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# South West Renewable Energy Zone Access Scheme Target Transmission Curtailment Level & Headroom Assessment Method

May 2024

# Acknowledgement of Country

Energy Corporation of New South Wales acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past and present through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally and economically.

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## Acknowledgements

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# Contents

<b>Acknowledgement of Country .....</b>	<b>2</b>
<b>Glossary</b>	
<b>1 Purpose.....</b>	<b>7</b>
<b>2 Background.....</b>	<b>7</b>
2.1 Curtailment framework.....	8
2.2 Aggregate maximum capacity cap .....	9
2.3 Target Transmission Curtailment Level (TTCL).....	9
2.4 Network Element access controls.....	10
2.5 Capacity periods.....	11
<b>3 Role of Infrastructure Planner .....</b>	<b>11</b>
3.1 Initial allocation .....	11
3.2 Headroom assessment and further allocation of access rights .....	12
3.3 Collection and use of generator data.....	13
3.4 Forecast curtailment calculation process for access rights .....	15
3.5 Headroom calculation.....	18
<b>Question and Answers.....</b>	<b>21</b>
Question 1: What was the method to calculate the 3.86% target curtailment level? .....	21
Question 2: Can the generation technology mix that was used to derive the TTCL be provided?.....	21
Question 3: Will there be any protections/compensation to Proponents if curtailment exceeds the 3.86% TTCL? .....	21
Question 4: How do the forecast curtailment and headroom calculations treat stand-alone storage and hybrid projects given that they can either alleviate or worsen congestion depending on how they operate? .....	21
Question 5: Will the Infrastructure Planner or the Network Operator provide a tool/forecast for the bidders to calculate/use for Marginal Loss Factor (MLF) for the whole REZ that is “bankable”?.....	22
Question 6: How is the Infrastructure Planner planning to let the market know headroom availability and the process for allocating access rights under headroom? .....	22
Question 7: Will different maximum capacities be applied to different periods of the day? .....	22

# Important notice

## Purpose of this Document

This document titled 'South West Renewable Energy Zone Access Scheme Target Transmission Curtailment Level & Headroom Assessment Method' (this Document) may be updated by the Energy Corporation of New South Wales from time to time. This Document contains information that applies to the initial allocation, and any subsequent allocation or grant, of access rights for the South West Renewable Energy Zone Access Scheme.

The purpose of this Document is further described in [Section 1](#).

## No reliance

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## Version control

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# Glossary

Table 1: Glossary

Term	Definition
Access Rights	Access rights as defined in the Access Scheme Declaration.
Access Right Holder	The person who holds an access right granted under the Access Scheme Declaration.
Access Scheme Declaration	The Access Scheme Declaration titled 'Renewable Energy Zone (South West) Access Scheme Order 2024' declared by the Minister under the EII Act, Section 24(1), on 4 April 2024 and published in the New South Wales (NSW) Government Gazette on 12 April 2024, as amended from time to time.
AEMO Services	AEMO Services Limited (ABN 59 651 198 364).
South West REZ	South West Renewable Energy Zone.
South West REZ Access Right	The access rights allocated under the South West REZ Access Scheme and in accordance with the South West REZ Access Scheme Declaration that authorises access to, and use of, the South West Renewable Energy Zone access rights network.
EII Act	Electricity Infrastructure Investment Act 2020 (NSW).
EII Regulation	Electricity Infrastructure Investment Regulation 2021 (NSW).
EnergyCo	The Energy Corporation of New South Wales (ABN 13 495 767 706), a statutory authority constituted by s 7 of the <i>Energy and Utilities Administration Act 1987</i> .
Hybrid Project	A co-located hybrid infrastructure network infrastructure project as defined in the South West REZ Access Scheme Declaration.
Infrastructure Planner	Infrastructure Planner as defined in the EII Act, being EnergyCo for the South West REZ.
Initial Allocation	<p>Allocation of maximum capacity under access rights up to the initial aggregate maximum capacity cap of 3.98 GW. Under the South West REZ Access Scheme Declaration, the Infrastructure Planner may determine that the initial allocation has been completed if:</p> <ul style="list-style-type: none"> <li>the aggregate maximum capacity of approved projects granted access rights under the initial allocation exceeds 90% of the initial aggregate maximum capacity cap for the access rights network; or</li> <li>the aggregate maximum capacity of approved projects granted access rights to the network element exceeds 90% of the initial network element capacity cap; or</li> </ul>

Term	Definition
	<ul style="list-style-type: none"> <li>it does not reasonably expect significant further access rights may be granted under the initial allocation.</li> </ul>
Minister	NSW Minister for Energy.
REZ	Renewable Energy Zone or REZ as defined in the EII Act.

# 1 Purpose

An access scheme has been declared in the South West Renewable Energy Zone (REZ) (**South West REZ Access Scheme Declaration**).<sup>1</sup> The Energy Corporation of New South Wales (**EnergyCo**) is the appointed Infrastructure Planner for the South West REZ under the **Electricity Infrastructure Investment Act 2020 (EII Act)**.<sup>2</sup> The Infrastructure Planner of the South West REZ is the appointed administrator of the access scheme under the South West REZ Access Scheme Declaration.<sup>3</sup> The Infrastructure Planner has functions under the **Electricity Infrastructure Investment Regulation 2021 (EII Regulation)** that include:

- to assess and determine the grant or increase of access rights to participants in the access scheme;<sup>4</sup> and
- to assess, calculate, forecast, determine and implement technical matters for the access scheme, including in relation to maximum capacities applying during different periods.<sup>5</sup>

This Document summarises:

1. How the Infrastructure Planner intends to apply the Target Transmission Curtailment Level (**TTCL**), Target Network Element Curtailment Level (**TNECL**), aggregate maximum capacity cap and network element capacity cap under the South West REZ Access Scheme when:
  - allocating access rights to the access rights network;<sup>6</sup> and
  - determining the aggregate maximum capacity available for the allocation of access rights through calculation of the headroom assessment.
2. The information sought from proponents<sup>7</sup> to support the application of the TTCL, TNECL, aggregate maximum capacity cap and network element capacity cap.
3. Responses to frequently asked questions on TTCL and headroom under the South West REZ Access Scheme.

To the extent of any inconsistency between this Document and the South West REZ Access Scheme Declaration, the South West REZ Access Scheme Declaration prevails. Terms used in this Document have the meaning given in the South West REZ Access Scheme Declaration unless otherwise defined.

## 2 Background

The South West REZ Access Scheme is a limited physical connections model with limitations on the size, nature and operation of generation and storage projects connecting to the access rights network. This model is designed to provide investor confidence by physically restricting the capacity of projects that can be granted access rights using a targeted level of transmission curtailment.

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<sup>1</sup> The Access Scheme Declaration in respect of the South West REZ made by the Minister under section 24(1) of the EII Act on 4 April 2024 as amended from time to time.

<sup>2</sup> EnergyCo has been appointed as the Infrastructure Planner for South West REZ under the *Renewable Energy Zone (South West) Order 2022* made by the Minister on 31 October 2022 as amended from time to time and in accordance with section 63 of the EII Act.

<sup>3</sup> See clause 21 of the South West REZ Access Scheme Declaration.

<sup>4</sup> Clause 6(1) of Schedule 1A of the EII Regulation.

<sup>5</sup> Clause 10 of Schedule 1A of the EII Regulation.

<sup>6</sup> 'Access rights network' has the meaning given in the South West REZ Access Scheme Declaration.

<sup>7</sup> Where access rights are allocated under an application process, 'Proponents' has the same meaning as Applicant in EnergyCo's Application Process Guidelines. Where access rights are allocated under a competitive tender process, 'Proponents' has the meaning given in AEMO Services Tender Guidelines.

Terms and conditions of the South West REZ Access Scheme are specified in the South West REZ Access Scheme Declaration.

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## 2.1 Curtailment framework

Under the South West REZ Access Scheme, the limited physical connections model is given effect by providing that the Infrastructure Planner may only:<sup>8</sup>

- grant an access right;
- approve an increase in the maximum capacity of an approved project; or
- approve a material change in the project characteristics of an approved project,

if it is satisfied that the grant or approval will not cause:

- the aggregate maximum capacity of all approved projects during any capacity period (see Section 2.5) to exceed the aggregate maximum capacity cap, as amended by headroom assessments, for that capacity period;
- the aggregate maximum capacity of all approved projects connecting to a specified network element during any capacity period to exceed the network element capacity cap, as amended by headroom assessments, for that capacity period;
- the forecast curtailment on the access rights network (as calculated in accordance with Schedule 3 of the South West REZ Access Scheme Declaration) to exceed the TTCL;
- the network element forecast curtailment on a specified network element to exceed the applicable TNECL.

Until a notification is made by the Infrastructure Planner,<sup>9</sup> the capacity period for the South West REZ is a single 24-hour day.<sup>10</sup> EnergyCo does not intend to notify additional capacity periods for the May 2024 tender of access rights.

The two key access controls in the “curtailment framework” are the aggregate maximum capacity cap and the TTCL, with associated network element capacity cap and TNECL for the specified network elements. These access controls and how they operate are explained below.

These access controls have been determined through economic modelling which considered generation planting in the South West REZ, to maximise benefit to NSW electricity consumers. Power flows between the South West REZ and adjacent networks were considered when setting the access controls. Calculation of forecast curtailment considers generation and storage of Access Right Holders to the access rights network only, using the following model:

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<sup>8</sup> Clause 7(3) of the South West REZ Access Scheme Declaration.

<sup>9</sup> Clause 7(5)(c) of the South West REZ Access Scheme Declaration.

<sup>10</sup> Definition of ‘capacity period’ and clause 7(6) of the South West REZ Access Scheme Declaration.

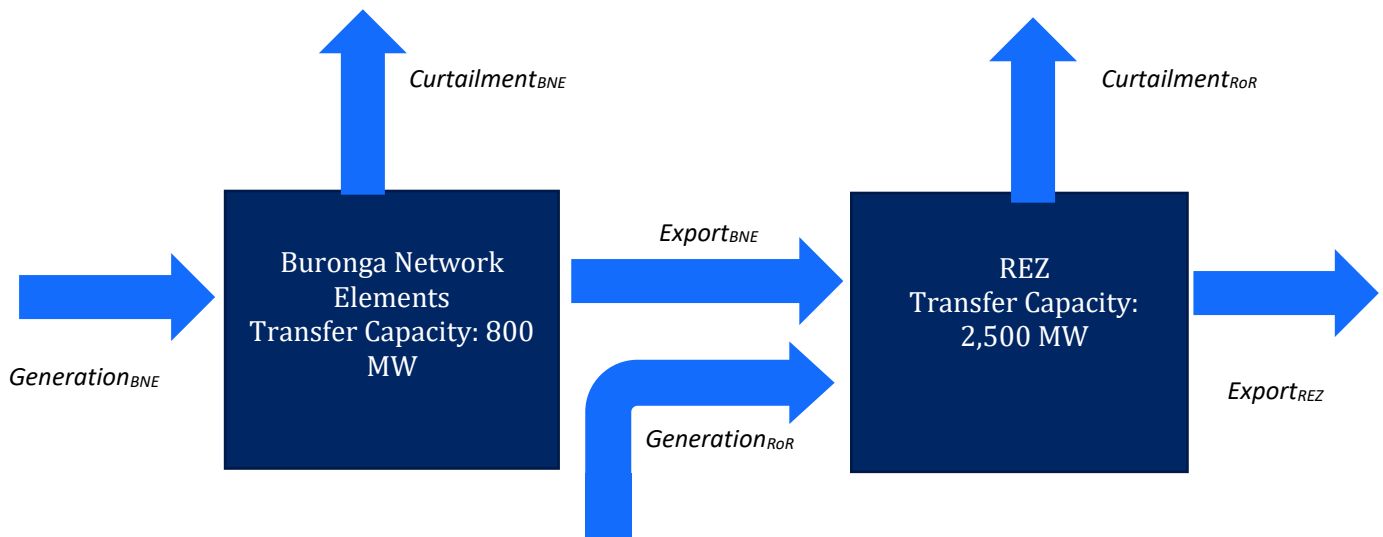


Figure 1. Model used for calculating forecast curtailment in the South West REZ.

Where:

- $Generation_{BNE}$  is the unconstrained generation connected to the Buronga Network Elements<sup>11</sup>
- $Curtailment_{BNE}$  is the energy curtailed due to the transfer capacity of the Buronga Network Elements
- $Export_{BNE}$  is the energy able to be exported from the Buronga Network Elements to the rest of the REZ given the transfer capacity of the network element
- $Generation_{RoR}$  is the unconstrained generation connected to the rest of the access rights network (i.e. not connected to the Buronga Network Elements)
- $Curtailment_{RoR}$  is the energy (from the Buronga Network Elements export and generation connected to the rest of the REZ) that is curtailed due to the transfer capacity of the REZ
- $Export_{REZ}$  is the energy exported from the REZ considering the transfer capacity of the REZ.

## 2.2 Aggregate maximum capacity cap

The aggregate maximum capacity cap is a limit on the aggregate maximum capacity of all approved projects connecting to the access rights network during a capacity period (see Section 2.5). The aggregate maximum capacity cap is calculated by adding each project's maximum capacity in megawatts (MW) for which it holds access rights as specified in the access rights register.

Under the South West REZ Access Scheme Declaration, the initial aggregate max capacity cap in all capacity periods is 3.98 GW.<sup>12</sup> This figure could be increased by the Infrastructure Planner after the initial allocation and following a headroom assessment (see Section 3.2).<sup>13</sup>

## 2.3 Target Transmission Curtailment Level (TTCL)

<sup>11</sup> For definition of the Buronga Network Elements, refer to the Dictionary of the South West REZ Access Scheme Declaration.

<sup>12</sup> Clause 8(1) of the South West REZ Access Scheme Declaration.

<sup>13</sup> Clause 8(4) of the South West REZ Access Scheme Declaration.

The TTCL for the initial term of the South West REZ Access Scheme is 3.86%.<sup>14</sup>

The TTCL is a limit on forecast curtailment as defined in the South West REZ Access Scheme and is not a guarantee of actual curtailment outcomes, as detailed further in this section.

Forecast curtailment represents the forecast technical curtailment of aggregated approved projects due to the transfer capacity of the access rights network for a reference year as set out in Table 2. This is expressed as a percentage, where:

$$\text{Forecast curtailment (\%)} = \frac{\text{forecast curtailed electricity}}{\text{forecast potential sent out generation}}$$

For the SW REZ, the calculation of forecast curtailment for comparison with the TTCL is undertaken using the model outlined in Figure 1. The forecast potential generation is the forecast potential generation of all projects connected to the access rights network ( $\text{Generation}_{\text{BNE}} + \text{Generation}_{\text{RoR}}$ ). The forecast curtailed electricity is the amount of this generation that would be curtailed due to transfer capacities on the access rights network ( $\text{Curtailment}_{\text{BNE}} + \text{Curtailment}_{\text{RoR}}$ ). Calculation of these curtailments considers generation and storage of Access Right Holders only. Power flows between South West REZ and adjacent networks were considered when setting the access controls.

Within the aggregate maximum capacity cap, access rights may only be granted where the eligible project's expected capacity profile does not cause the modelled forecast curtailment on the access rights network in a given reference year to exceed the TTCL.<sup>15</sup>

There are three important features of the TTCL:

1. **The forecast curtailment only considers curtailment driven by the transfer capacity of the access rights network and is aggregated for all projects across a full reference year.** It does not consider curtailment that may occur due to technical constraints outside the REZ, power flows from outside the REZ (although these flows were considered when setting the access controls), economic curtailment or an individual project location on the access rights network.
2. **The TTCL is the calculated forecast curtailment for the aggregate of the REZ generation. Individual projects may experience a higher or lower level of actual curtailment than the TTCL.**
3. **Proponents will need to perform their own due diligence and modelling as curtailment outcomes will not be promised or compensated.** The access scheme does not change the National Electricity Market Dispatch Engine (NEMDE) process and Access Right Holders can still be constrained by NEMDE for various reasons. This could result in Access Right Holders being affected by constraints differently from one another.

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## 2.4 Network Element access controls

In addition to the access controls that apply for the whole of the access rights network, access right award for projects connecting to any specified network element such as the Buronga Network Elements is also governed by two specific sub-access controls, the network element capacity cap and TNECL. These access controls are analogous to the aggregate maximum capacity cap and the TTCL, but apply specifically to the specified network element.

The network element capacity cap is a limit on the aggregate maximum capacity of all approved projects connecting to a network element. The aggregate maximum capacity on the network element is calculated by

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<sup>14</sup> Clause 9(1) of the South West REZ Access Scheme Declaration.

<sup>15</sup> Clause 7(3)(c) of the South West REZ Access Scheme Declaration.

adding each project on the network element's maximum capacity in megawatts (MW) for which it holds access rights as specified in the access rights register.

The Buronga Network Elements has been specified as an element to which a network element capacity cap will apply for the initial term of the South West REZ Access Scheme.<sup>16</sup> The TNECL applicable for the Buronga Network Elements for initial term is 3.86%.<sup>17</sup>

Like the TTCL, the TNECL is a limit on forecast curtailment on the Buronga Network Elements as defined under the South West REZ Access Scheme Declaration, and is not a guarantee of actual curtailment outcomes. Forecast curtailment on the Buronga Network Elements is calculated only taking into account the projects connecting to the network element and the transfer capacity of the network element, which is 800 MW. The same formula structure is used as for the TTCL:

$$\text{Forecast curtailment (\%)} = \frac{\text{forecast curtailed electricity}}{\text{forecast potential sent out generation}}$$

Where forecast potential sent out generation is  $Generation_{BNE}$  and forecast curtailed electricity is  $Curtailment_{BNE}$ . Like the TTCL, calculation of these curtailments considers generation and storage of Access Right Holders to the Buronga Network Elements only. Power flows between the South West REZ and adjacent networks were considered when setting the access controls.

Within the network element capacity cap, access rights may only be granted where the eligible project's expected capacity profile does not cause the modelled forecast curtailment on the network element in a given reference year to exceed the TNECL.

The features of the TTCL described in Section 2.3 also apply to the TNECL.

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## 2.5 Capacity periods

The Infrastructure Planner, after providing sufficient notice and consultation, may grant an access right to an eligible project, or increase the maximum capacity of an approved project, using different maximum capacity amounts for different capacity periods within a 24-hour day (a maximum capacity profile).<sup>18</sup>

A capacity period refers to an intra-day period notified by the Infrastructure Planner in accordance with clause 7(5) of the South West REZ Access Scheme Declaration, and which may vary for days during different seasons. Until a notification is made, the capacity period for the South West REZ is a single 24-hour day.<sup>19</sup> EnergyCo does not intend to notify additional capacity periods for the May 2024 tender of access rights.

# 3 Role of Infrastructure Planner

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## 3.1 Initial allocation

The initial allocation covers the grant of access rights within the initial aggregate maximum capacity cap.<sup>20</sup>

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<sup>16</sup> Clause 8(2) of the South West REZ Access Scheme Declaration.

<sup>17</sup> Clause 9(2) of the South West REZ Access Scheme Declaration.

<sup>18</sup> Clause 7(5) of the South West REZ Access Scheme Declaration.

<sup>19</sup> Definition of 'capacity period' and clause 7(6) of the South West REZ Access Scheme Declaration.

<sup>20</sup> In limited circumstances, the Infrastructure Planner can determine that the initial allocation is completed before access rights up to the initial aggregate maximum capacity cap have been allocated – see clause 7(4) of the South West REZ Access Scheme Declaration.

In the initial allocation, the Infrastructure Planner may grant access rights or increase maximum capacity to a proposed project upon recommendation of the Consumer Trustee,<sup>21</sup> providing the aggregate maximum capacity cap and network element capacity cap are not breached.<sup>22</sup> As described in Section 2.1, the Infrastructure Planner must also ensure the grant of access rights will not cause:

- the forecast curtailment on the access rights network to exceed the TTCL or
- the forecast curtailment on the Buronga Network Elements to exceed the TNECL.

The method for calculating the forecast curtailment is outlined in Section 3.4.

In calculating the forecast curtailment under the South West REZ Access Scheme, the Infrastructure Planner must, amongst other things:

- determine an expected capacity profile for a relevant project based on information that the Infrastructure Planner considers will assist it in accurately forecasting the project's likely future generation profile including, without limitation:<sup>23</sup>
  - representative information for the relevant plant type from AEMO modelling inputs;
  - market modelling;
  - the project's own forecast generation profile;
  - the project characteristics; and
- select a reference year for the purposes of the calculation of forecast curtailment.<sup>24</sup>

The Infrastructure Planner will specify the characteristics of the generation traces requested of projects as part of the competitive tender process for access rights. These specifications are outlined in Section 3.3.

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## 3.2 Headroom assessment and further allocation of access rights

The Infrastructure Planner may determine that the initial allocation is complete when:

- For the access rights network, the aggregate maximum capacity in any capacity period of approved projects granted access rights under the initial allocation exceeds 90% of the initial aggregate maximum capacity cap in that capacity period;
- For the network elements, the aggregate maximum capacity in any capacity period of approved projects granted access rights to that network element under the initial allocation exceeds 90% of the network element capacity cap in that capacity period; or
- the Infrastructure Planner does not reasonably expect that significant further access rights may be granted within the relevant initial allocation.<sup>25</sup>

The Infrastructure Planner is to notify the Consumer Trustee and Access Right Holders and publish a notice on its website when the initial allocation is complete.<sup>26</sup>

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<sup>21</sup> Clause 7(1)(a) of the South West REZ Access Scheme Declaration. AEMO Services Limited has been appointed as the Consumer Trustee under section 60 of the EII Act.

<sup>22</sup> Clause 7(3) of the South West REZ Access Scheme Declaration.

<sup>23</sup> Clause 7(8) of the South West REZ Access Scheme Declaration.

<sup>24</sup> Clause 6 of Schedule 3 of the South West REZ Access Scheme Declaration.

<sup>25</sup> Clause 7(4) of the South West REZ Access Scheme Declaration.

<sup>26</sup> Clause 7(4) of the South West REZ Access Scheme Declaration.

The Infrastructure Planner is to conduct a headroom assessment as soon as practicable after the initial allocation of access rights.<sup>27</sup> Following this, the Infrastructure Planner must conduct further headroom assessments at least every two years for the next six years.<sup>28</sup> In addition, the Infrastructure Planner has the discretion to conduct additional headroom assessments at any time where it forms the opinion that there is likely to be material headroom on the access rights network or network element.<sup>29</sup>

The headroom is the increase in aggregate maximum capacity in a capacity period that could be allocated without resulting in forecast curtailment on the access rights network exceeding the TTCL, or forecast curtailment on a specified network element exceeding the TNECL.<sup>30</sup>

It may be possible to increase the aggregate maximum capacity cap without breaching the TTCL or TNECL due to factors including:

- an increase in the transfer capacity of the access rights network or a network element, either due to augmentations to the access rights network or augmentations between the boundary point of the access rights network and the regional reference node;
- the impact of storage projects on the generation profile of projects connected to the access rights network; or
- differences between expected capacity profiles of projects and capacity profiles post commissioning.

The headroom calculation methodology is outlined in Section 3.5.

The Infrastructure Planner may decide that the amount of additional maximum capacity made available after a headroom assessment should be less than the headroom calculated under a headroom assessment.<sup>31</sup>

The Infrastructure Planner must notify the Consumer Trustee and Access Right Holders of the proposed headroom and proposed increase to the aggregate maximum capacity cap (among other access controls).<sup>32</sup> The Consumer Trustee and Access Right Holders can make a written submission in response to the draft headroom assessment before the final headroom assessment is published.<sup>33</sup>

The Infrastructure Planner may then grant access rights up to the new aggregate maximum capacity cap and network element capacity cap, ensuring the granting of access rights to a project will not cause forecast curtailment to exceed the TTCL or the TNECL.

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## 3.3 Collection and use of generator data

The Infrastructure Planner will consider the generator data requested during a tender or application process for access rights and may conduct further due diligence to assess the quality of the submitted information. This may include, in the case of an approved project, collecting and using any historical available capacity and sent out generation.

When requested in the tender or application process, proponents must provide a generation trace for each connection point proposed to be allocated an access right. Table 2 outlines the characteristics of the data that will be requested from access right applicants, and their application to the calculation of forecast curtailment for the granting of access rights.

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<sup>27</sup> Clause 10(1)(a) of the South West REZ Access Scheme Declaration.

<sup>28</sup> Clause 10(1)(b) of the South West REZ Access Scheme Declaration.

<sup>29</sup> Clause 10(1)(c) of the South West REZ Access Scheme Declaration.

<sup>30</sup> Clause 10(2) of the South West REZ Access Scheme Declaration.

<sup>31</sup> Clause 10(3) of the South West REZ Access Scheme Declaration.

<sup>32</sup> Clause 10(4) of the South West REZ Access Scheme Declaration.

<sup>33</sup> Clause 10(5) of the South West REZ Access Scheme Declaration.

Table 2: Characteristics of generation traces that may be requested from proponents

Characteristic	Decision	Rationale and application
<b>Probability of Exceedance (PoE)</b>	Proponents will provide 50% PoE traces (P50)	<ul style="list-style-type: none"> <li>• a common measure and level of certainty familiar to the market.</li> <li>• provides the most likely level of generation and may avoid unnecessarily limiting the amount of maximum capacity that may be granted under access rights compared to using a lower probability of exceedance (i.e. assuming higher generation).</li> </ul>
<b>Reference Year</b>	The Infrastructure Planner will use the year of <b>median forecast curtailment</b> (out of three specified data years) as the reference year for comparison with the TTCL.	<ul style="list-style-type: none"> <li>• projects will provide three half-hourly traces, based on weather data from three specified data years.</li> <li>• selecting the median year provides a “likely” level of curtailment and may enable a less conservative granting of access rights than the year of highest forecast curtailment.</li> <li>• the data years will be communicated with each competitive tender process.</li> </ul>
<b>Technology type</b>	Proponents will provide traces for individual components of the project separately (e.g. a hybrid solar project would provide one trace for solar and one trace for storage)	<ul style="list-style-type: none"> <li>• the Infrastructure Planner may also create a trace that represents expected behaviour of each storage project or storage component of a hybrid project.</li> </ul>
<b>Degradation assumptions</b>	Degradation should be excluded from the provided traces	<ul style="list-style-type: none"> <li>• different projects may make different assumptions about degradation. Excluding degradation allows for a more accurate comparison between projects.</li> </ul>

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## 3.4 Forecast curtailment calculation process for access rights

The Infrastructure Planner must calculate the forecast curtailment for the combination of projects that are being considered for granting of an access right and projects which have already been granted an access right in any previous award. The Infrastructure Planner must ensure the granting of access rights to a project does not cause forecast curtailment on the access rights network in a given reference year to breach the TTCL, or forecast curtailment on the network element to exceed the TNECL.<sup>34</sup> The Consumer Trustee will also consider the forecast curtailment when considering which projects to recommend for access right allocation.

The Infrastructure Planner will undertake the following steps to calculate forecast curtailment and determine if a project (or group of projects) can be granted access rights without causing forecast curtailment to breach the TTCL or the TNECL:

### 1. Determine expected capacity profiles for each project

The Infrastructure Planner will determine an expected capacity profile for each connection point, both for projects applying for access rights, and (after the first award of access rights) for any projects that have already been granted access rights. The trace will be half hourly generation in megawatts (MW), determined at P50 level of certainty and for the specified financial years. The relevant years will be communicated with each competitive tender process.

The Infrastructure Planner may determine an expected capacity profile for each project that it considers reflects a likely generation profile for that project, based on information including:

- generation traces submitted by proponents as part of the access rights application or competitive tender process;
- AEMO ISP variable renewable energy traces; and
- recorded traces for projects already connected to the access right network.

Proponents will submit generation traces for the weather dependant components of the project (e.g. wind and solar). When considering the generation traces submitted by proponents, a due diligence process may be undertaken to assess the quality of the submitted traces.

For storage and load projects, and the storage and load components of hybrid projects, proponents will need to submit an expected profile for the storage or load component of their project. The Infrastructure Planner may use this profile or create expected profiles taking into account the expected capacity profiles of other proposed and connected projects.

For hybrid projects, the Infrastructure Planner will add the traces determined for each project component at the same point of connection, to create one trace for that connection point limited by the capacity for which the project has applied for access rights.

**For projects granted and applying for access rights to the Buronga Network Elements or any other network element to which a TNECL and network element capacity cap applies (refer to Figure 1 for term definitions):**

### 2. Create an aggregated half hourly generation profile for the group of projects

*Generation<sub>BNE</sub>* (per Figure 1)

For each half hour period in each data year, the Infrastructure Planner will sum the expected capacity profiles (converted to MWh) for projects being considered for access rights to the network element and any projects which have already been granted access rights to the network element.

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<sup>34</sup> Clauses 7(3)(c) and 7(3)(d) of the South West REZ Access Scheme Declaration.

This will create a half hourly aggregated capacity profile of the potential forecast generation connected to the network element that could be sent out if the network element had infinite transfer capacity ( $Generation_{BNE}$ ).

3. **Calculate the generation in each half hour that is curtailed (unable to be sent out) due to the transfer capacity of the network element**

$$Curtailment_{BNE} = \text{maximum}(Generation_{BNE} - BNE \text{ transfer capacity}, 0)$$

For each half hour period in each data year, the Infrastructure Planner will determine the generation on the network element that exceeds the transfer capacity of the network element ( $Curtailment_{BNE}$ ).

Only curtailment due to the transfer capacity of the network element is considered. Curtailment due to other factors such as economic dispatch, bidding, project location or curtailment beyond the access rights network is not considered. Power flows from outside the REZ are not considered in this calculation (as they were considered when setting the access controls).

4. **Add up the forecast curtailed generation for the network element for each year**

$$\sum Curtailment_{BNE}$$

For each data year, the Infrastructure Planner will sum the forecast curtailed generation in each half hour on the network element to determine the annual forecast curtailed generation on the network element ( $Curtailment_{BNE}$ ).

5. **Express this as a percentage of the potential sent out generation for each year to calculate the forecast curtailment on the network element**

Under the South West REZ Access Scheme Declaration, forecast curtailment is defined by the following formula:

$$\text{Forecast curtailment (\%)} = \frac{\text{forecast curtailed electricity}}{\text{forecast potential sent out generation}}$$

For the network element, this is equal to:

$$= \frac{\sum Curtailment_{BNE}}{\sum Generation_{BNE}}$$

For each data year, the Infrastructure Planner will calculate the forecast curtailment on the network element by expressing the total annual forecast curtailed generation on the network element ( $Curtailment_{BNE}$ ) as a percentage of the total annual generation that could be sent out if not limited by the transfer capacity of the network element ( $Generation_{BNE}$ ).

**For the access rights network as a whole (refer to Figure 1 for term definitions):**

6. **From Step 3, create a trace of expected generation exported from the network element to the rest of the access rights network**

$$Export_{BNE} = Generation_{BNE} - Curtailment_{BNE}$$

For each half hour in each data year, the Infrastructure Planner will subtract the curtailed generation in Step 3 ( $Curtailment_{BNE}$ ) from the network element aggregated half hourly generation profile in Step 2 ( $Generation_{BNE}$ ) to create a profile of expected generation exported from the network element to the rest of the access rights network ( $Export_{BNE}$ ).

7. **Create an aggregated half hourly generation profile for generation into the rest of the access rights network**

$$Generation \text{ into rest of REZ} = Generation_{RoR} + Export_{BNE}$$

For each half hour period in each data year, the Infrastructure Planner will sum the expected capacity profiles for projects being considered for access rights (and any projects which have already been granted access) to the rest of the access rights network excluding the Buronga Network

Elements. This will then be added to the profile of expected generation exported from the network element to create a half hourly aggregated capacity profile of the potential forecast generation that could be sent out of the rest of the access rights network if the REZ had unlimited transfer capacity.

**8. Calculate the generation in each half hour that is curtailed (unable to be sent out) due to the transfer capacity of the REZ**

$$Curtailment_{RoR} = \text{maximum}(\text{Generation into rest of REZ} - \text{REZ transfer capacity}, 0)$$

For each half hour period in each data year, the Infrastructure Planner will determine the generation calculated in Step 7 that exceeds the transfer capacity of the access rights network ( $Curtailment_{RoR}$ ).

Only curtailment due to the transfer capacity of the access rights network is considered. Curtailment due to other factors such as economic dispatch, bidding, project location or curtailment beyond the access rights network is not considered. Power flows from outside the REZ are not considered in this calculation (as they were considered when setting the access controls).

**9. Add up the forecast curtailed generation for each year on the rest of the access rights network and add to forecast annual curtailed generation on the Buronga Network Element to give the total annual forecast curtailed generation in the REZ.**

$$\text{Total annual forecast curtailed generation in REZ} = \sum Curtailment_{BNE} + \sum Curtailment_{RoR}$$

For each data year, the Infrastructure Planner will sum the forecast curtailed generation calculated in Step 8 in each half hour to determine the annual forecast curtailed generation on the access rights network, excluding the Buronga Network Elements.

This will be added to the total annual forecast curtailed generation on the Buronga Network Elements calculated in Step 4 to determine the total annual forecast curtailed generation in the REZ.

**10. Express the total annual forecast curtailment as a percentage of the potential sent out generation for each year**

Under the South West REZ Access Scheme Declaration, forecast curtailment is defined by the following formula:

$$\text{Forecast curtailment (\%)} = \frac{\text{forecast curtailed electricity}}{\text{forecast potential sent out generation}}$$

For the whole of the REZ, this is equal to:

$$= \frac{\sum Curtailment_{BNE} + \sum Curtailment_{RoR}}{\sum Generation_{BNE} + \sum Generation_{RoR}}$$

For each data year, the Infrastructure Planner will calculate the forecast curtailment by expressing the total annual forecast curtailed generation calculated in step 10 as a percentage of the total annual generation connected to the entire access rights network (including the Buronga Network Elements).

**11. Select the median year as the reference year and compare against the TTCL and the TNECL.**

The Infrastructure Planner will select the year (out of the specified data years) with median forecast curtailment calculated in step 10 as the reference year for comparison with the TTCL. The Infrastructure Planner will also compare the forecast curtailment on the network element in this year calculated in Step 5 with the TNECL. If the TTCL and the TNECL are not exceeded, the group of projects seeking access can be granted access rights providing the aggregate maximum capacity cap and network element capacity cap are also not exceeded.

In addition to assessing forecast curtailment for the grant of access rights, during a competitive tender process the Infrastructure Planner will also provide advice on forecast curtailment to the Consumer Trustee during the tender process to inform the shortlisted projects recommended for granting access rights.

Subject to the above, access rights will be granted until the initial allocation of 3.98 GW of maximum capacity is reached.

After the initial allocation is exhausted and before subsequent processes for the allocation of access rights, or if an augmentation to the network occurs, the Infrastructure Planner will conduct a headroom assessment, to determine if the aggregate maximum capacity cap can be increased and more access rights granted.

## 3.5 Headroom calculation

Once the initial allocation is exhausted, and at least every two years thereafter for the next six years, the Infrastructure Planner must perform a headroom assessment. Please refer to section 3.2 for more information.

The Infrastructure Planner will undertake the steps described below to calculate potential headroom and determine if the aggregate maximum capacity cap can be increased for the South West REZ. This process will be completed twice, once considering only the network element, network element capacity cap and the TNECL, then considering the entire REZ. As the network element capacity cap is a sub cap within the aggregate maximum capacity cap, any declaration of headroom on the network element will also mean a declaration of headroom for the REZ as a whole.



Figure 2. Steps in the headroom calculation.

- 1. Create a half hourly aggregate expected generation trace, by summing the P50 traces of projects which have already been granted access rights.**

The Infrastructure Planner will determine likely expected capacity profiles for projects which have been granted access rights. When headroom on the network element is being calculated, this will only include generation awarded access rights to the network element. When headroom on the whole REZ is being calculated, this will result in two traces – one for generation connected to the network element and one for generation connected to the rest of the access rights network, so the forecast curtailment for the whole REZ can be calculated as outlined in Section 3.4.

As some projects may be commissioned, and others may have just been granted access rights, these expected capacity profiles may be a mix of actual and expected generation. If measured profiles are available for commissioned projects, the Infrastructure Planner will select a reference year(s) aligning with the year of measured data from the commissioned projects.

- 2. Develop generic wind and solar expected capacity factor profiles for the South West REZ.**

These profiles will be used to represent generation from potential future projects. They will be half hourly traces of the capacity factor (from 0 to 1) of a generic wind (or solar) project, which can be multiplied by the nameplate capacity of additional wind (or solar) generation to provide a generation trace for the additional capacity. The capacity factors do not consider economic curtailment but reflect the potential output given the weather in that half hour.

These traces may be developed from an average of the expected capacity factor profiles of projects that have received access rights in the South West REZ, using measured data where available, or

from AEMO ISP capacity profiles for the South West REZ. They will be developed for the reference year(s) selected in Step 1.

As the behaviour of storage projects is expected to be driven by market price signals, the Infrastructure Planner will not consider a generic storage trace to represent potential future storage capacity. Headroom will be calculated taking into account the generation and storage access rights holders and potential future wind and solar generation.

### 3. Calculate the maximum available headroom

An optimisation routine will be used to calculate the maximum available headroom. The aggregate maximum capacity will be increased beyond the initial allocation through the addition of generic additional wind and solar generation. The optimisation routine will:

- change the additional capacity (MW) of generic wind and generic solar
- keep the forecast curtailment in the selected reference year below the TNECL or TTCL
- seek to maximise aggregate maximum capacity on the network element, or the whole access rights network (the sum of the maximum capacities of the projects which have been granted access rights, and the capacity of additional generic wind and solar).

In each iteration of the optimisation routine, the routine will:

- choose a capacity (MW) of additional generic solar and wind generation
  - the Infrastructure Planner will start each headroom assessment with 0 MW of additional wind and solar.
- add expected capacity profiles for the generic solar and wind to the aggregate expected generation profile of the network element or the access rights network
  - the generic half hourly expected capacity factor profiles for wind and solar will be multiplied by the chosen capacity (MW) of generic wind and solar respectively, and the resultant expected capacity profile added to the aggregate expected generation profile of the projects that have been granted access rights, to create a potential expected generation profile for the network element or access rights network.
- calculate the annual forecast curtailment
  - the annual forecast curtailment on the network element or for the access rights network will be calculated following the steps outlined in Section 3.4
- compare with the TNECL or the TTCL, as relevant
  - the annual forecast curtailment on the network element will be compared against the TNECL, or the annual forecast curtailment on the access rights network against the TTCL, to determine if chosen amounts of generic additional wind and solar generation will breach the TNECL or TTCL.
- choose the next iteration of capacity (MW) of generic wind and solar
  - based on the comparison with the TNECL or TTCL, the model will choose new capacity (MW) of generic wind and solar and run the process again. It will continue to iterate until it has maximised the aggregate maximum capacity, while keeping forecast curtailment below the TNECL or TTCL.

Once the optimal MW of generic additional wind and solar have been determined, the headroom is then calculated as

$$\text{Headroom} = \text{MW Generic Solar} + \text{MW Generic Wind}$$

### 4. Calculate headroom for other combinations of solar and wind capacity

The headroom calculated in Step 3 is the maximum headroom that could be declared. However, this is dependent on a specific combination of wind and solar capacity, which may not reflect the economically optimal combination of wind and solar connected to the access rights network, or the proportions of projects in development. As a result, the Infrastructure Planner may decide not to increase the aggregate maximum capacity cap by the full amount of headroom calculated. To inform this decision, the Infrastructure Planner will also calculate the headroom for other capacity combinations of generic solar and wind generation.

The Infrastructure Planner will calculate headroom following the same method, but imposing other restrictions on the optimisation routine to align with potential generation mixes, such as:

- the generation mix of known projects that are in development
- the economically optimal generation mix that was modelled for the calculation of the TTCL
- high wind and high solar scenarios

The Infrastructure Planner may also consider the headroom available for the whole REZ with different ratios of generation planting between the network element and the rest of the REZ.

The Infrastructure Planner will consider both the maximum headroom and the headroom calculated from other potential generation combinations when determining the extent to which the aggregate maximum capacity cap for the access rights network can be increased.

The increase to the aggregate maximum capacity cap is calculated by:

$$\begin{aligned} & \text{Increase to aggregate maximum capacity cap} \\ &= \text{declared headroom} + \sum \text{MW of projects with access rights} \\ & - \text{initial aggregate maximum capacity cap} \end{aligned}$$

For information on the requirements for the Infrastructure Planner to notify of a draft headroom assessment, and consider submissions in response to this, please see Section 3.2 above, or the [Access Scheme Declaration](#) clauses 10(4) and 10(5).

# Question and Answers

## Question 1: What was the method to calculate the 3.86% target curtailment level?

Modelling to arrive at the TTCL of 3.86% incorporated wind capacity profiles based on wind measurements in South West REZ. This was described in the [South West REZ Access Scheme Supplementary Position Paper](#) published in December 2023.

The TTCL was calculated considering the forecast technical curtailment on the access rights network during the period when the South West REZ has 2,500 MW of transfer capacity operational. The assumed installed generation was developed by modelling the economically optimal wind and solar generation build out throughout the NEM and considering the build in the South West REZ during the chosen time period. This generation build is based on the same assumptions as the ISP, other than the wind capacity profiles in South West REZ, and does not consider storage.

Under the South West REZ Access Scheme Declaration, the TTCL will remain the same for the initial term of the access scheme.

## Question 2: Can the generation technology mix that was used to derive the TTCL be provided?

The TTCL represents a forecast of curtailment levels for use in the allocation of access rights but does not represent a promise on actual curtailment outcomes. It is expected that proponents may undertake their own due diligence to assess curtailment. The portfolio mix used to derive the TTCL will not be published so as not to pre-empt the outcome of access tenders and the assessment of projects based on their performance against the criteria documented in the tender guidelines.

## Question 3: Will there be any protections/compensation to Proponents if curtailment exceeds the 3.86% TTCL?

The TTCL is an indicator of forecast curtailment (as defined in the access scheme) based on current modelling and does not represent a promise of actual curtailment outcomes for any particular project. As such, there will not be any compensation in a situation where a project experiences greater curtailment than the TTCL. However, the TTCL governs the Infrastructure Planner's power to grant access rights through a process that models transmission curtailment on the access rights network at a point in time.

The TTCL does not reflect the expected curtailment of any individual project connecting to the access rights network, which will also be subject to any technical curtailment driven by factors beyond the boundary of the access rights network as well as economic curtailment. The access right is not intended to wholly remove locational price signals for generators, but rather to give projects enough information to accurately assess these risks.

## Question 4: How do the forecast curtailment and headroom calculations treat stand-alone storage and hybrid projects given that they can either alleviate or worsen congestion depending on how they operate?

The calculation of the TTCL was based on solely wind and solar projects, as these technologies have readily available regionally specific expected generation profiles. As the behaviour of storage and other dispatchable technologies is in part driven by price signals and the bidding behaviour of projects around them, a generic storage trace cannot be developed. The Infrastructure Planner will not consider a generic storage trace to represent potential future storage capacity and will calculate headroom taking into account the generation and storage access rights holders and potential future wind and solar generation.

For the purposes of calculating forecast curtailment and recommending access rights, the Infrastructure Planner will consider storage traces provided by proponents, and may use this profile or create expected profiles taking into account the expected capacity profiles of other proposed and connected projects.

For the purposes of granting access rights, the Infrastructure Planner may conduct further due diligence on the traces used by the Infrastructure Planner in the application process or by the Consumer Trustee during the competitive tender process. Subject to due diligence, these traces will be used as representative of the project to calculate the forecast curtailment as outlined in Section 3.4. For hybrid projects, all traces of project components behind the same connection point will be added to create a trace for that connection point with an upper limit set at the maximum capacity of the project.

### **Question 5: Will the Infrastructure Planner or the Network Operator provide a tool/forecast for the bidders to calculate/use for Marginal Loss Factor (MLF) for the whole REZ that is “bankable”?**

No, these are matters for generators to consider and analyse as needed in making informed decisions. Generators connected to the access rights network will be settled at the existing regional reference node (RRN) and projects (connection points in relation to which access rights are held) will have individual MLFs determined by AEMO under the NER. No regulations modifying the NER approach to the determination of MLFs are proposed.

### **Question 6: How is the Infrastructure Planner planning to let the market know headroom availability and the process for allocating access rights under headroom?**

The Infrastructure Planner will conduct a headroom assessment when the initial allocation is exhausted. Following the initial allocation, any headroom available will be notified to the Consumer Trustee, Access Right Holders and published on the Infrastructure Planner’s website in line with the requirements under the South West REZ Access Scheme Declaration.<sup>35</sup>

### **Question 7: Will different maximum capacities be applied to different periods of the day?**

The South West REZ Access Scheme Declaration currently considers a single capacity period for a 24-hour day. However, different maximum capacities in different periods may be introduced in the future following a consultation process<sup>36</sup>. Once introduced, different aggregate maximum capacity caps would apply across different time-of-day periods.

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<sup>35</sup> Clause 10(4) of the South West REZ Access Scheme Declaration.

<sup>36</sup> Clause 7(5) of the South West REZ Access Scheme Declaration.

