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Sia Lagos

Registrar

Important Information

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Concise Statement

No. of 2024

Federal Court of Australia
District Registry: Queensland
Division: General

AUSTRALIAN ENERGY REGULATOR

Applicant

CALLIDE POWER TRADING PTY LTD (ACN 082 468 719)

Respondent

A OVERVIEW

1. In this proceeding, the Applicant (**AER**) alleges that the Respondent (**CPT**), in respect of the Callide C4 *generating unit*¹ of the Callide C Power Station (**Callide C PS**), contravened r 4.15(a)(1) and cl 5.2.5(a)(1) of the *National Electricity Rules (NER)*, on 25 May 2021, by failing to ensure that its *plant* met or exceeded certain *performance standards*, and by failing to plan and design its *facilities* and/or ensure that they are operated to comply with the *performance standards* applicable to those *facilities*.

B IMPORTANT FACTS GIVING RISE TO THE CLAIM

B1 Callide C PS

2. Callide C PS is a power station which generates electricity at Mount Murchison, Queensland. Callide C4 is a *synchronous generating unit* at Callide C PS. CPT is the *Scheduled Generator* and a *Registered Participant* in respect of Callide C4.
3. At all relevant times, and on 25 May 2021:
 - (a) The Callide C4 *generating unit* was a coal-fired steam turbine, capable of generating up to 420MW of alternating current (**AC**) electricity at a *voltage* of 19.5kV. The Callide C4 switchyard had a *connection point*, at which it connected and supplied electricity to the *transmission network* (via the Calvale substation) and the *power system* more generally, at a *voltage* of 275kV.

¹ Terms defined in Chapter 10 of the NER are italicised where they appear in this Concise Statement. The NER Chapter 10 definitions are set out in the attached glossary.

Filed on behalf of (name & role of party) Australian Energy Regulator, the Applicant
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- (b) The *generating unit* had various auxiliary plant, which operated on AC power at 6.6kV or 415V, and included mechanisms to support the safe operation, cooling and lubrication of the *generating unit*. A transformer between the *generating unit* and the auxiliary plant converted the AC power *voltage* down from 19.5kV to 6.6kV to supply that plant (**unit transformer**). A further transformer between the *generating unit* and the *connection point* converted the AC power *voltage* up from 19.5kV to 275kV in order to connect to the *power system* (**generator transformer**).
- (c) The Callide C PS also had systems for controlling and monitoring the *generating unit*, and *protection systems*, which required 220V direct current (**DC**) power. Callide C4 could obtain DC power from a Callide C4 battery and battery charger (preferred) or from a shared station battery and charger (stand by). Each of the battery chargers required 415V AC power.

B2 The Callide Standards

- 4. Where a person wishes to establish a connection to a *network*, that person must negotiate and enter into a *connection agreement* with the relevant *Network Service Provider*: cl 5.3.7(a) of the NER. The *connection agreement* must include *performance standards* in relation to certain technical requirements: see cl 5.3.7(b) of the NER.
- 5. At all relevant times from 29 August 2008 onwards, there was a *performance standard* dated 29 August 2008 which applied to the Callide C PS *generating system*, including Callide C4 (**Callide Standards**). The Callide Standards included the following:
 - (a) Each *generating unit* has primary *protection systems* to disconnect from the *power system* any faulted element within the protection zones that include the *connection point*, the *generating unit* stator winding or any *plant* connected between them: cl 3.6 (**Protection System Standard**).
 - (b) Each primary *protection system* has sufficient redundancy to ensure that a faulted element within its protection zone is disconnected from the *power system* within the applicable *fault clearance time* with any single protection element (including any communications facility upon which that *protection system* depends) out of service: cl 3.6 (**Fault Clearance Standard**).
 - (c) Each *synchronous generating unit* has a *protection system* to promptly disconnect it in the event of pole slipping: cl 3.7 (**Pole Slip Standard**).
- 6. Under the NER, CPT was obliged:
 - (a) by cl 4.15(a)(1), as a *Registered Participant*, to ensure that its *plant* met or

exceeded the *performance standards* applicable to its *plant*; and

- (b) by cl 5.2.5(a)(1), as a *Generator*, to plan and design its *facilities* and ensure that they were operated to comply with the *performance standards* applicable to those facilities.

B3 The Callide C4 protection systems

7. On 25 May 2021, the Callide C4 *generating unit* had a variety of protection systems. Specifically, these included: (a) the 19.5kV and 6.6kV plant *protection system* (**Generator Protection System**); (b) the X generator transformer differential *protection system* (**X Differential Protection System**); and (c) the Y overall differential *protection system* (**Y Differential Protection System**).
8. The Generator Protection System provided protection from events such as loss of excitation, pole slip and reverse power. Such events can cause a *generating unit* to operate in an unstable fashion, threatening the secure and stable operation of the *power system* and with the potential for significant plant damage.
9. The Generator Protection System had two “protection zones” (as that term is used in the Callide Standards) – one bounded by the Callide C4 generator circuit breaker (**GCB protection zone**), and the other by the circuit breaker at the Calvale substation (**Calvale protection zone**). The function of the circuit breakers in this context is to disconnect the *generating unit* from the *power system*, upon the occurrence of events such as those identified in [8] above.
10. The X Differential Protection System provided protection from *short circuit faults* in the primary equipment connected between the high voltage side of the generator transformer, the high voltage side of the unit transformer, and the *generating unit*. The Y Differential Protection System provided protection from *short circuit faults* in the primary equipment connected between the high voltage side of the generator transformer, the low voltage side of the unit transformer, and the *generating unit*. Their respective “protection zones” were bounded by the *generating unit* and the circuit breaker at the Calvale substation (**differential protection zones**).
11. For each of the protection zones, the “elements within the protection zone” included the *generating unit*. The “protection elements” of each of the *protection systems*, as that term is used in the Callide Standards, relevantly included the supply of DC power (in the sense that the *protection systems* could not function without it).
12. In respect of the Fault Clearance Standard, the applicable *fault clearance times* at Callide C4 were as follows: (a) for the Generator Protection System, “as necessary to

prevent plant damage and meet stability requirements”; (b) for the X Differential Protection System, 100 ms; and (c) for the Y Differential Protection System, 110 ms.

B4 Events on 25 May 2021

13. On 25 May 2021, CPT (or alternatively CS Energy Ltd ACN 078 848 745, which operated Callide C PS on behalf of CPT and other entities) was engaged in completing a procedure of replacing the C4 battery charger.
14. The previous day, in the course of that procedure, CPT had configured Callide C4 so that DC power was supplied (via its main 220V DC switchboard) by the station battery and battery charger.
15. At about **13:33** on 25 May 2021, CPT switched Callide C4’s DC power supply (via its main 220V DC switchboard) from being connected to the station battery and battery charger to being connected to the C4 battery charger. The C4 battery was still disconnected from the system. Upon switching, the C4 battery charger failed to supply DC power to the main 220V DC switchboard.
16. Subsequently, and as a consequence, there was a loss of DC supply to the control circuits of the 6.6kV incomer circuit breakers, causing those circuit breakers to trip. This caused a loss of AC power supply to the 6.6kV system. There was also a loss of DC supply to the *generating unit’s* monitoring and control systems, and to the Generator Protection System.
17. Because of the loss of AC supply to the 6.6kV system: (a) there was a loss of AC supply to all 415V switchboards on Callide C4, including the 415V input supply to the C4 battery charger; (b) without the 415V input supply, the C4 battery charger could not recover DC voltage and resume DC power supply; and (c) there was a loss of AC power to the auxiliary plant, which ceased to function.
18. In those circumstances, the Callide C4 *generating unit* lost steam, stopped *generating* and began motoring asynchronously. Relevantly: (a) the C4 *generating unit* lost excitation; (b) there was a pole slip in the C4 *generating unit*; and (c) there was reverse power when the C4 *generating unit* began motoring instead of generating.
19. However, because there was no DC power supply, the Generator Protection System failed to operate. Relevantly, at about 13:33, despite the events referred to in [18] above, the Generator Protection System failed to cause the generator circuit breaker to disconnect the *generating unit* from the *power system*, as it should have done.
20. As a result of the matters in [15] to [19] above, the Callide C4 *generating unit* was operated asynchronously for an extended period of time, ultimately leading to its

catastrophic failure and plant damage.

21. At **14:06**, among other things, at Callide C4 there was: (a) a two-phase *short circuit fault* in the *generating unit* (**first short circuit fault**); and (b) a single phase-to-ground *short circuit fault*, followed by a double phase-to-ground *short circuit fault*, both within the 275kV system (**second and third short circuit faults**).
22. However, because there was no DC power supply, each of the X and Y Differential Protection Systems failed to operate. Relevantly, at about 14:06, despite the *short circuit faults* referred to in [21] above, each of the X and Y Differential Protection Systems failed to disconnect the *generating unit* (and/or the 275kV plant, in respect of the second and third *short circuit faults*) from the *power system*, as they should have done. Rather: (a) all lines out of the Calvale 275kV substation tripped at the remote ends only; and (b) Callide C4 disconnected from the *power system* only when the entire Calvale 275kV substation was disconnected, thus clearing the sustained fault.

C RELIEF SOUGHT FROM THE COURT

23. The AER seeks against CPT declarations, civil penalties, and orders for remedying the breach or preventing recurrence, under s 44AAG(1)(b) and (2)(a) and (c) of the *Competition and Consumer Act 2010* (Cth) as set out in the Originating Application, as well as its costs.

D LEGAL GROUNDS FOR RELIEF SOUGHT

D1 Failure to meet the Fault Clearance Standard and/or the Protection System Standard

24. By reason of the matters in [7] to [9] and [11] to [20] above, on 25 May 2021, in respect of the Callide C4 *generating unit*, there was one or more faulted elements (within the meaning of the Callide Standards) within the GCB protection zone of the Generator Protection System. However, the Generator Protection System failed to disconnect the Callide C4 *generating unit* from the *power system* within the applicable *fault clearance time* (i.e. as necessary to prevent plant damage and meet stability requirements).
25. Further, by reason of the matters in [7], [10] to [17] and [21] to [22] above, on 25 May 2021, in respect of the Callide C4 *generating unit*, there was one or more faulted elements (within the meaning of the Callide Standards) within each of the differential protection zones of, respectively, the X and Y Differential Protection Systems. However, each of the X and Y Differential Protection Systems failed to disconnect the Callide C4 *generating unit* (and/or the 275kV plant in respect of the second and third *short circuit faults*) from the *power system* within the applicable *fault clearance times*

(i.e. respectively 100 ms and 110 ms).

26. Further, in the circumstances set out in [7] to [22] above, each of the Generator Protection System and the X and Y Differential Protection System lacked sufficient redundancy to ensure that the *generating unit* was disconnected from the *power system* within the applicable *fault clearance times*. In particular, there was no alternative (redundant) DC supply to any of those *protection systems*, including because an “automatic change over switch” intended to automatically change DC power supply to the Callide C4 220V DC distribution board (supplying the Y Differential Protection System) from the C4 battery and charger to the station battery and charger (stand by) was not functioning.
27. By reason of the matters set out in [24] to [26] above, on 25 May 2021:
- (a) the Callide C4 *generating unit* failed to meet or exceed the Protection System Standard; and/or
 - (b) each of the Generator Protection System and the X and Y Differential Protection Systems failed to meet or exceed the Fault Clearance Standard;

in that each of the Generator Protection System and the X and Y Differential Protection Systems lacked sufficient redundancy to ensure that the *generating unit* (and/or the 275kV plant, in respect of the second and third *short circuit faults*) (the faulted element) was disconnected from the *power system* within the applicable *fault clearance time* with the DC power supply to the *generating unit* (the protection element) out of service.

D2 Failure to meet the Pole Slip Standard

28. In the circumstances set out in [7] to [9] and [13] to [20] above, the Callide C4 *generating unit's protection systems* failed to promptly disconnect it from the *power system* upon the occurrence of the pole slip referred to in [18](b) above, and/or were not capable of doing so, and therefore it failed to meet or exceed the Pole Slip Standard.

D3 Contraventions of r 4.15(a)(1) and cl 5.2.5(a)(1) of the NER

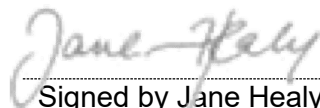
29. By reason of each of the matters set out in [27] and [28] above, and in respect of each of those matters individually:
- (a) in contravention of r 4.15(a)(1) of the NER, CPT failed to ensure that its *plant* (the Callide C4 *generating unit* and/or each of the Generator Protection System and the X and Y Differential Protection Systems, including the DC power supply to the *generating unit*) met or exceeded the Callide Standards, being a *performance standard* applicable to that *plant*; and

- (b) in contravention of cl 5.2.5(a)(1) of the NER, CPT (i) failed to plan and design its *facilities* (the Callide C4 *generating unit*); and/or (ii) failed to ensure that those *facilities* were operated, to comply with the Callide Standards, being a *performance standard* applicable to those *facilities*.
30. Each of r 4.15(a) and cl 5.2.5(a) is prescribed by s 2AA(1)(c) of the *National Electricity (Queensland) Law* (Qld) (**NEL**) and reg 6 of the *National Electricity Regulations* (SA)² to be a *tier 1 civil penalty provision*, with a maximum penalty of \$10,000,000.

E ALLEGED HARM

31. Callide C4's prolonged period of asynchronous operation resulted in: (a) its absorption of a large amount of *reactive power*; (b) *short circuit faults* at Callide C4; (c) widespread under-voltages and over-voltages on the National Electricity Market (**NEM**) in Central Queensland; (d) the tripping of nine major *generating units* and loss of 3,045MW in generation; (e) customer load shedding of approximately 2,300MW, disconnecting customers in Queensland and northern New South Wales; and (f) the tripping of major transmission lines, including the separation of Queensland from the rest of the NEM. These circumstances, resulting from the contraventions, posed a risk to the stability of the power system and required AEMO to activate the Reliability and Emergency Reserve Trader (**RERT**) at significant cost to market participants. The catastrophic failure of Callide C4 (a major *generating unit*) and resulting plant damage resulted in it being out of service until approximately mid-2024. In the period after 25 May 2021, the wholesale spot price for electricity in Queensland was higher in comparison to the previous year, and also in comparison to the preceding period.

Date: 9 February 2024



Signed by Jane Healy, Senior Executive Lawyer
for and on behalf of the Australian Government Solicitor
Lawyer for the Applicant

This Concise Statement was prepared by Matthew Peckham of Counsel and settled by Nicholas De Young KC.

² The *National Electricity Regulations* (SA) apply as a law of Queensland, pursuant to s 2 of the NEL (Qld).

GLOSSARY OF DEFINED TERMS

The definitions are derived from Chapter 10 of the NER, unless stated otherwise.

<i>civil penalty provision</i>	Has the meaning given by s 2AA of the NEL (Qld).
<i>connect</i>	To form a physical link to or through a <i>transmission network</i> (including to a <i>network connection asset</i> or a <i>dedicated connection asset</i> that is physically linked to that <i>transmission network</i>) or <i>distribution network</i> .
<i>connection point</i>	Relevantly, the agreed point of <i>supply</i> established between <i>Network Service Provider(s)</i> and another <i>Registered Participant</i> [or <i>Code Participant</i>], <i>Non-Registered Customer</i> or <i>franchise customer</i> .
<i>facilities</i>	<p>A generic term associated with the apparatus, equipment, buildings and necessary associated supporting resources provided at, typically:</p> <ul style="list-style-type: none">(a) a power station or generating unit;(b) a substation or power station switchyard;(c) a control centre (being a AEMO control centre, or a distribution or transmission network control centre);(d) facilities providing an <i>exit service</i>.
<i>fault clearance time</i>	In respect of a <i>fault type</i> , the time within which the <i>protection system</i> is designed, operated and maintained to clear a <i>short circuit fault</i> of that <i>fault type</i> within its protection zone.
<i>generation</i>	The production of electrical power by converting another form of energy in a <i>generating unit</i> .
<i>generating unit</i>	The plant used in the production of electricity and all related equipment essential to its functioning as a single entity.
<i>generating system</i>	<ul style="list-style-type: none">(a) Subject to paragraph (b), for the purposes of the <i>NER</i>, a system comprising one or more <i>generating units</i>.(b) For the purposes of clause 2.2.1(e)(3), clause 4.9.2, Chapter 5 and a <i>jurisdictional derogation</i> from Chapter 5, a system comprising one or

more *generating units* and includes auxiliary or *reactive plant* that is located on the *Generator's* side of the *connection point* and is necessary for the *generating system* to meet its *performance standards*.

Generator

A person who engages in the activity of owning, controlling or operating a *generating system* that is *connected* to, or who otherwise *supplies* electricity to, a *transmission system* or *distribution system* and who is registered by AEMO as a *Generator* under Chapter 2.

national grid

The sum of all *connected transmission systems* and *distribution systems* within the *participating jurisdictions*.

network

The apparatus, equipment, plant and buildings used to convey, and control the conveyance of, electricity to customers (whether wholesale or retail) excluding any *connection assets*. In relation to a *Network Service Provider*, a *network* owned, operated or controlled by that *Network Service Provider*.

performance standards

A standard of performance that:

- (a) is established as a result of it being taken to be an applicable performance standard in accordance with clause 5.3.4A(i); or
- (b) is included in the register of *performance standards* established and maintained by AEMO under rule 4.14(n),

as the case may be.

plant

Relevantly, in relation to a connection point, includes all equipment involved in generating, utilising or transmitting electrical *energy*.

power system

The electricity power system of the *national grid* including associated *generation* and *transmission* and *distribution networks* for the *supply* of electricity, operated as an integrated arrangement.

protection system

A system, which includes equipment, used to protect a *Registered Participant's facilities* from damage due to an

electrical or mechanical fault or due to certain conditions of the *power system*.

reactive power

The rate at which *reactive energy* is transferred.

Reactive power is a necessary component of alternating current electricity which is separate from *active power* and is predominantly consumed in the creation of magnetic fields in motors and *transformers* and produced by *plant* such as:

- (a) alternating current generators;
- (b) capacitors, including the capacitive effect of parallel *transmission* wires; and
- (c) *synchronous condensers*.

Registered Participant

Relevantly, with certain exclusions or extensions, a person who is registered by *AEMO* in any one or more of the categories listed in rr 2.2 to 2.7 of the *NER*.

Scheduled Generator

A *Generator* in respect of which any *generating unit* is classified as a *scheduled generating unit* in accordance with Chapter 2.

short circuit fault

A fault having a metallic conducting path between any two or more conductors or between any conductor and ground, including touching conductors and faults through earthing facilities, and excluding faults within equipment at a station.

synchronous generating unit

The alternating current generators of most thermal and hydro (water) driven power turbines which operate at the equivalent speed of the *frequency* of the *power system* in its *satisfactory operating state*.

tier 1 civil penalty provision

Has the meaning given by reg 6 of the *National Electricity Regulations* (SA).

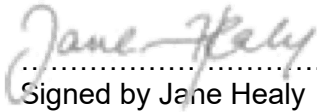
voltage

The electronic force or electric potential between two points that gives rise to the flow of electricity.

CERTIFICATE OF LAWYER

I, Jane Healy, certify to the Court that, in relation to the Concise Statement filed on behalf of the Applicant, the factual and legal material available to me at present provides a proper basis for each allegation in the pleading.

Date: 9 February 2024



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Signed by Jane Healy
for and on behalf of the Australian Government Solicitor
Lawyer for the Applicant