. 9.

<sup>75</sup> Oakley Greenwood, August 2013, External Review of the Heywood RIT-T, pp. 22–25.

In relation to the National Generator Forum concerns that a 'zero carbon price' scenario had not been considered, we are of the view that this scenario was not necessary for this RIT-T assessment. The Heywood Interconnector RIT-T modelled a range of potential future carbon price outcomes, including a low carbon price. There is no indication that a lower carbon price would result in a significant change in the ranking of the preferred options.

A 'zero carbon price scenario' is not warranted because it would not change the sign of the net economic benefits of any of the credible options, nor affect the ranking of the credible options. In the revised central scenario, which modelled a low carbon price, substantial market benefits still accrued for each credible option. Further, as outlined by ElectraNet and AEMO, the outcomes of the Heywood Interconnector RIT-T did not show a positive correlation between the carbon price and the market benefits modelled.

The choice of variables and parameters in the 'reasonable scenarios' selected sufficiently reflected those which were likely to affect the ranking of the credible option or the sign of the net economic benefit of any of the credible options. This is supported by the findings in Oakley Greenwood's report. There are plausible variations to some of the variables and parameters in the reasonable scenarios, such as the assumption of a constant differential between gas prices in Victoria and South Australia and that the Large-scale Renewable Energy Target targets would be met. However, as outlined by Oakley Greenwood they are not likely to be material enough to affect the ranking of the credible options.

We note that the National Generators Forum raised concerns that the outcomes of the Heywood Interconnector RIT-T may be driven by out-dated demand forecasts modelled in the reasonable scenarios. As outlined in ElectraNet and AEMO's response, to account for the change in market conditions since the commencement of the RIT-T, the revised central scenario incorporated a lower demand forecast based on the most recent 2012 National Electricity Forecasting Report forecast, which did not assume a recovery of demand. We consider that this was sufficient to ensure that the reasonable scenarios considered encompassed a range of electricity demand forecasts appropriate to the assessment of the credible options under consideration—consistent with the requirements of the RIT-T.

We note the comments by Oakley Greenwood that long term investment planning is often done in the face of uncertainty and that it is unlikely the uncertainty in market conditions will diminish. The RIT-T application guidelines envisage that there may be material uncertainty over the future supply and demand conditions and characteristics. To account for this, the RIT-T application guidelines state the range of reasonable scenarios should reflect the range of potential outcomes. Associated with each reasonable scenario is a probability corresponding to the likelihood of that scenario occurring at the time the RIT-T is undertaken.<sup>76</sup>

The reasonableness of any assumptions in the RIT-T must be assessed by reference to the information available to ElectraNet and AEMO at the time of the RIT-T assessment. Circumstances may change over time during and after the RIT-T assessment, which the business may respond to. For example, since completion of the RIT-T, ElectraNet decided to include the South East control scheme as part of the Heywood Interconnector Upgrade (see box 3.1 below).

The AER considers the weighting assigned to the reasonable scenarios reflect the probability of each relevant scenario occurring. We consider that methodology detailed in the project assessment

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<sup>76</sup> RIT-T application guidelines, pp. 32–33.

conclusions report by ElectraNet and AEMO on how the weightings were derived for the reasonable scenario is sufficient to ensure that the weightings assigned reflect the probability of each relevant reasonable scenario occurring. This is consistent with stakeholder comments, including those provided by Frontier Economics on behalf of Macquarie Generation, which noted that the highest weighted reasonable scenario, the revised central scenario was the most realistic scenario considered in the project assessment conclusions report.<sup>77</sup>

**Box 3.1: ElectraNet proposal to include the South East control scheme in the scope of the Heywood Interconnector Upgrade**

In their response to the AER information request, ElectraNet and AEMO stated that further analysis since the project assessment conclusions report indicates that there has been an increase in the benefits associated with the South East control scheme proposed by Infigen Energy<sup>78</sup>. This is due to the reduction of load associated with the installation of embedded generation in South East South Australia. The reduction in load will increase load flows over the South East transformers, increasing congestion on the transformer. This makes the implementation of a control scheme to manage constraints arising due to the South East transformers economically viable. ElectraNet and AEMO consider this is consistent with the findings in the project assessment conclusions report, which found a south east control scheme would only be viable under conditions where demand in the southeast fell.

On this basis, ElectraNet proposed to include the south east control scheme in the scope of the Heywood Interconnector Upgrade project.

**AER view**

We consider that ElectraNet's proposal to include the South East control scheme does not alter the preferred option identified in the Heywood Interconnector RIT-T. Therefore, it does not affect our determination of whether the preferred option satisfies the RIT-T.

The Heywood Interconnector RIT-T did not include the South East control scheme in the preferred option. The analysis undertaken at the time of the project assessment conclusions report showed that the South East control scheme would have negative market benefits and reduce the net economic benefits of the preferred option. ElectraNet stated it would continue to monitor the situation and undertake further analysis going forward as warranted. As the cost of the control scheme falls below the RIT-T cost thresholds, ElectraNet considered that an investment decision could be made later independent of the outcome of the Heywood Interconnector RIT-T analysis and not be subject to further RIT-T processes.

We agree with the position taken by ElectraNet in the Heywood Interconnector RIT-T project assessment conclusions report. Any investment decision in relation to the South East control scheme made subsequent to the project assessment conclusions report is independent of the outcomes Heywood Interconnector RIT-T. As such, the south east control scheme does not form part of the preferred option.

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<sup>77</sup> Frontier Economics, June 2013, Market benefits of Heywood upgrade - a report prepared for Macquarie Generation, p. 1.

<sup>78</sup> Infigen Energy is a developer, owner and operator of renewable generation. In a submission to the Heywood Interconnector RIT-T project assessment conclusions report, Infigen Energy proposed a control scheme should be considered as either a stand-alone credible option or in combination with option 1b.

### 3.4 Quantification of costs

The RIT-T requires the proponent to quantify the costs of each credible option considered.<sup>79</sup> Costs are defined as the present value of the direct costs of the credible option and include classes such as the costs incurred in constructing or providing the credible option.<sup>80</sup>

An important distinction between the Heywood Interconnector RIT-T and a contingent project application (as discussed in section 1.5) is that the quantification of costs in the RIT-T does not need to conform to any of the capital and operating expenditure criteria and factors in the Electricity Rules.

The network capital cost component of the credible options in the Heywood Interconnector RIT-T was developed by ElectraNet and SP AusNet. ElectraNet's cost estimates were based on historical data from actual projects and their substation and line design manuals. These cost estimates were subject to review by external engineering consultants. SP AusNet's cost estimates have been based on in-house estimation. Operating costs for the network options were assumed to be 2 per cent of the capital costs.<sup>81</sup>

The capital costs of the control schemes considered in the option 6a and 6b were based on estimates provided by the consulting firm David Strong & Associates (DSA) and adjusted based on an indicative estimate received from SP AusNet. Operating costs were also based on adjusted total cost estimates provided by DSA.<sup>82</sup>

Table 3.3 below outlines the total capital cost of each credible option.

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<sup>79</sup> RIT-T, paragraph 2.

<sup>80</sup> RIT-T, paragraph 2(a).

<sup>81</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 87.

<sup>82</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 87.



**Table 3.3 Total capital costs of each credible option considered**

	Total capital cost (\$2011-2012, million)
Option 1a	78.0
Option 1b	107.7
Option 2a	95.4
Option 2b	125.1
Option 3	888.8
Option 4	40.6
Option 5	233.2
Option 6a	21.6
Option 6b	84.3

Source: Heywood Interconnector RIT-T project assessment conclusions report, table 6-1

### 3.4.1 Stakeholder comments

Stakeholder comments to the AER in relation to the quantification of costs raised two specific concerns. EnerNOC queried whether it was appropriate to treat demand response payments entirely as a cost. The National Generators Forum was concerned that the costs of modelled additional network developments required to increased flows on the Heywood interconnector were not included as costs.

#### Treatment of demand response payments

EnerNOC considered there was a mistake in the calculation of the net economic benefit of option 5—the treatment of demand response payments made by ElectraNet to EnerNOC as part of the demand management program as a cost was incorrect. EnerNOC considered that because a proportion of the demand response payments would be passed onto consumers, this constituted a transfer of wealth from producers to consumers and should not be treated as a cost.<sup>83</sup> EnerNOC estimated that 50 per cent of the demand response payments made by ElectraNet would be passed onto consumers. If this proportion of the demand response payments was treated as a transfer of wealth and not a cost, then the present value of option 5 would increase from \$47 million to \$203.9 million, making option 5 the credible option with the highest net economic benefits.<sup>84</sup>

#### ElectraNet and AEMO response

ElectraNet and AEMO's response considered that the current RIT-T provisions do not permit the approach taken to the treatment of demand response payments raised by EnerNOC. They noted that

<sup>83</sup> EnerNOC, 26 February 2013, Letter to AER - Dispute notice regarding SA-VIC Interconnection Upgrade RIT-T, p. 1.

<sup>84</sup> EnerNOC, 26 February 2013, Letter to AER - Dispute notice regarding SA-VIC Interconnection Upgrade RIT-T, p. 2.

costs in the RIT-T are defined as the present value of the direct costs of a credible option and that it included the costs of constructing or providing the option. Further, it noted that the AER had provided specific guidance that it is appropriate to adopt the quoted contract price in determining the costs of non-network options. Therefore, the treatment of non-network options in the Heywood Interconnector RIT-T was consistent with the RIT-T provisions and AER guidance on the RIT-T.<sup>85</sup>

Additionally, ElectraNet and AEMO stated that it would be incorrect to assume all money paid by EnerNOC to participating consumers is a wealth transfer. In a competitive market for demand management services, the amount paid by demand management providers should reflect their direct costs, including the costs passed onto participating consumers and a reasonable rate of return.<sup>86</sup> ElectraNet and AEMO also noted that EnerNOC's submission to the project specification consultation report suggested that payments to customers participating in the demand management program should be considered a market benefit. They considered that demand response payments would not constitute a relevant additional category of market benefit.<sup>87</sup>

### **Inclusion of costs of modelled network developments**

To quantify the market benefits of a credible option, the RIT-T requires a RIT-T proponent to model future additional network development. The National Generators Forum submitted that the capital cost of additional network developments modelled in the RIT-T should be included as a cost of the credible option to the extent they were necessary to increase transfers on the Heywood interconnector.<sup>88</sup> It highlighted the following three additional network developments modelled in the Heywood Interconnector RIT-T should have been included as additional costs:<sup>89</sup>

- the new upgrade of the Ballarat-Moorabool 220kV line in 2016-17
- the existing upgrading of the Ballarat-Bendigo 220kV line in 2016-17
- the new 275kV supply to the Riverland area in South Australian in 2025-26.

Further, the National Generators Forum noted a large share of the market benefits is associated with 460 MW of gas plant relocating from South Australia to Victoria. It considered that for the benefits of lower dispatch in Victoria to be realised, this relied not only on the Heywood Interconnector Upgrade but also on related transmission work to increase flows on Murraylink. In the current market with declining demand it is difficult to forecast the need for additional generation in Victoria or determine what fuel source new generators may utilise. Accordingly, the National Generators Forum stated that it would welcome further cost-benefit analysis that includes the costs of upgrading all relevant transmission infrastructure that affects flows across the Heywood Interconnector.<sup>90</sup>

### **ElectraNet and AEMO response**

ElectraNet and AEMO stated that the network developments modelled were included in both the base case and the preferred option. This means that the market benefits that may arise from the network developments modelled would be captured in both the base case and the preferred option.

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<sup>85</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 3.

<sup>86</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 3.

<sup>87</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 3-4.

<sup>88</sup> National Generators Forum, 22 February 2013, Letter to the AER - Heywood Interconnector Upgrade RIT-T determination, p. 3.

<sup>89</sup> National Generators Forum, 22 February 2013, Letter to the AER - Heywood Interconnector Upgrade RIT-T determination, p. 3.

<sup>90</sup> National Generators Forum, 22 February 2013, Letter to the AER - Heywood Interconnector Upgrade RIT-T determination, p. 3.

Therefore, any benefits from the three modelled network projects would be effectively excluded from the net economic benefits of the preferred option.<sup>91</sup>

Further, ElectraNet and AEMO noted that the triggers for the three additional modelled network projects identified by the National Generators Forum are distinct from the need to upgrade the Heywood interconnector. Therefore, the likely relocation of gas or other generation plants identified in the project assessment draft and conclusions reports are a result of the augmentation of the Heywood Interconnector alone.<sup>92</sup>

### 3.4.2 Oakley Greenwood view

Oakley Greenwood concluded that the majority of the costs of the credible option in the Heywood Interconnector RIT-T were reasonable. The costs had been subject to extensive stakeholder consultation, including the feasibility studies conducted by ElectraNet and AEMO and the formal RIT-T consultation process. Oakley Greenwood noted that the estimate of control scheme costs were subject to considerable debate between stakeholders and the RIT-T proponents.

Oakley Greenwood observed that the capital costs for network equipment such as transmission lines, transformers<sup>93</sup> and reactive plant<sup>94</sup> were itemised in the project assessment draft report and carried forward into the project assessment conclusions report and no stakeholder submissions criticised the values.<sup>95</sup> However, it noted that stakeholder submissions to the project assessment conclusions report had called for an independent review of costs. Oakley Greenwood stated with some exceptions the costs used in the project assessment conclusions report aligned with the values used in the joint feasibility study undertaken prior to the formal commencement of the Heywood Interconnector RIT-T, which was subject to consultation and informed by external advice in relation to costs.<sup>96</sup>

Oakley Greenwood considered it was notable that in the Heywood Interconnector RIT-T a markedly higher cost was estimated for 132 kV works in South Australia than was allowed in the feasibility study. In the context of stakeholder comments about the independence of network cost estimates, it considered there was a potential discipline on ElectraNet to provide accurate costings. Although a lower costing may produce a more favourable outcome in a RIT-T assessment, this may, subject to an AER determination, mean a lower revenue base in the future.<sup>97</sup>

Oakley Greenwood noted that the costs for the demand management program in option 5 adopted the cost framework proposed by EnerNOC and were not challenged by other stakeholders during the RIT-T consultation process. On this basis, it is reasonable to conclude the requirements of the RIT-T have been met.<sup>98</sup>

Oakey Greenwood observed that the source of costs for the control scheme was subject to considerable stakeholder comments. Oakey Greenwood assessed the treatment of control scheme costs by ElectraNet and AEMO, and concluded that as the control scheme costs were relatively small compared to overall costs and benefits assessed. Therefore, it was unlikely to affect the ranking of the

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<sup>91</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 5.

<sup>92</sup> ElectraNet & AEMO, 5 April 2013, Letter to AER - Heywood Interconnector Upgrade RIT-T - attachment A, p. 5.

<sup>93</sup> Transformers are a plant or device that reduces or increases the voltage of alternating current. For further information see chapter 10 of the National Electricity Rules.

<sup>94</sup> Reactive plant is plant which is normally specifically provided to be capable of providing or absorbing reactive power. For further information see chapter 10 of the National Electricity Rules.

<sup>95</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 36.

<sup>96</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 36.

<sup>97</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 36.

<sup>98</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 35.

credible options. On this basis, the estimate used to quantify control scheme costs was fit for purpose.<sup>99</sup>

In relation to the assumption of operating costs being 2 per cent of capital costs, Oakley Greenwood stated that no justification was provided by ElectraNet and AEMO. Noting that option 3 is the only credible option that was to be developed at a new site, Oakley Greenwood observed the operational costs quantified for all other credible options should be for the change in operating costs at the existing sites where the credible options are implemented. This change in cost would be complex to assess. Oakley Greenwood considered that there was a risk in making operating cost assumptions based on a percentage of asset cost given the wide range of factors which may influence operating cost. However, it noted a recent United Kingdom Electricity Transmission Costing Study provided a mechanism to illustrate the relative size and influence of relevant factors on a range of transmission technologies. On balance, Oakley Greenwood concluded that the assumption of 2 per cent was reasonable and met the requirements of the RIT-T.<sup>100</sup>

Oakley Greenwood concluded that the quantified costs of the preferred option captured the network developments needed to increase interconnector transfer capability on the Heywood interconnector (and the incremental market benefits which accrue as a result of this). It agreed with the comments made by ElectraNet and AEMO that the relevant consideration in the RIT-T is whether net market benefits are increased by alleviating the first, existing binding constraint and not whether specific areas in the NEM will become congested beyond that first more limiting constraint. While it is important that constraints which limit the potential benefits of augmentation be accounted for, there is a judgement about the boundary of a project and what should require a separate RIT-T. In this instance, Oakley Greenwood considered a manageable package of works and material market benefits for the credible options has been identified.<sup>101</sup>

### 3.4.3 AER view

We consider that the costs of the credible options have been appropriately quantified by ElectraNet and AEMO.

We consider that the methodology outlined by ElectraNet and SP AusNet to estimate the capital costs is reasonable. As both ElectraNet and SP AusNet own and operate the principal transmission network of their NEM jurisdiction, it is appropriate for them to rely on their internal expertise to estimate the likely capital costs of network augmentation. Further the capital cost estimates of ElectraNet have been subjected to external review and no capital cost estimates were directly challenged by stakeholders during the Heywood Interconnector RIT-T consultation process. The use of the cost estimates<sup>102</sup> and scope proposed by EnerNOC for the demand management program in Option 5 was appropriate.

We note that the estimate of the control scheme costs have been subject to criticism from stakeholders. However, as stated by Oakley Greenwood, they are appropriate for the purposes of a RIT-T assessment and would be unlikely to affect the ranking of the credible options.

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<sup>99</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 36.

<sup>100</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, pp. 36–37.

<sup>101</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 31.

<sup>102</sup> This refers to the indicative cost of \$120 000 MW/annum availability fee and \$750/MWh dispatch fee proposed by EnerNOC for the demand management program and not EnerNOC's view on how those costs should be treated in a RIT-T assessment.

On the basis of Oakley Greenwood's assessment, we consider the use of a 2 per cent assumption to estimate the operating costs of the credible option by ElectraNet and AEMO is reasonable and consistent with the requirements of the RIT-T.

### **Inclusion of costs of modelled network developments**

In relation to the concerns raised by the National Generators Forum about the need to include the cost of modelled network developments, our view is consistent with the response provided by ElectraNet and AEMO. If the reason for the modelled network development is not related to the identified need addressed by the Heywood Interconnector RIT-T, then it should not be included as part of the cost of the credible option. Further, as the modelled network developments are included in both the credible options considered and base case, it would not affect the assessment of market benefits. Therefore, it would not affect the ranking of the credible options.

Network augmentation on the main transmission flow paths in the NEM has the potential to affect network flows. As identified by Oakley Greenwood, a judgement has to be made on the boundary of a project considered by the RIT-T. We consider the cost of the additional modelled network development did not need to be included as costs for the credible options considered. The purpose of the modelled network developments is to address needs on the transmission network beyond that related to congestion on the Heywood interconnector. Further, we agree with Oakley Greenwood's view that the RIT-T project boundary was appropriately scoped.

### **Treatment of demand response payments**

We do not consider that the proportion of demand response payments made to customers by EnerNOC should be considered as a transfer of surplus from producers to consumers. EnerNOC also raised this issue in its submission to the AER on the regulatory investment test for distribution (RIT-D). As we explained in the explanatory statement accompanying the draft RIT-D and draft RIT-D application guidelines, a demand response payment 'is, at least partly, compensating consumers for the cost of not consuming electricity. To this extent, benefits that energy consumers receive from dispatch payments would be offset by the negative market benefit of not consuming electricity.'<sup>103</sup>

As correctly identified by ElectraNet and AEMO, the RIT-T requires that the RIT-T proponent quantify the direct costs associated with each credible option, including the costs of constructing or providing the option. The demand response payment is a cost incurred by ElectraNet for the purpose of providing the demand management component of option 5.

Alternatively, as outlined in A.3 of the RIT-T application guidelines, where a demand management option leads to an increase in the amount of voluntary load curtailment, this would result in a negative contribution to the market benefits of the credible option. The negative market benefit would be equivalent to the quantity (in MWh) of voluntary load curtailment undertaken due to the credible option multiplied by consumers' willingness to pay (in \$/MWh) for the electricity that is voluntarily curtailed due to the credible option. Here, the consumers' willingness to pay would be equivalent to the payment they received from the demand aggregator.

On this basis, a RIT-T proponent should include demand response payments as either a cost of providing the demand management component of a credible option, or a negative market benefit associated with increase voluntary load curtailment. A RIT-T proponent cannot include demand

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<sup>103</sup> AER, Draft RIT-D and draft RIT-D application guidelines - Explanatory Statement, p. 12.

response payments as both a cost and a negative market benefit as the RIT-T excludes benefits which have been included in the costs of a credible option.<sup>104</sup>

### 3.5 Quantification of market benefits

The RIT-T proponent is required to quantify, for each credible option, all classes of market benefit that are material. A market benefit is material if it is likely to affect the outcome of the assessment of the credible options under the RIT-T.<sup>105</sup> A market benefit may not be quantified if estimated cost of the undertaking the analysis to quantify the market benefit is likely to be disproportionate to the scale, size and potential benefits of each credible option assessed.<sup>106</sup>

The market benefit of each credible option is quantified by firstly comparing, for each reasonable scenario, the state of the world with the credible option in place to the state of the world in the base case where no option is implemented and then weighting the benefits derived by the probability of each relevant scenario occurring.

The state of the world is a mutually consistent description of all the relevant market supply and demand characteristics and conditions likely to prevail if a credible option proceeds or in the base case, where the credible option does not proceed.<sup>107</sup>

ElectraNet and AEMO identified the classes of market benefit as material in the Heywood Interconnector RIT-T, including changes in:<sup>108</sup>

- generator fuel consumption (including changes in carbon costs)
- voluntary load curtailment
- involuntary load shedding
- costs for other parties
- network losses.

ElectraNet and AEMO's quantification of market benefits found the two key categories of market benefit material to the RIT-T assessment to be changes in generator fuel consumption and changes in costs for other parties.<sup>109</sup> Table 3.4 below summaries the gross market benefit for each credible option in the Heywood Interconnector RIT-T.

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<sup>104</sup> RIT-T, paragraph 6.

<sup>105</sup> RIT-T, paragraph 8(a).

<sup>106</sup> RIT-T, paragraph 8(b).

<sup>107</sup> RIT-T, paragraph 17.

<sup>108</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 89.

<sup>109</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 93.

**Table 3.4 Gross market benefits for credible options assessed**

	Central scenario	Low scenario	High scenario	Revised scenario	central market benefit (weighted)
Scenario weights	29%	13%	17%	41%	
Option 1a	144.6	308.8	264.5	232.0	222.2
Option 1b	199.1	340.8	306.2	284.0	270.5
Option 2a	151.6	308.7	272.7	236.8	227.5
Option 2b	199.2	340.5	304.9	284.2	270.4
Option 3	290.8	444.7	350.0	247.2	303.0
Option 4	85.9	176.6	173.4	190.8	155.6
Option 5	261.5	411.7	372.6	271.6	304.1
Option 6a	19.9	48.8	8.5	12.1	18.5
Option 6b	176.0	342.9	295.4	261.6	253.1

Source: Heywood Interconnector RIT-T project assessment conclusions report, table 6-2

### 3.5.1 Stakeholder comments

Macquarie Generation raised concerns about the effect of the intra-regional constraints modelled and the gas prices assumed for the 2030–39 period in the Heywood Interconnector RIT-T on the quantification of market benefits. Macquarie Generation engaged Frontier Economics, to independently model and review the market benefits modelled for 'option 1b'—the preferred option identified in the Heywood Interconnector RIT-T—under the revised central scenario.

#### Modelling of intra-regional constraints

Frontier Economics stated it had assessed the market benefits of the preferred option under the revised central scenario to be \$24.23 million (\$2011-12) compared to ElectraNet and AEMO's finding of \$284 million (\$2011-12) in the Heywood Interconnector RIT-T.<sup>110</sup> Frontier Economics identified the key reason for this differential was the difference in the treatment of intra-regional flows.<sup>111</sup> While the Heywood Interconnector RIT-T included the impact of intra-regional constraints on Heywood interconnector flows, Frontier Economics assessment only modelled interconnection. This meant Frontier Economics assumed the Heywood interconnector was available bi-directionally at all times up

<sup>110</sup> Frontier Economics, May 2013, Market benefits of the Heywood Upgrade - a report prepared for Macquarie Generation, p. 17.

<sup>111</sup> Frontier Economics, May 2013, Market benefits of the Heywood Upgrade - a report prepared for Macquarie Generation, pp. 21–25.

to its full transfer limit (meaning flows across the Heywood interconnector would not be limited by intra-regional constraints).<sup>112</sup>

To estimate the extent to which the modelled benefits of the preferred option may be influenced by the treatment of intra-regional constraints in the Heywood Interconnector RIT-T, Frontier Economics compared the results of the preferred option against those of option 4. Option 4 was considered a good comparison as it seeks to 'firm up' the existing 460MW notional interconnector transfer capacity. However, Frontier Economics concluded that the gross market benefits of option 4 did not account for the difference in values between the gross market benefits it had calculated for option 1b and those calculated by ElectraNet and AEMO.<sup>113</sup>

Frontier Economics requested ElectraNet and AEMO to outline how sensitive the gross market benefits for the base case and option 1b modelled in the Heywood Interconnector RIT-T were to the assumed configuration of intra-regional constraints.<sup>114</sup> Further, it sought for the release of public half-hourly inter-regional flow data, and import and export limits between Victoria and South Australia across both the Heywood and Murraylink interconnector. This would assist stakeholders understand and interpret the impact of assumed intra-regional constraints on the quantification of market benefits.<sup>115</sup> It noted for example, that without access to the flow data, and import and export limits, it would not be possible to assess the reasonableness of the peak congestion hours modelled on the Heywood Interconnector in the base case in 2016-17—which is much larger compared to the data from the previous seven financial years.<sup>116</sup>

Based on Frontier Economics' review, Macquarie Generation considered that important issues were raised about the extent congested parts of the network addressed by network solutions were factored into the costs of option 1b, and the extent existing intra-regional constraints would be built out if option 1b did not proceed. If a key driver of option 1b was the relief of intra-regional constraints, then this effect should have been separately quantified—with published data on the incidence of intra-regional congestion at key times and detailed commentary in the project assessment conclusions report.<sup>117</sup>

Macquarie Generation also identified a number of intra-regional constraints that it considered would be relevant in an assessment of the costs and benefits of upgrading the Heywood interconnector. However, Macquarie Generation considered insufficient information was provided by ElectraNet and AEMO on how these intra-regional constraints were treated in the RIT-T, or whether the costs of network augmentation to relieve those intra-regional constraints were included in the costs of the credible options.<sup>118</sup>

### ***ElectraNet and AEMO response***

ElectraNet and AEMO agreed that the primary source of the discrepancy between the results of the Heywood Interconnector RIT-T and Frontier Economics modelling report was the treatment of intra-regional constraints.

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<sup>112</sup> Frontier Economics, May 2013, Market benefits of the Heywood Upgrade - a report prepared for Macquarie Generation, p. 21.

<sup>113</sup> Frontier Economics, May 2013, Market benefits of the Heywood Upgrade - a report prepared for Macquarie Generation, pp. 25–26.

<sup>114</sup> Frontier Economics, May 2013, Market benefits of the Heywood Upgrade - a report prepared for Macquarie Generation, p. 28.

<sup>115</sup> Frontier Economics, May 2013, Market benefits of the Heywood Upgrade - a report prepared for Macquarie Generation, p. 28; Frontier Economics, July 2013, Frontier's response to AEMO/ElectraNet information release, p. 4.

<sup>116</sup> Frontier Economics, July 2013, Frontier's response to AEMO/ElectraNet information release, pp. 3–4.

<sup>117</sup> Macquarie Generation, 31 May 2013, Letter to the AER - Heywood Interconnector Upgrade: Regulatory Investment Test - Transmission (RIT-T), p. 3.

<sup>118</sup> Macquarie Generation, 8 July 2013, letter to AER - Heywood Interconnector Upgrade - AER determination, p. 2.



ElectraNet and AEMO considered that the assumption by Frontier Economics that the interconnector was available bi-directionally at all times up to its full notional transfer limit does not enable the full market benefits of the preferred option to be evaluated accurately. The Heywood interconnector RIT-T specifically addresses the restrictions on Heywood Interconnector flows associated with voltage stability limitations and thermal limits on the South Australian 132kV network.<sup>119</sup> ElectraNet and AEMO provided power flow diagrams that show how the implementation of the preferred option would remove intra-regional thermal constraints and voltage stability constraints to provide firm 650 MW transfer capability on the Heywood interconnector under a range of operating conditions. The power flow diagrams also showed how the preferred option would provide generators in the South East with improved access to key transmission network flow paths.<sup>120</sup>

ElectraNet and AEMO observed that the benefits of only adding a third transformer could be inferred through comparing option 1a, 1b and option 4. First, in comparing the difference between option 1a and option 4, ElectraNet and AEMO noted that the two options only differ in the installation of a third transformer at the Heywood Interconnector and had a difference in benefits of \$39.4 million. The use of capacitor banks in option 1a and option 4 would alleviate the voltage stability constraints to provide a limit greater than 460 MW under a wide range of operating conditions, but would not be sufficient to provide a firm 650 MW limit on the Heywood Interconnector. This makes the third transformer a marginal investment in option 1a. However, option 1b, which utilises series compensation rather than capacitor banks, allows for a firm 650 MW limit on the Heywood Interconnector under a range of conditions. This makes the third transformer accrue significantly more gross market benefits in option 1b than in option 1a.<sup>121</sup>

Further, ElectraNet and AEMO noted that the absence of intra-regional congestion in Frontier Economics modelling would influence investment patterns, which would give rise to significant differences in operating benefits that may emerge.<sup>122</sup>

ElectraNet and AEMO outlined the constraint formulation process utilised in the Heywood Interconnector RIT-T. In the workshop with the AER, AEMO and ElectraNet stated that this constraint formulation process was developed on the same basis as those used in the actual operation of the NEM and subject to considerable internal quality assurance checking.<sup>123</sup> AEMO also provided to the AER an internal memorandum outlining the quality assurance processes followed by the AEMO modelling team on the project assessment draft report.<sup>124</sup>

ElectraNet and AEMO considered that sufficient information had been provided to understand the benefits as reported in the Heywood Interconnector RIT-T project assessment conclusions report. The sensitivity of the results to intra-regional constraints—not addressed by the implementation of the credible options assessed—is not relevant and this analysis has not been undertaken by AEMO and ElectraNet.<sup>125</sup> In response to Frontier Economics' observations about the increase in congestion in the base case compared to previous financial years, ElectraNet and AEMO noted that the historical

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<sup>119</sup> ElectraNet & AEMO, 21 June 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, p. 2.

<sup>120</sup> ElectraNet & AEMO, 21 June 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, pp. 5–13.

<sup>121</sup> ElectraNet & AEMO, 21 June 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, pp. 2–3.

<sup>122</sup> ElectraNet & AEMO, 21 June 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, p. 3.

<sup>123</sup> AER, Meeting minutes - AER workshop with AEMO and ElectraNet - Heywood Interconnector RIT-T, p.2.

<sup>124</sup> ElectraNet & AEMO, 24 July 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, pp. 2–4.

<sup>125</sup> ElectraNet & AEMO, 21 June 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, p. 3.

congestion data provided by Frontier Economics showed continued growth in congestion hours. If this rate of growth continues, by 2016-17 the congestion hours should exceed the 1, 300 hours modelled in the base case.<sup>126</sup> In the workshop with the AER, AEMO and ElectraNet indicated that this increase in congestion was associated with the entry of new generation in the South Australian 275 kV network.<sup>127</sup>

ElectraNet and AEMO provided an explanation of how the intra-regional constraints identified by Macquarie Generation have been treated in the Heywood Interconnector RIT-T.<sup>128</sup>

### Gas price assumptions

Frontier Economics' observed that the Heywood Interconnector RIT-T, market modelling outcomes for the preferred options showed operational cost savings continuing to increase past 2030-31. However, its own market modelling results for the preferred option showed that from 2030-31 onwards, operational cost savings stay broadly stable.<sup>129</sup>

Frontier Economics' concluded this was driven by a very aggressive fuel price trajectory resulting from AEMO's extrapolation of gas prices for the period post 2030 which was based on a 10 year average growth rate. Frontier Economics considered that these gas prices were unrealistic, as they were far above the range of forecast liquefied natural gas netback prices facing the eastern-Australia gas market, and forecast production costs of non-conventional coal seam methane gas in Queensland and South Australia. In the long run one or both of these factors should constrain gas prices at levels below what is implied by AEMO and ElectraNet's gas price extrapolation.<sup>130</sup>

### ElectraNet and AEMO response

ElectraNet and AEMO considered that the assumption of the gas price for the period post 2030 was unlikely to affect the selection of the preferred option. The majority of the market benefits associated with the preferred option accrued prior to the year 2030. Further the fuel price assumption was common to all credible options, therefore, any change to gas price assumption would affect the assessment of all the credible options considered.<sup>131</sup>

ElectraNet and AEMO also challenged that the forecast gas price was 'very aggressive', especially when compared to the scenarios published by AEMO in its 2013 planning assumptions.<sup>132</sup>

## 3.5.2 Oakley Greenwood view

Oakey Greenwood concluded that the approach undertaken by ElectraNet and AEMO to quantify market benefits broadly satisfy the requirements of the RIT-T. Oakley Greenwood identified issues with the assessment of market benefits associated with changes in network losses, changes in voluntary load curtailment and changes in load shedding, but this was not likely to be material to the outcomes of the Heywood Interconnector RIT-T. In the process of the qualitative review of the impact

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<sup>126</sup> ElectraNet & AEMO, 24 July 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, pp. 1–2.

<sup>127</sup> AER, Meeting minutes - AER workshop with AEMO and ElectraNet - Heywood Interconnector RIT-T, p.2.

<sup>128</sup> ElectraNet & AEMO, 24 July 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, pp. 6–7.

<sup>129</sup> Frontier Economics, May 2013, Market benefits of Heywood Upgrade - a report prepared for Macquarie Generation, p. 24.

<sup>130</sup> Fronter Economics, June 2013, Frontier's response to AEMO/ElectraNet information release, pp. 4–5.

<sup>131</sup> ElectraNet & AEMO, 24 July 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, pp. 4–5.

<sup>132</sup> ElectraNet & AEMO, 24 July 2013, Letter to the AER - Heywood Interconnector Upgrade - AER information request - attachment A, p. 5.

of the assumed generation investment schedules, Oakley Greenwood eliminated options 1a, 2a, 2b, 3, 4 and 6a as possible choices for the preferred option.

Oakley Greenwood also considered whether the market benefits not assessed by ElectraNet and AEMO may be material, and concluded that there may be substantial market benefits associated with the costs of high impact, low probability events (specifically, the outage of a transformer at Heywood) and firmness of interconnector capacity. However, this would not likely affect which credible option is identified as the preferred option.

In response to concerns raised by Macquarie Generation, Oakley Greenwood considered that the relevant and appropriate consideration of intra-regional constraints was incorporated in the Heywood Interconnector RIT-T and the post 2030 gas prices modelled were not likely to affect the outcome of the Heywood Interconnector RIT-T.

### **Quantification of material market benefits**

To assess the quantification of material market benefits by ElectraNet and AEMO. Oakley Greenwood undertook a review of the methodology, assumptions and input data used in the Heywood Interconnector RIT-T.

Oakley Greenwood's report observed that the classes of material market benefits were quantified by ElectraNet and AEMO using market modelling (on a least cost basis) of the entire NEM using established industry modelling software tools PLEXOS to determine investment schedules and Prophet to determine dispatch. Broadly, Oakley Greenwood considered this approach was consistent with the requirements of the RIT-T.<sup>133</sup>

Oakley Greenwood considered that ElectraNet and AEMO should not have used marginal loss factors in the quantification of network losses as they are used to signal the marginal effects for dispatch priority and spot pricing but do not calculate loss. Instead, actual or average loss factors should have been used. However, this would not affect the outcomes of the Heywood Interconnector RIT-T as the changes in average loss will generally be even smaller than marginal loss factors and remain an insignificant part of the assessment.<sup>134</sup>

Oakley Greenwood considered the modelling of voluntary and involuntary load reductions in the Heywood Interconnector RIT-T was not likely to result in an accurate estimate of the quantum of those classes of market benefits. While it was considered in the Prophet model, the use of least cost modelling meant that high prices would only occur at times of physical scarcity. Therefore, this would limit the possible situations in which voluntary reductions in load would occur to only at times of physical scarcity. However, as the market benefits of voluntary and involuntary load reductions are very small, this will not impact on the outcomes of the RIT-T.<sup>135</sup>

Oakley Greenwood identified that ElectraNet and AEMO assumed a common generation investment schedule in the assessment of the market benefits for options 1a, 1b, 2a, 2b, 4 and 6b. This meant the capital deferral market benefits of those options would be identical and differences in the gross market benefit would only arise due to differences in other market benefits. This assumption would also affect the comparison of operating costs between the credible options. Oakley Greenwood sought to assess the effect of this approach on the outcomes of the RIT-T by considering the potential for different options to show different market benefits to those published in the Heywood

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<sup>133</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, pp. 13–14,16.

<sup>134</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 14.

<sup>135</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, pp. 14–15.

Interconnector RIT-T project assessment conclusions report in the event an individual investment schedule had been developed. Oakley Greenwood found:<sup>136</sup>

- The preferred option differed from option 1a only in the form of voltage support provided. The preferred option delivers higher savings in operational costs based on the same investment schedule. This means the preferred option will always deliver higher benefits where the same investment schedule is used. If individual investment schedules were developed, option 1b would have greater opportunity for operational cost savings than option 1a as it has a higher nominal limit. Therefore, option 1a would not provide higher benefits than option 1b.
- Option 2a and option 2b are identical to options 1a and 1b with the addition of a third transformer at south east. Thus the same logic as above would apply and option 2b would have higher market benefits than option 2a.
- The results of the project assessment conclusions report show that the differences in operational cost savings between the two options 1b and 2b is trivial. This indicates that following the reconfiguration of the 132kV network in South Australia (common to both option 1b and option 2b), south east transformer capacity is not expected to constrain flows, meaning the additional third transformer would provide no additional market benefits. Therefore, option 1b and option 2b would likely have similar investment schedules, but option 2b would always have higher costs.
- While option 3 provides higher gross benefits, its cost is markedly higher. Therefore the net economic benefit of option 3 will be less than the majority of other options.
- Option 4 is the same as option 1a without a third transformer at Heywood. It is unclear why the same investment schedule was adopted given the operational cost savings market benefits associated with an installation of a third transformer at the Heywood interconnector. If a different investment schedule was adopted for option 4, the lower transfer capability at Heywood would likely result in less capital deferral market benefits and less opportunity to provide for operational cost savings relative to option 1a.
- Option 5 assumes the same generation investment as option 1b other than a 200 MW deferral in open cycle gas turbine investment. ElectraNet and AEMO have assumed that the scope and size of the demand management is the same in each reasonable scenario, treating it as a fixed component of the network augmentation option. Option 5 is ranked lower than option 1b and option 6b as a result of this choice.
- Option 6a was assumed to have the same investment schedule as the base case and, therefore, have no capital deferral market benefits. This is plausible as the option is only designed to enhance South Australian export capacity when wind generation levels are high and it is reasonable to assume that the market price will be low and have little impact on generation investment schedules.
- Based on the common investment schedule, the capacity deferral benefits of option 6b may be overstated. The use of control schemes at both Heywood and in the south east of South Australia in option 6b substitute for the installation of a third transformer to increase transfer capacity at Heywood. However they will only be used when output from wind generators is high and there will be no impact on the investment in generation plant in South Australia under high load import conditions or where investment elsewhere would reduce use of high cost fuel in South Australia. However, while the market benefits may be lower, control schemes generally have a lower cost.

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<sup>136</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, pp. 15–21.

Based on these observations, Oakley Greenwood concluded that the correct preferred option would either be option 1b, option 5 or option 6b and this would hold regardless of sensitivity or parameter.<sup>137</sup>

### Impact of market benefits not quantified

Oakley Greenwood's report reviewed whether the classes of market benefit not assessed by ElectraNet and AEMO could affect the choice of the preferred option:<sup>138</sup>

- Oakley Greenwood agreed in principle with AEMO and ElectraNet that the market benefits associated with changes in ancillary services are unlikely to be material.
- There is no obvious combination of parameters that a formal analysis of option value would provide more insight than the probability weighted scenarios and sensitivities in this case.
- Oakley Greenwood agreed with the conclusion that the impact of an outage of a Heywood transformer would be severe. However, as the outage of a transformer is a high impact, low probability event the effect on the quantification of market benefits would be low and immaterial in the assessment of the market benefits of the credible option. However, where a prolonged outage leads to more than minimal load shedding, Oakley Greenwood considered this should be priced considerably higher given the increased disruption and public policy and political implications. If this was quantified or considered, option 1b would be favoured over option 5 or 6b as the latter two would be limited or have no value during a prolonged outage of one of the Heywood transformers.
- Oakley Greenwood agreed with ElectraNet and AEMO on the difficulty of modelling competition benefits and that the cost of quantifying them would be disproportionate to the benefits. While it agreed with the comparisons made by ElectraNet and AEMO in the Heywood Interconnector RIT-T on the likely effect the consideration of competition benefits would have on the market benefits of each option, it would be inappropriate to rely heavily on competition benefits to distinguish between options.
- A closely related issue to competition benefits was the degree of firmness of interconnector capability and its effects on regional participation. Oakley Greenwood considered this would have an impact on the capital deferral market benefits in the RIT-T. A lack of firmness will limit the effectiveness of inter-regional settlement residues, reducing the commercial viability of inter-regional trading. This undermines the extent to which market based responses will match modelled outcomes. However, this improvement in firmness might only result in option 3 seeing a relative improvement in ranking, but it would not displace option 1b as the preferred option. For this to occur, option 1b would need a reduction in its capital deferral benefits of about 25 per cent, which seems unlikely.

### Modelling of intra-regional constraints

In response to Macquarie Generation and Frontier Economics requests for the release inter-regional flow data, and import and export limits, Oakley Greenwood noted that the detailed provision of hourly flow and limits by ElectraNet and AEMO would only provide some of the relevant information. This, at best, would only confirm the trend of network flow reported in the Heywood Interconnector RIT-T.

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<sup>137</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 21.

<sup>138</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, pp. 26–29.

However, this will not address the question of whether future congestion would be reduced to the extent claimed unless the derivation of future limits is also explained.<sup>139</sup>

Oakley Greenwood outlined the process of constraint formulation and how constraint equations are used in market modelling to restrict inter-regional flows according to the constraint equations, which account for consequential intra-regional network loading. Development of constraint equations is a process that involves extensive network modelling and is not a single analysis that can be tabled for review. Results can only be tested by observation of actual network loading or from extensive in network modelling.<sup>140</sup>

In the absence of a full recalculation of likely flows and future constraints it would not be feasible to numerically confirm the claims of ElectraNet and AEMO. This is an inherent limitation of a process like the RIT-T in the NEM.<sup>141</sup>

Accordingly, Oakley Greenwood considered that the review of the credibility and plausibility of the modelling of the intra-regional constraints is the key mechanism to assess the veracity of the analysis.<sup>142</sup> Oakley Greenwood considered that together, provision of:<sup>143</sup>

- written advice to the AER that the internal process used to develop constraints in the NEM is equivalent to the process employed in operation of the NEM
- a listing of all constraint equations released by ElectraNet and AEMO on 21 December 2012
- annual summaries of binding constraints
- plausible explanations of all issues about intra-regional congestion raised by stakeholders
- written confirmation that all relevant potential constraints had been accounted for, and
- written confirmation that costs for relief of intra-regional congestion assumed have been incorporated

has provided a satisfactory demonstration that in the circumstances the relevant and appropriate consideration of intra-regional constraints was incorporated into the Heywood Interconnector RIT-T and, therefore, meets the requirements of the RIT-T in this respect.

### Fuel cost assumptions

Oakley Greenwood stated that without passing opinion on the veracity of the gas price forecasts post 2030 used in the Heywood Interconnector RIT-T, it agreed with ElectraNet and AEMO that the circumstances of a lower gas price would not likely change the ranking of the credible options.<sup>144</sup>

### 3.5.3 AER view

We consider that the selection of material market benefits and the quantification of those material market benefits largely satisfies the requirements of the RIT-T. Where issues have been identified with the quantification of market benefits, we do not consider they are likely to affect the outcome of the Heywood Interconnector RIT-T.

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<sup>139</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 30.

<sup>140</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 30.

<sup>141</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 30.

<sup>142</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 31.

<sup>143</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 32.

<sup>144</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 23.

As outlined by Oakley Greenwood, the quantification of market benefits through the use of the PLEXOS and Prophet software tools to model market benefits is consistent with industry practice, and the least cost modelling approach is consistent with the requirements of the RIT-T. Therefore, the key classes of market benefits that contribute most to the gross market benefits quantified for the credible options was modelled appropriately.

We note Oakley Greenwood identified issues surrounding the assessment of market benefits associated with the use of marginal loss factors to determine network losses, and the quantification of voluntary load curtailment and involuntary load shedding using a least cost modelling approach. However, as the contribution of these market benefits to the gross market benefits of the credible options is small, we agree with Oakley Greenwood that they are unlikely to influence the ranking of the credible options.

The AER agrees with the findings of Oakley Greenwood's review of the impact of the common generation investment schedules and process of reasoning used in the qualitative review. Accordingly, while it may have been preferable to develop individual generation investment schedules for each credible option, this assumption is not likely to have affected the ranking of the credible options and, ultimately, which credible option is identified as the preferred option.

In relation to the classes of market benefits not quantified by ElectraNet and AEMO, we agree that it was unlikely that the market benefits associated with the changes in ancillary services costs, competition benefits and additional option value are unlikely to be material. In relation to additional option value, ElectraNet and AEMO concluded in the project assessment conclusions report that the quantification of any additional option value would require a significant modelling assessment and be disproportionate to the option value identified.<sup>145</sup> Taking into account Oakley Greenwood's finding that there is no obvious combination of parameters that a formal analysis of options would provide more insight than the probability weighted scenarios and sensitivities in this case, the AER agrees with the conclusion by ElectraNet and AEMO.

For the market benefits associated with high impact, low probability events and interconnector firmness, we note Oakley Greenwood's comment that they may be quantified in a manner which affects the ranking of the credible options (though not enough to affect the selection of the preferred option).

In relation to high impact, low probability events, we agree with Oakley Greenwood that the cost of a prolonged transformer outage at Heywood will be immaterial in an RIT-T assessment due to the low probability of the event occurring. Oakley Greenwood has suggested that the cost of a prolonged transformer outage may be more appropriately quantified using a value of reliability price which incorporates the public policy and political implications of a prolonged transformer outage. This may result in the cost of a high impact, low probability event being material to the RIT-T assessment. However, we consider that the public policy and political implications of a prolonged transformer could not be quantified in a RIT-T assessment. The RIT-T is an assessment of the costs and/or benefits of an investment option to all those who consume, produce and transport electricity in the NEM.<sup>146</sup> The public policy and political implications of a prolonged transformer outage are likely to be matters that fall outside the scope of the RIT-T assessment.

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<sup>145</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 85.

<sup>146</sup> RIT-T, paragraph 2, 4(b).

In relation to interconnector firmness, we agree with Oakley Greenwood that the quantification of market benefits associated with interconnector firmness is unlikely to affect the outcomes of the Heywood Interconnector RIT-T.

### **Modelling of intra-regional constraints**

In relation to the concerns raised about the modelling of intra-regional constraints, we note that the RIT-T requires that in estimating the magnitude of classes of market benefits, the market dispatch modelling methodology must incorporate a realistic treatment of network constraints.<sup>147</sup> We agree with Oakley Greenwood's findings that the release of the modelled network limits and flows as requested by stakeholders would only confirm the results the network flows reported in the Heywood Interconnector RIT-T. Therefore, this would not address the question of whether a realistic treatment of network constraints was applied.

We concur with Oakley Greenwood that full review and recalculation of both the likely flows and likely future constraints to confirm the outcomes of the Heywood Interconnector RIT-T would not be feasible. Accordingly, we consider that the best approach to assessing whether a realistic treatment of network constraints has been applied is to review the methodology and processes undertaken by ElectraNet and AEMO in the formulation of future constraints, and an examination of the reasonableness of the outcomes.

We consider the methodology and processes undertaken by ElectraNet and AEMO to formulate constraints would be likely to result in a realistic treatment of network constraints. In correspondence to the AER, ElectraNet and AEMO outlined the process followed in the formulation of the future network constraints in the RIT-T and stated that the processes followed the same processes as those used to formulate constraints in operation of the NEM. Further, ElectraNet and AEMO provided an internal document outlining the quality assurance processes undertaken during the RIT-T assessment to ensure the correctness of the market modelling.

We accept Oakley Greenwood's view that the provision of additional information by ElectraNet and AEMO about the modelled constraints in the Heywood Interconnector RIT-T during our assessment of whether the preferred option demonstrates there was a realistic treatment of network constraints. In particular, ElectraNet and AEMO have:

- confirmed all substantive network constraints in the NEM which may affect flows between South Australia and Victoria were modelled. This includes constraints which would continue to restrict interconnector flows following the implementation of a credible option. As noted by Oakley Greenwood, the examples of binding constraints provided by ElectraNet in its confirmation email was consistent with the full list of constraints published earlier, and the histograms of the incidence of binding constraints provided in separate correspondence
- provided a reasonable explanation of how the preferred option addresses thermal and voltage limitations which restrict interconnector flows and provides additional firm interconnector capacity
- provided a reasonable explanation for all issues raised by stakeholders in relation to intra-regional congestion.

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<sup>147</sup> RIT-T, paragraph 11.



### 3.6 Identification of the preferred option

The final step in the RIT-T assessment is the identification of the preferred option. The preferred option is the credible option which maximises the net economic benefit compared to all other credible options. The net economic benefit of a credible option is the market benefit minus the cost.

The Heywood Interconnector RIT-T identified option 1b as the preferred option. Table 3.5 below summarises the net economic benefit of each credible option in the Heywood Interconnector RIT-T.

**Table 3.5 Net economic benefit of credible options assessed (present value, \$2011-2012 million)**

	Costs	Market benefit	Net economic benefit	Ranking under the RIT-T
Option 1a	57.8	222.2	164.4	4
Option 1b	79.8	270.5	190.8	=1
Option 2a	70.7	227.5	156.8	6
Option 2b	92.7	270.4	177.7	3
Option 3	212.2	303.0	90.8	8
Option 4	30.6	155.6	125	7
Option 5	147.1	304.1	156.9	5
Option 6a	16.7	18.5	1.8	9
Option 6b	63.1	253.1	190.0	=1

Source: Heywood Interconnector RIT-T project assessment conclusions report, table 6-3.

ElectraNet and AEMO found that the net economic benefits for option 1b and option 6b were essentially equal and could not be differentiated in any of the reasonable scenarios considered or sensitivity analysis undertaken.<sup>148</sup> They considered that option 1b should be selected as the preferred option ahead of option 6b due to:<sup>149</sup>

- the uncertainty surrounding the commercial and technical feasibility of control schemes
- higher transfer capability in option 6b being reliant on additional wind generation near Krongart. While this has been modelled to occur, there was still uncertainty surrounding these developments

<sup>148</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, p. 113.

<sup>149</sup> ElectraNet & AEMO, 9 January 2013, Heywood Interconnector RIT-T project assessment conclusions report, pp. 114–115.

- the RIT-T analysis has not shown there would be substantial additional benefits associated with adopting the control scheme over a third transformer at Heywood. Therefore, the additional time and costs taken to conclusively address the uncertainties surrounding the control scheme are not warranted. As option 1b delivers benefits to the market in the year in which it is commissioned, delay in the investment decision would deprive the market of these benefits.

### 3.6.1 Oakley Greenwood view

Oakley Greenwood considered that option 1b was correctly identified as the preferred option.

As outlined in 3.5.3, Oakley Greenwood's review of the use of common generation investment schedules in the Heywood Interconnector RIT-T concluded that options 1b, 5 and 6b were the remaining options which could be selected as the preferred option. Following further consideration, Oakley Greenwood considered that option 1b was correctly identified as the preferred option, on the basis:<sup>150</sup>

- for the deferral time proposed, the sizing of the demand management program results in option 5 having a weighted average benefit below option 1b
- if interconnector firmness and high impact, low probability event costs are also factored in, then option 1b would be favoured over option 6b to be the preferred option.

### 3.6.2 AER view

The AER considers that option 1b was correctly identified as the preferred option.

As noted by Oakley Greenwood, the reasons provided by ElectraNet and AEMO for selecting option 1b over option 6b are essentially pragmatic. Neither the RIT-T nor RIT-T application guidelines provide any guidance on which credible option should be identified as the preferred option in the situation where the net economic benefit is equivalent. In these circumstances, we consider selection of option 1b over option 6b as reasonable.

The findings of Oakley Greenwood's report also support the selection of option 1b over option 6b. In addition to their finding that option 1b is likely to have benefits in reducing the costs of a high impact, low probability event and increasing interconnector firmness, their findings in relation to the effect of common generation investment schedules also favour the selection of option 1b over option 6b. As stated by Oakley Greenwood, the use of common investment schedules for both option 1b and option 6b is likely to have overstated the capital deferral market benefits associated with option 6b.

We agree with the conclusion by Oakley Greenwood that option 5 is inferior to option 1b given the current sizing and cost of the demand management program in option 5. As ElectraNet and AEMO adopted the costing proposed by EnerNOC, we do not consider further investigation into potential changes to the demand management program was necessary in the RIT-T analysis.

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<sup>150</sup> Oakley Greenwood, August 2013, External review of the Heywood RIT-T, p. 37.

## 4 AER determination

In accordance with clause 5.16.6(b)(2) of the National Electricity Rules, our determination is that the preferred option identified in the Heywood Interconnector RIT-T satisfies the RIT-T. We consider:

- The identified need in the Heywood Interconnector RIT-T, to increase the sum of producer and consumer surplus in the NEM, is consistent with the requirements of the RIT-T.
- All the credible options assessed met the definitional requirements of a credible option. The number and range of credible options assessed was appropriate given the magnitude of the likely costs of the credible options.
- The number, choice and weighting of the reasonable scenarios modelled by ElectraNet and AEMO satisfies the requirements of the RIT-T. While there are plausible variations to some of the variables and parameters in the reasonable scenarios (for example, the differential between South Australian and Victorian gas prices may decrease), these variations would not affect the ranking of the credible options.
- The costs of the credible options have been appropriately quantified.
- The selection of material market benefits and the quantification of those material market benefits largely satisfies the requirements of the RIT-T. To the extent that some of the classes of market benefits may not have been appropriately quantified, this would not have affected which credible option is identified as the preferred option.
- 'Option 1b' was correctly identified as the preferred option.