



Application form for the issue of an Electricity Generation Licence

by the Essential Services Commission of SA under the
Electricity Act 1996

August 2017

Enquiries concerning this application form should be addressed to:

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Licence requirements and conditions

It is essential that licence applicants read the Essential Services Commission's (**Commission**) Advisory Bulletin No 4 – "*Licensing Arrangements for the Electricity and Gas Supply Industries*" before they fill out this form. This Bulletin is available on the Commission website www.escosa.sa.gov.au under electricity/licensing.

Generation operations which require a licence

Section 15(2)(a) of the *Electricity Act 1996 (Act)*¹ is explicit in that it requires a person that carries on the operation of the generation of electricity to hold a licence. This requirement applies to all generators with the exception of a generator that can rely on:

- (1) one of the statutory exemptions specified in the Electricity (General) Regulations 1997 (**Regulations**) outlined below;
- (2) an individual exemption issued by the Commission (with the approval of the Minister) pursuant to section 80(1) of the Act; or
- (3) an exemption made by Governor under a regulation pursuant to section 98(2)(e) of the Act.

Pursuant to Regulations 6(1) and (2), the following generators are exempt from the requirement to hold a generation licence:

- ▶ a generator whose generating plant has a rated nameplate output of 100kVA or less;
- ▶ a generator that does not supply electricity for reward to or by means of a transmission or distribution network;
- ▶ a generator that generates electricity for the sole consumption of that generator or a designated body (such bodies must be designated by the Minister²); or
- ▶ a generator that generates electricity for a person at a premises occupied or used by the person as a tenant or licensee (whether directly or indirectly) of the generator (or a designated body) where that person is not charged for the supply of electricity except by a licensed retailer/generator or as an unspecified part of rent or charges for the occupation or use of the premises.

It is important for generators (or proposed generators) to carefully consider whether they can rely on a statutory exemption from the requirement to be licensed. If the reliance on a statutory exemption is queried by the Commission, the onus to provide evidence that a particular exemption can be relied upon is on the relevant generator.

In addition, in the event that the operations of a generator change so that it can no longer rely on one of the three exemptions specified above, it will need to apply to the Commission for a generation licence immediately in order to continue those operations.

Mandatory licence conditions

Sections 21(1) and 22 of the Act requires the Commission to place certain mandatory conditions in generation licences. The Commission strongly recommends that applicants review these mandatory conditions. Applicants must be familiar with the relevant conditions and confident that they can comply with the conditions.

Additional technical licence conditions

Additional technical licence conditions apply to all new electricity generators seeking to connect to the South Australian power system. Applicants for a generation licence should familiarise

¹ Available at <https://www.legislation.sa.gov.au/LZ/C/A/ELECTRICITY%20ACT%201996.aspx>

² To date, the Minister for Energy and Resources has not designated any bodies for the purposes of Regulations 6(1).

themselves with the Commission's Inquiry into the licensing arrangements for generators in South Australia final report, available on the Commissions website.³

Model licence conditions reflecting the Inquiry findings and conclusions have been developed and are available in Appendix 1. The model conditions will be applicable to all new applications, having regard to advice from the Australian Energy Market Operator (**AEMO**) on the specific circumstances of individual applications received.

Depending on the specific characteristics of a given generation project, the model conditions may be varied to the degree necessary to ensure that South Australian consumers' long-term interests with respect to the price, quality and reliability of electricity services are protected.

Annual licence fees

Holding a licence incurs annual licence fees. The licence fees determined by the Minister for Resources and Energy are administered by the Commission. At annual intervals, the Commission, on behalf of the Minister, will send to each licensee, depending on the category within the sector, an invoice for the licence fee. Licence fees are to be paid on receipt of an invoice via one of the payment options set out in the invoice.

The initial licence will not be issued until the first annual licence fee (or approved licence fee instalment) has been paid.

³ Refer: <http://www.escosa.sa.gov.au/projects-and-publications/projects/inquiries/inquiry-into-licensing-arrangements-under-the-electricity-act-1996-for-inverter-connected-generators/inquiry-into-licensing-arrangements-under-the-electricity-act-1996-for-inverter-connected-generators>

supporting information will be made available on the Commission's website and in hard copy from the Commission's office for this purpose.

If applicants believe that they are providing confidential information when completing this form they should write "this information is confidential" after any such information. It is the applicant's responsibility to ensure this is clearly highlighted on the form. Applicants should also provide a 'non-confidential' version of the form capable of publication on the Commission's website.

The Commission will use information supplied in applications and in support of applications in accordance with the requirements of Part 5 of the Essential Services Commission Act 2002. Applicants claiming confidentiality are encouraged to familiarise themselves with Part 5. Applicants should note that the Commission may disclose confidential information in some circumstances.

Further information

Applicants should note that the Commission may ask applicants who have submitted an application form to provide further information to the Commission, or to clarify the information that they have already provided if required.

Please note that, in the event that an application lacks sufficient detail and the Commission is required to request additional information from an applicant, delays in the assessment of the application may occur.

Licence Application Form

1 The Applicant

1.1 Identity of Applicant

Greentricity Pty Limited, a wholly owned subsidiary of AGL Energy Limited (AGL) and part of the AGL consolidated group. AGL provides the financial, technical and human resources of the Applicant.

1.2 Legal Identity of Applicant

Greentricity Pty Limited ACN 122 144 709 registered in NSW.

1.3 Address and Contact Details of Applicant

Business Address:

200 George St
Sydney, NSW 2000
T: 03 8633 6000

Postal Address:

Locked Bag 1837
St Leonards, NSW 2065

1.4 Contact Person on behalf of Applicant

Meng Goh, Senior Manager Wholesale Market Regulation

T: 02 9921 2221

E-mail: MGoh@agl.com.au

Business Address: 200 George St, Sydney, NSW 2000

Postal Address: Locked Bag 1837, St Leonards, NSW 2065

1.5 Contact Person for Licence Fees

Meng Goh, Senior Manager Wholesale Market Regulation

T: 02 9921 2221

E-mail: MGoh@agl.com.au

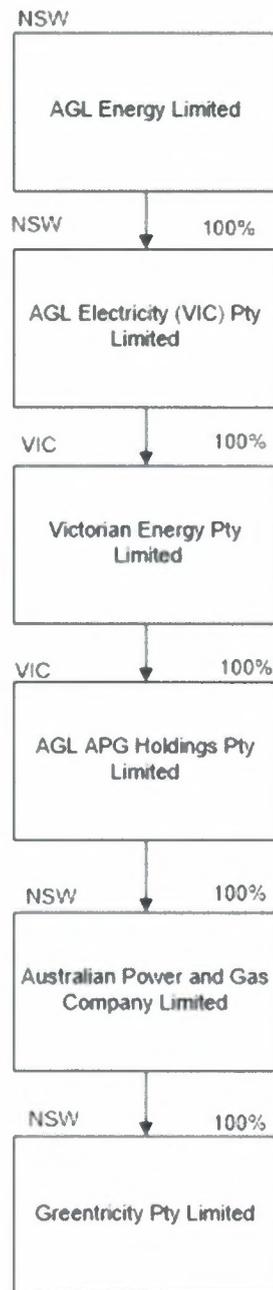
Business Address: 200 George St, Sydney, NSW 2000

Postal Address: Locked Bag 1837, St Leonards, NSW 2065

1.6 Diagram of Corporate or other Structure

AGL performs the functions, roles and responsibilities of its 100% owned subsidiary entities, including Greentrlicity. Key personnel involved in the operation of Greentrlicity's activities are outlined in section 3.9 and 3.10.

The ownership structure of Greentrlicity is outlined below:



2 The Licence

2.1 Date from which Licence is sought

30th January 2018

2.2 Nature and scope of operations for which Licence is sought

The Energy Storage for Commercial Renewable Integration (ESCRI) battery is being developed as part of a demonstration project with the Australian Renewable Energy Agency.

The battery is intended to play several roles: a generator; a load; a provider of system ancillary services; and/or a provider of network services.

Greentricity is therefore seeking a generation licence for the ESCRI battery.

The battery is a 30MW Lithium Ion Battery and will be connected at 33kV to the ElectraNet Dalrymple substation on the Yorke Peninsula.

The ESCRI battery will be owned and physically maintained by ElectraNet.

Greentricity will have remote control over the battery with regard to charging and discharging, and will trade generation and load from the ESCRI battery within the NEM. Remote operation of the ESCRI battery will occur from the AGL Dispatch Centre that also controls AGL's wind farms at Hallett and Wattle Point.

3 Suitability of applicant to hold a licence

3.1 Standard of honesty and integrity shown by Applicant

Greentricity has never:

- been found guilty of any criminal offence
- been successfully prosecuted under any Territory, State or Commonwealth legislation (such as the Australian Securities and Investments Commission Act 2001 or the Competition and Consumer Act 2010)
- been the subject of disciplinary action
- been the subject of any past or present administrative or legal actions in relation to an authorisation, authority, or licence in any industry.

3.2 Standard of honesty and integrity shown by Officers and major shareholders of Applicant

AGL requires a high standard of honesty and integrity from its officers and employees.

The AGL Code of Conduct (Attachment A) is a publicly available document that enables external parties and stakeholders to understand how they can expect to be treated when they interact with AGL.

The Code of Conduct sets out the ethical behaviour expected of all employees: to behave with honesty, integrity and lawfully. It sets out overarching principles of ethical behaviour and explains:

- The obligations of AGL to assist all employees and contractors to act in accordance with these principles.
- How AGL's employees and contractors should act consistently with the principles.

In addition, AGL maintains internal policies and procedures such as:

- Fraud and Corruption Risk Control Policy
- Whistleblower Policy

3.3 Names and addresses of the Officers of Applicant

[REDACTED]	[REDACTED]		
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED]

3.4 Names and addresses of major shareholders of Applicant

Full Name	AGL Energy Limited (ABN 74 115 061 375)		
Date of Birth	Not applicable		
Title held	Not applicable		
Business Address			
Street	200 George Street		
Suburb	Sydney		
State	NSW	Post Code	2000

3.5 Details of the group members

Greentricity does not control any entities.

As outlined in section 1.6, Greentricity is a wholly owned subsidiary of AGL and is part of the AGL consolidated group.

3.6 Additional information

Please answer the following questions.

- ▶ Is the applicant a resident of, or does it have permanent establishment in, Australia? Where the answer to this question is no, please provide further detail.

Yes

- ▶ Is the applicant under external administration (as defined in the Corporations Act 2001) or under a similar form of administration under any laws applicable to it in any jurisdiction? Where the answer to this question is yes, please provide further detail.

No

- ▶ Is the applicant immune from suit in respect of the obligations under the Electricity Act 1996? Where the answer to this question is yes, please provide further detail.

No

- ▶ Is the applicant capable of being sued in its own name in a court of Australia? Where the answer to this question is no, please provide further detail.

Yes

3.7 Financial resources available to the Applicant

AGL is one of Australia's top 50 listed companies and is Australia's largest private owner, operator, and developer of over 1800 MW renewable generation assets. AGL has Australia's largest retail energy and dual fuel customer base, retailing natural gas, electricity and energy-related products and services to over 3.6 million customer accounts. AGL's FY17 revenue is over \$12.5 billion.

Greentricity does not prepare a separate financial report. Its financial accounts are consolidated in the AGL Energy Limited Annual Financial report, which can be accessed from this link:

<https://www.agl.com.au/about-agl/investor-centre/reports-and-presentations/financial-results..>

3.8 Additional Details of Structure of Applicant

Please refer to the comments in section 1.6 regarding Greentricity's relationship with AGL.

Greentricity is not party to a partnership, joint venture or alliance agreement with any other companies.

3.9 Human resources available to the Applicant

Greentricity is fully supported by AGL in carrying out its functions. This includes the teams lead by:

- Richard Wrightson: Executive General Manager, Wholesale Markets. Richard has over 22 years' experience in wholesale energy markets in the UK and Australia. Before commencing at AGL in 2010, Richard was involved in the UK electricity industry in the contract and trading areas of two of the largest generators, PowerGen and British Energy. His significant experience in the Australian energy sector

includes consulting on the National Electricity Market commencement, as well as working at the Electricity Trust of South Australia, the State Electricity Commission of Victoria and, Loy Yang Powers.

- Doug Jackson: Executive General Manager Group Operations. Doug joined AGL in 2013 as Chief Operating Officer in the former Merchant Energy division. He has over 35 years' experience in the power generation industry in North America and Australia. Prior to joining AGL, Doug worked in the United States and Canada as a Vice President with TransAlta and has an extensive career in the power generation industry, leading the operations and construction of electricity generation and mining assets. He manages the physical operation and maintenance of AGL's portfolio of wind, water, gas fired generation plants and mines.

3.10 Technical resources available to the Applicant

The resources for trading of electricity related to the ESCRI battery will be provided by the AGL Wholesale Markets led by the Executive General Manager, Richard Wrightson, under Head of Physical Markets Trading Melinda Buchannan.

The key technical resources in the Physical Markets Trading are under the control of Boris Basich, Manager Physical Electricity Trading.

The technical resources for the licensed activities will be provided by the AGL Group Operation led by the Executive General Manager, Doug Jackson, under General Manager Colin Mills for Gas and Renewable Group.

This group also provides technical resources for the Torrens Island Power Station and the five wind farms in South Australia

The key technical resources in the Gas and Renewable group are under the control of Simon Kelley, Renewables Manager.

The maintenance of the installation will be managed by ElectraNet, the Transmission Network Service Provider for South Australia.

3.11 Quality of Electricity Produced/Connection Agreement

Greentricity has entered into a Battery Operating Agreement with ElectraNet for the connection of the ESCRI battery to the Dalrymple substation. As per the Battery Operating Agreement, Electranet will be responsible for maintaining the battery.

A copy of the Battery Operating Agreement between Greentricity and ElectraNet is attached (Attachment B) – please note that this document is confidential and should not be published.

3.12 Risk Management

AGL maintains a Risk Policy and a Risk Management and Assessment Standard.

- The Risk Policy sets out AGL's commitment to ensure that risk management practices are embedded into all business processes and operations. It sets out key risk management objectives and key accountabilities.
- The Risk Management and Assessment Standard sets out AGL's approach to risk management, which is modelled on ISO 31000 and adapted to AGL's specific requirements. It provides guidance to AGL employees on how to conduct risk assessments and in doing so provides a consistent approach across AGL.

A copy of the Risk Management Assessment Standard is attached (Attachment C) – please note that this document is confidential.

3.13 Development Act Approval

ElectraNet has advised that approval under the Development Act 1993 (SA) was granted in October 2017.

3.14 Registration with AEMO

AGL will register the ESCRI battery with AEMO. AEMO has advised that their dispatch system currently requires batteries to be registered as both a generator and a load.

3.15 Licences held by the Applicant in other Australian jurisdictions.

Greentricity does not hold any electricity or gas licences in other Australian jurisdictions.

3.16 Previous unsuccessful licence applications in other Australian jurisdictions

Please state whether the applicant has applied for an electricity or gas licence in another Australian jurisdiction and not been issued with a licence, and provide details if relevant.

Greentricity has not applied for an electricity or gas licence in other Australian jurisdictions.

3.17 Licences held by Associates of the Applicant

If an associate of the applicant (within the meaning of the Corporations Act) holds an electricity or gas licence in South Australia or in other Australian jurisdictions, please provide details.

The AGL group of companies holds generation licences for the following facilities in South Australia:

- Torrens Island A (420MW)
- Torrens Island B (800MW),
- Wattle Point wind farm (93MW),
- Hallett wind farm (95MW)
- Hallett Hill wind farm (71MW),
- North Brown Hill wind farm (132MW)
- The Bluff wind farm (53MW)

In addition, the AGL group of companies holds a large portfolio of generation licences across Australia:

- Loy Yang A (2000MW),
- Dartmouth hydro (185MW),
- Somerton GT (170MW)
- McKay Creek Hydro (300MW),

- West Kiewa hydro (68MW),
- Eildon hydro (120MW)
- Macarthur wind farm (420MW),
- Oaklands Hill wind farm (63 MW)
- Bayswater (2800MW),
- Liddell (2200MW)
- Broken Hill Solar (53MW)
- Nyngan Solar (102MW)

3.18 Compliance Plans

A copy of AGL's draft Generator Compliance Program for Batteries is attached (Attachment D) – please note that this document is confidential and should not be published.

4 Factors specified in the Essential Services Commission Act 2002

The ESCRI battery is expected to provide benefits regarding the quality and reliability of electricity supply. It may also help to make electricity more affordable in South Australia.

The battery will provide fast frequency response (inertia) and frequency control ancillary services. This is expected to help improve the security and reliability of the electricity network, particularly in the context of increased levels of renewable energy generation.

The battery will help reduce the operating constraints on the Heywood interconnector with Victoria which, in turn, has the potential to place downward pressure on wholesale energy prices in South Australia.

Should the transmission line to the Yorke Peninsula cease to operate, the battery will assist in maintaining supply. The islanded battery will work together with the existing 90MW Wattle Point wind farm and rooftop solar PV in a microgrid to provide backup local supply until connection to the grid is restored.

More generally, the project is expected to demonstrate that utility scale batteries can be used to provide multiple concurrent benefits (and generate multiple revenue streams). By showing that it can deliver both regulated network services and competitive market services, it may encourage other energy developers to enter the market with battery projects.

5 Application fees

Applicants for a licence must pay to the Commission an application fee fixed by the Minister for Energy from time to time. This fee is presently set at \$1,000 per licence. Please enclose this fee with the application. An application cannot be considered until this fee has been received and cannot be refunded.

6 Declaration

All information in this application for the issue of a licence to authorise electricity generation operations in the electricity supply industry in South Australia must be verified by a Statutory Declaration of the applicant, in accordance with the provisions of the *Oaths Act 1936 (SA)*⁴, stating that the information contained in the application is true and correct to the best of the applicant's knowledge, information and belief.

Where the applicant is a body corporate, evidence of the relevant authority of the declarant to sign on behalf of the body corporate must also be provided to the Commission.⁵

Statutory Declaration

KHIR MENG GOH

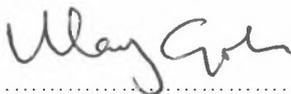
I

of 30 WESTERN CRESCENT, WESTLEIGH, NSW 2120

do solemnly and sincerely declare that the information contained in this Application for the issue of a licence to authorise electricity generation operations in the electricity supply industry in South Australia is true and correct to the best of my knowledge information and belief.

And I make this solemn declaration conscientiously believing the same to be true, and by virtue of the provisions of the *Oaths Act 1936*.

Date 20/10/17

Signature 

(Where the applicant is a body corporate, the declaration must be made by a person authorised by body corporate to sign on its behalf)

Declared at: SYDNEY this 20th day of OCTOBER 2017

Before me:  RYAN RATILAL, LEGAL PRACTITIONER

(Signature of Justice of the Peace or other person authorised under the *Oaths Act 1936*)

⁴ or equivalent legislation in other Australian jurisdictions.

⁵ The Commission will accept a copy of a Board minute (or circulating resolution) giving approval for the declarant to sign on behalf of the applicant as evidence of the relevant authority.

Attachment 1

2017 model licence conditions for new generators

Interpretation of this schedule

1. Interpretation

- 1.1. Terms used in this schedule and also in the National Electricity Rules (NER) have the same meaning in this schedule as they have in those rules (unless otherwise specified or unless the context otherwise requires).
- 1.2. For the purposes of this schedule, the term:

Commission - means the Essential Services Commission, established under the Essential Services Commission Act 2002.

continuous uninterrupted operation means that, for voltage disturbances within the continuous operating range (that is, connection point voltage fluctuating within 90 percent and 110 percent of normal voltage), active power must be maintained (unless there has been a change in the intermittent power source) and reactive power must be managed to meet voltage control requirements.

Disturbance ride through capability

2. Disturbance ride through capability – general requirements

- 2.1. The non-synchronous generating system must meet the following requirements:
 - (a) The low voltage ride-through activation threshold (LVRT), as measured at the low voltage (LV) terminals of the generating units and dynamic reactive support plant (as applicable), must not be less than 85 percent of nominal voltage.
 - (b) The generating system must maintain continuous uninterrupted operation for voltage disturbances as specified in clauses 3, 7 and 8.
 - (c) Where LVRT and high voltage ride-through (HVRT) requirements in the NER are specified in respect of the generating system's connection point, the withstand capability of individual generating units is to be determined at the LV side of the generating unit's transformer. All individual generating units must remain connected for connection point voltages within the LVRT/HVRT withstand requirements, irrespective of the generating system's transformer tap position.

3. Disturbance ride-through (reactive current injection)

- 3.1. The generating system must supply additional capacitive reactive current (reactive current injection) of up to 4 percent of the maximum continuous current of the generating system (in the absence of a disturbance) for each 1 percent reduction of connection point voltage below 90 percent of normal voltage, as shown in Table 1. This requirement applies at the LV terminals of the generating units and dynamic reactive support plant (as applicable) for power system disturbances resulting in a voltage reduction of up to 100 percent of normal voltage at the connection point.
- 3.2. The generating system must supply additional inductive reactive current (reactive current absorption) of up to 6 percent of the maximum continuous current of the generating system (in the absence of a disturbance) for each 1 percent increase in connection point voltage

above 110 percent of the normal voltage, as shown in Table 1. This requirement applies at the LV terminals of the generating units and dynamic reactive support plant (as applicable).

- 3.3. The reactive current injection must be maintained until the connection point voltage returns to within the range of 90 percent to 110 percent of normal voltage.

Table 1: Reactive current injection requirements

Reactive current response	Current injection gain (%)	Current absorption gain (%)	Minimum amount of contribution as percentage of rated current	Speed of contribution	
				Rise time (millisecond)	Settling time (millisecond)
Synchronous	4	6	250	30	N/A
Non-synchronous	4	6	100	30	60

- 3.4. The amount of reactive current injection required may be calculated using phase-to-phase, phase-to-ground, or sequence components of voltage. For the last method, the ratio of negative-sequence to positive-sequence current injection must be X.⁶

- 3.5. The generating system must comply with the following response characteristics for reactive current injection:

- (a) A rise time no greater than 30 milliseconds and a settling time no greater than 60 milliseconds applies to reactive current injection requirements.⁷
- (b) The reactive current injection requirements described above apply for all pre-disturbance reactive power control modes (voltage control, power factor control and reactive power control).⁸
- (c) The reactive current response must be adequately damped as defined in the NER.
- (d) Upon occurrence of a fault, reactive power consumption must not exceed 5 percent of maximum continuous rated current of the generating system and must be limited to the rise time duration set out in Table 1.
- (e) The post-fault reactive power contribution of the generating system must be sufficient to ensure that the connection point voltage is within the following ranges for continuous uninterrupted operation:
 - (i) voltages over 110 percent for the durations permitted under NER clause S5.1a.4;
 - (ii) 90 percent to 110 percent of normal voltage continuously;
 - (iii) 80 percent to 90 percent of normal voltage for a period of at least 10 seconds; and
 - (iv) 70 percent to 80 percent of normal voltage for a period of at least 2 seconds.

4. Disturbance ride through (active power injection requirements)

⁶ The exact ratio of negative-sequence to positive-sequence current injection will be specified by the Commission at the time the licence is issued.

⁷ The settling time requirement does not apply to synchronous generators.

⁸ This requirement does not apply to synchronous generators.

- 4.1. The generating system must be capable of restoring active power to at least 95 percent of the level existing just prior to a fault within X milliseconds after disconnection of the faulted element.⁹
- 4.2. Upon occurrence of a fault, a generating system's transient active power consumption must not exceed one power frequency cycle and must not exceed 5 percent of the maximum continuous rated current of the generating system.

5. Multiple low voltage disturbance ride-through

- 5.1. The generating system, including, but not limited to, each of its generating units and dynamic reactive power support plant, must be capable of withstanding both of the following within a five minute interval:
 - (a) Any combination of voltage disturbances causing the voltage at the respective low voltage (LV) terminals of the equipment to drop below 85 percent of the nominal voltage for a total duration of 1,500 milliseconds regardless of disturbance type, duration, and residual voltage at the generating unit's terminals. The total number of voltage disturbances for which successful ride-through is required is limited to 15. Each fault can be a solid fault resulting in 100 percent voltage drop at the connection point with duration not exceeding the longest time expected to be taken for the breaker fail protection system to clear the fault, as set out in Table S5.1a.2 of the NER.
 - (b) A single worst-case long-duration shallow voltage disturbance, causing the voltage at the connection point to drop to 70- 80 percent of the normal voltage for a total duration of 2,000 milliseconds.
- 5.2. Subject to compliance with the requirements in clause 5.1, the generating system, including, but not limited to, each of its generating units and dynamic reactive power support plant, is not required to withstand any additional voltage variation exceeding ± 15 percent of nominal voltage experienced at the respective LV terminals within 30 minutes from the commencement of the first variation.¹⁰

6. Disturbance ride-through (high voltage disturbance ride-through)

- 6.1. The generating system must have a level of over-voltage withstand capability consistent with the levels shown in Table 2.¹¹
- 6.2. The generating system must maintain continuous uninterrupted operation for temporary over voltage durations as specified in Table 2.

Table 2: Required over voltage withstand capability

Temporary overvoltage (% of normal voltage)	110–115	>115–120	>120–125	>125–130	>130–140
Duration(s)	1,200	20	2	0.2	0.02

7. Disturbance ride-through (partial load rejection)

- 7.1. The non-synchronous generating system must be capable of continuous uninterrupted operation during and following a power system load reduction of 30 percent from its

⁹ The exact active power recovery time will be specified by the Commission at the time the licence is issued and will be between 100 and 500 milliseconds.

¹⁰ For synchronous generators, consideration will be given to the physical limitations of the plant. This may require a variation to this condition, to be determined by Commission at the time of issuing of the licence.

¹¹ Unless otherwise specified by the Commission at the time the licence is issued.

pre-disturbance level or equivalent impact from separation of part of the power system in less than 10 seconds, provided that the loading level remains above minimum load.

8. Disturbance ride-through (frequency disturbance ride-through)

- 8.1. The generating system must be capable of continuous uninterrupted operation for any combination of the following rates of change of frequency:
- (a) ± 4 Hz/s for 250 milliseconds
 - (b) ± 3 Hz/s for 1 second, until such time as power system frequency breaches the extreme frequency excursion tolerance limits.¹²

9. Disturbance ride-through (voltage phase angle shift)

- 9.1. The generating system must not include any vector shift or similar relay/protective function acting upon voltage phase angle which might operate for phase angle changes less than 20 degrees.

Voltage control capability

10. Voltage control capability

- 10.1. The generating system must be capable of being controlled by a fast-acting, continuously variable, voltage control system which must be able to receive a local and remote voltage set point.
- 10.2. The generating system must be capable of operating at either a set reactive power level or a set power factor, which must be able to be set locally or remotely at any time.
- 10.3. The voltage, power factor and reactive power control mode of the generating system must be capable of:
- (a) being overridden by the disturbance ride through requirements specified in clauses **Error! Reference source not found.** to 9 (inclusive) during power system voltage disturbances, and
 - (b) automatically reverting to power factor or reactive power mode when the disturbance has ceased.

System strength

11. System strength

- 11.1. Individual components of plant within a generating system, which includes but is not limited to generating units and dynamic reactive power plant, must be capable of operating down to the following levels at the high voltage terminals in relation to each component:
- (a) minimum short circuit ratio of 1.5, and
 - (b) minimum positive sequence X/R ratio of 2.

Active power control capability

12. Active power control capability

¹² For synchronous generators, consideration will be given to the physical limitations of the plant. This may require a variation to this condition, to be determined by the Commission at the time of issuing of the licence.

- 12.1. The generating system must be capable of automatically providing a proportional increase or decrease in active power output, in response to falling and rising power system frequency respectively.
- 12.2. To comply with clause 12.1:
 - (a) An active power response to changing power system frequency must be provided with no delay, beyond that required for stable operation, or inherent in the plant controls, once frequency leaves the deadband.
 - (b) The steady state droop setting of the active power response must be adjustable in the range 2 percent to 10 percent.
 - (c) The frequency deadband for the active power response must be adjustable in the range from 0 to +/- 1.0 Hz.
- 12.3. The generating system must be capable of sustaining a response to abnormal frequency conditions for at least 10 minutes, subject only to energy resource availability for intermittent generating systems.
- 12.4. The generating system must be capable of applying different deadband and droop settings in response to rising and falling frequency and for different levels of frequency change.

13. Active power control capability (AGC capability)

- 13.1. The generating system must have active power control capabilities that allow it to participate in existing national electricity market arrangements requiring automatic generation control (**AGC**).
- 13.2. At a minimum, the AGC must have the capability to:
 - (a) receive and respond to a remotely determined active power control setpoint, updated at a rate of every four seconds, transmitted to the generating system, and
 - (b) provide the following information to AEMO, upon a request from AEMO under NER clauses S5.2.6.1 or 3.8.2:
 - (i) actual active power output;
 - (ii) maximum raise limit;
 - (iii) minimum lower limit;
 - (iv) maximum raise ramp rate; and
 - (v) maximum lower ramp rate.

14. Active power control capability (rate of change of active power)

- 14.1. The generating system must be capable of limiting the rate of change of active power, both upwards and downwards. A generating system is not required to comply with a limit on the

rate of reduction of active power where the reduction in active power is caused by energy resource availability for intermittent generating systems.

- 14.2. The generating system must be capable of implementing different active power rate limits for operation in the normal operating frequency band and for contingency events.
- 14.3. The generating system must be capable of setting a ramp rate limit with accuracy of within 10 percent.

15. Active power control capability

- 15.1. The generating system must have the capability to provide real-time information about its active power control settings to AEMO, including mode of operation, deadband and droop parameters and any other active power control setting that may change during real-time operation.

System restoration

16. System restoration

- 16.1. Where sufficient minimum fault level is available from online synchronous machines, the generating system must have the following capability in the event of a black system:
 - (a) the generating system must be capable of operation with auxiliary loads only for X minutes¹³ while system load is being restored, and
 - (b) the generating system, including, but not limited to, each of its generating units and dynamic reactive power support plant (as applicable) must have the capability to provide steady-state and dynamic reactive power when operating with auxiliary loads only for X minutes while system load is being restored.¹⁴

¹³ The exact duration will be specified by the Commission at the time the licence is issued.

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