



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:

Essential Services Commission
GPO Box 2605
Adelaide SA 5001

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Freecall: 1800 633 592 (SA and mobiles only)
E-mail: escosa@escosa.sa.gov.au
Web: www.escosa.sa.gov.au

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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 themselves with the

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).

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>

This form is to be completed by persons making application to the Commission for the issue of a licence to authorise electricity generation operations in the electricity supply industry in South Australia.

Section 16(1)(a) of the Act provides that an application for the issue of a licence must be made to the Commission in a form approved by the Commission. This is the form approved by the Commission.

An application for a licence may be made by any legal person including, without limitation, individuals, partnerships, incorporated associations, unit and other forms of trusts and corporations. Entities that are not a legal person (for example, an unincorporated joint venture) cannot apply for a licence.

Applicants should list the information requested in the spaces provided in this form and enclose additional information when required. Applicants must take all reasonable steps to ensure the information provided in the application form is complete, true and correct and are required to make a declaration to that effect in the application form. Failure to disclose information or misrepresent any matter relevant to such information may result in a licence not being issued or in the suspension or cancellation of a licence at a later time.

Application fees

How to lodge an application

► ☐ In writing to: Essential Services Commission of SA
GPO Box 2605
Adelaide SA 5001

► ☐ Electronically to: licensing@escosa.sa.gov.au

The Commission will consult with relevant government, industry and consumer groups in the conduct of its licensing functions through a public consultation process. Consequently, applications and/or 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

Applicants must answer all questions in this section.

1.1 Identity of Applicant

State the full name of the applicant. The applicant is the person who will be undertaking the electricity generation operations that will be the subject of the licence. Joint applicants should each complete an application form, and submit their application forms at the same time, with a covering letter explaining that a joint application is being made.

Name: Pumped Hydro (SA) Pty Ltd

1.2 Legal Identity of Applicant

Provide information about the applicant, (i.e. whether the applicant is a natural person, private limited company or partnership, etc). If the applicant is a body corporate, please also state the jurisdiction in which the applicant is registered, and the applicant's ABN/ACN.

Pumped Hydro (SA) Pty Ltd

The company is a proprietary company, limited by shares

ABN: 11 617 761 743 ACN: 617 761 743

Registered in Queensland

1.3 Address and Contact Details of Applicant

Business Address: Level 2, 340 Adelaide Street, Brisbane.....

State: QLD Post Code: 4000

Postal Address (if different to Business Address):

PO Box 146, Ferny Hills.....

State: QLD Post Code: 4055

Telephone: 1300 ALTURA (1300 258 872) Facsimile:

E-mail: info@alturagroup.com.au

1.4 Contact Person on behalf of Applicant

The full name, title and contact details of a person to whom the Commission can direct enquiries and correspondence about the application.

Full Name: Peter Bennett.....

Title: GM: Commercial Development

Business Address: Level 2, 340 Adelaide Street, Brisbane.....

State: QLD Post Code: 4000

Postal Address (if different to Business Address):

PO Box 146, Ferny Hills.....

State: QLD Post Code: 4055
Telephone: 0428 218 201 Facsimile:
E-mail: peter@alturagroup.com.au.....

1.5 Contact Person for Licence Fees

The full name and/or title of the person to whom the Commission can direct enquiries and correspondence about licence fees.

Full Name: Peter Bennett.....

Title: GM: Commercial Development

Business Address: Level 2, 340 Adelaide Street, Brisbane.....

State: QLD Post Code: 4000

Postal Address (if different to Business Address):

PO Box 146, Ferny Hills.....

State: QLD Post Code: 4055.....

Telephone: 0428 218 201 Facsimile:

E-mail: peter@alturagroup.com.au.....

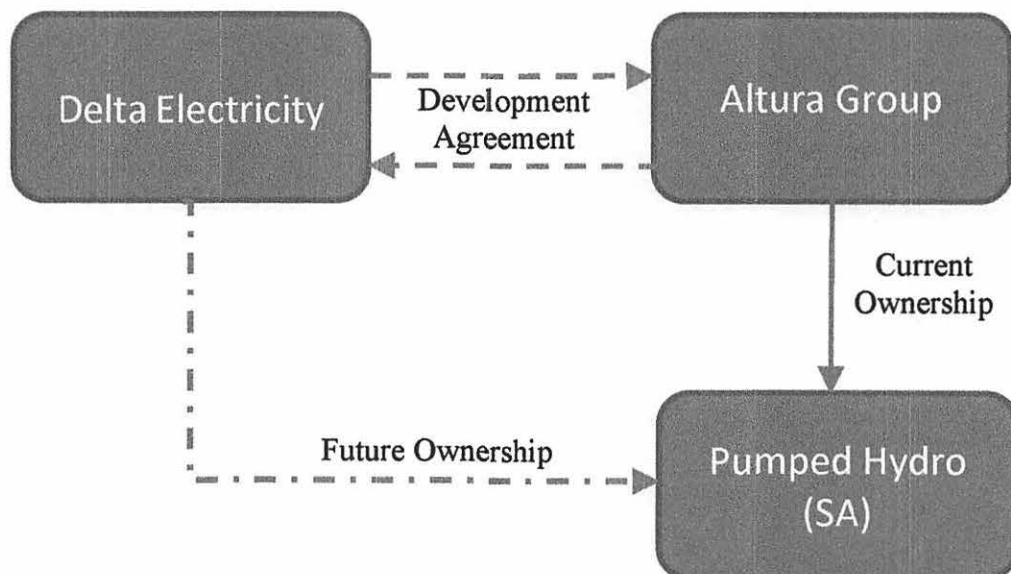
1.6 Diagram of Corporate or other Structure

Please attach with this application form details of the corporate or other structure, including details of any related companies within the meaning of the Corporations Act 2001; and a diagram of the organisational chart, including composition of the board, management and other key personnel responsible for the key functions of the business.

Pumped Hydro (SA) Pty Limited (the Applicant) is a special purpose vehicle (SPV) which has been registered to own the Goat Hill Pumped Hydro Storage Project. Pumped Hydro (SA) is currently a wholly owned subsidiary of Altura Group.

Altura Group has entered into a Development Agreement with Sunset Power International (trading as Delta Electricity), for the development of the Goat Hill project. Through the Development Agreement, Delta enjoys exclusive rights to market the Project and is the anticipated project constructor, owner and operator of the facility.

Project Development Structure



About Altura Group

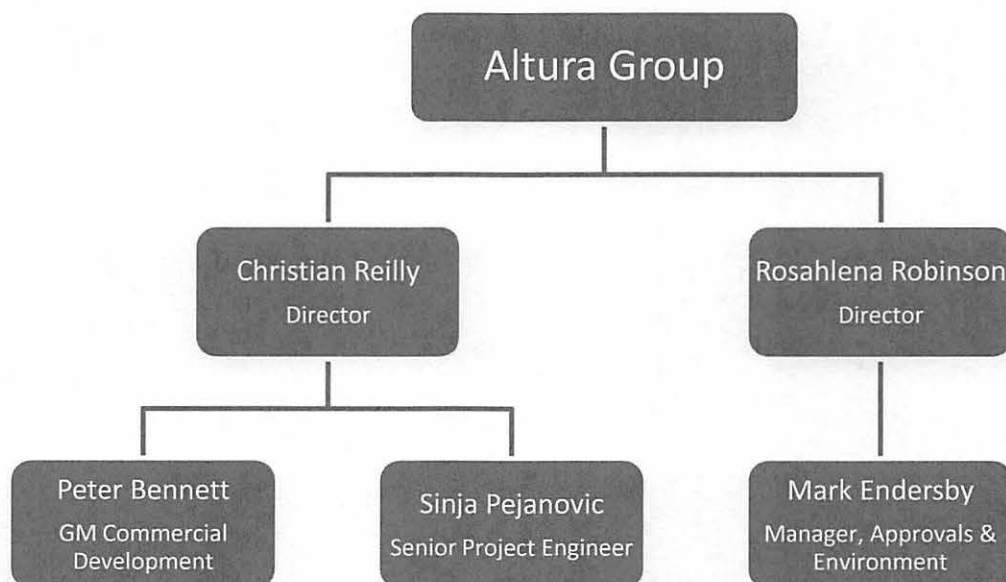
Altura Group was formed to meet the growing need for experienced renewable energy project development expertise into Australia. Altura has assembled a core team capable of progressing the Goat Hill Project quickly and effectively through the proposed development program. Altura has formed relationships with key experts in South Australia, Australia and internationally to provide capacity to execute all elements of the work program to a high quality.

Altura has a focus on pumped storage hydro projects from project inception through all stages of project development, financial close and construction including:

- Energy market & economic evaluation
- Site selection
- Land acquisition
- Engineering & site surveys
- Environmental Assessment
- Stakeholder Engagement
- Infrastructure connections
- Major contract procurement
- Project delivery

All resources required by Pumped Hydro (SA) are provided by Altura. The core Altura Team responsible for delivering the Goat Hill Project covers all key areas relevant to the stage of project development. The team has extensive experience in the energy and infrastructure sector in Australia, Africa and Latin America. In addition, Altura has developed strategic business partnerships with key services providers required to develop pumped storage projects from inception through to Financial Close.

The Altura Group organization chart is shown below. The qualifications and experience of the team members is provided under section 3.9.



About Delta Electricity

Delta Electricity is the largest privately held generator in the NEM, through ownership and operation of the 1,320MW Vales Point Power Station in NSW. Delta has a long history in power development and operation. The company was formed by the NSW Government in 1996 as part of the reform of the electricity sector, and it was acquired by its current owners in 2015. Delta holds a generation and retail electricity licences in NSW and a retail licence in Victoria.

Delta's corporate profile can be summarised as follows:

- A growing strategic Independent Power Producer entering a new phase of growth
- Energy Production of 6-8,000GWh per year
- Delta's Management Team have been responsible for approximately 50% of new firm capacity generation in the NEM in the last growth phase (2005-2010) (Neerabup CCGT, Braemar 1 & 2, Uranquinty & Colongra OCGTs)
- Long term stable highly skilled workforce including energy trading, operations & asset management
- Investment in renewable energy project development as part of growth strategy (Goat Hill Pumped Storage Project, Vales Point Solar Project).

Vales Point Power Station was commissioned in the late 1970's and consists of two 660MW black coal fired generating units which Delta operates as baseload, providing a reliable 24hr supply of energy.

Delta also has a solar project under development at the Vales Point Ash Dam, which consists of a series of operational and closed landfill cells. The closed cells have been capped with soil and rehabilitated with native grasses. Delta is currently investigating an option for the establishment of a utility scale solar field on approximately 80 hectares of this rehabilitated land. An initial solar capacity assessment has found that up to 55 MW of renewable energy could be generated.

Delta's vision is to deploy Delta's expertise to grow a diverse energy portfolio through strategic partnerships. Delta's mission statement guides what they do and how they do it. It incorporates corporate values developed through staff consultation and the recognition that a sustainable energy business must balance the community need for energy against operational impacts. Delta's mission is to generate electricity safely, reliably and competitively while respecting workmates, customers, community and the environment.

Delta is guided by the following objectives:

- to operate efficient, safe and reliable facilities for the generation of electricity at a competitive cost;
- to be a successful participant in the wholesale market for electricity;
- to contribute to the development of low carbon emission electricity;
- to promote the use of sustainable energy practices;
- to protect the environment by conducting operations in compliance with environment laws;
- to contribute to regional development and decentralisation in the way in which they operate; and
- to improve the skills and work practices of their people to promote and enhance safety, productivity, efficiency and job satisfaction.

2 The Licence

Applicants must answer all questions in this section.

2.1 Date from which Licence is sought

Applicants should usually allow the Commission a minimum of 12 weeks to consider an application, as a public consultation period of at least four weeks forms part of the Commission's consideration of licence applications. If the applicant seeks to have the licence issued by a certain date, provide this date. Please note that the Commission does not undertake to issue the licence by this date.

The Licence is sought as soon as is reasonably possible.

2.2 Nature and scope of operations for which Licence is sought

Applicants for a generation licence must state the location of the generation plant, the expected name plate capacity of the generation plant, the type of generation and fuel used and some details about how the generator is to be connected to the network. Applicants for a wind generation licence must attach a map showing the location of the wind turbines.

The Applicant seeks a generation licence for the operation of a pumped storage hydro generation facility.

The Goat Hill Pump Storage Hydro Project (the Project) is located approximately 12km west of Port Augusta, SA and is accessed off the Eyre Highway.

The Project will have an installed generation capacity of 230MW and 8 hours of storage capacity. The design considers the use of two fixed-speed, reversible, Francis pump-turbines, each with a generating capacity of 115MW.

The project has been sized considering an appropriate scale for the South Australian market and for a storage volume adequate to manage daily energy cycles.

The Project will include two reservoirs to store fresh water, located at an elevation differential of approximately 200m, connected together via a water conveyance system in the form of a single steel penstock. Both reservoirs will be lined and covered to minimise water loss.

The Project comprises the following:

- The powerhouse which contains the pump-turbine / motor-generator units and auxiliaries.
- Upper reservoir
- Lower reservoir
- Penstock
- Linear infrastructure (transmission line, water supply pipeline, access roads)
- Auxiliary infrastructure (admin building, workshop and maintenance areas).

A project location map is attached as Annexure A and a general arrangement of the proposed scheme is attached as Annexure B.

The facility stores electricity as potential energy by using electricity to pump water from the lower reservoir to the upper reservoir. When required, this stored energy is returned to the grid by releasing the water from the upper reservoir back to the lower reservoir through the reversible turbine-generators.

Aside from a large energy storage capability (1840MWh), the machines are also able to offer frequency support to the grid, provide significant real inertia to the grid, may be operated as synchronous condensers and the facility is also has black-start capability. Mode change times either from standstill or for example from generating to pumping to synchronous condenser operation are short; in the order of less than 5 minutes and depending on the mode change, in many cases less than 90 seconds.

Further details as to how the facility will contribute to energy security and reliability of the power system are nominated in the table below. Pumped storage hydro is inherently flexible and the facility will be designed to ensure sufficient capability to adapt to changing market conditions over the full expected life of the asset,

| | |
|--|---|
| Primary Operating Pattern | The plant will be available to operate continuously throughout the year with high availability to respond to variations in grid energy supply and demand. The proposed operating modes will require high capacity factors of pumping and generation, typically in predictable daily cycles, however the functionality of the plant is also expected to be utilised in several secondary roles described below. In general, the plant can be expected to operate on daily cycles, with the entire capacity of the dedicated upper and lower reservoirs stored or discharged daily. |
| Pumping | The pumping period will generally coincide with periods of oversupply from intermittent renewable energy or periods of low demand which result in a surplus of system power generation capacity. Regular pumping cycles are expected to result from PV solar production on rooftop and utility scale wind and solar schemes and during overnight periods characterised by low demand. |
| Generating | During periods of higher demand and low contribution from intermittent renewable generation the operating mode will be reversed and the water stored in the upper reservoir will be returned through the turbines housed in the powerhouse to generate electricity. Typically, this is expected to occur during the morning as demand increases until before solar contribution increases; and from the early evening coinciding with reduced contribution from solar and an increase in demand, through until the late evening. |
| Intermittent Operation | To meet the variable system load characteristics in the future and provide flexibility of power system operation, the plant will be able to stop and start as necessary during either generation or pumping. |
| Immediate Generation Response | To provide rapid dynamic response to a sudden loss of large generation in-feed elsewhere on the power system, duty on one or both units may be required. This may be provided from either no-load generation mode or alternatively from part-load. |
| Immediate Pumping Response | Rapid dynamic response will also be provided in pump mode by load shedding. The three ways in which the units contribute to immediate response requirements (i.e. when a system disturbance occurs which requires swift removal of pump load) are: <ul style="list-style-type: none"> • Removal of pump load through closure of the guide vanes and main inlet valve followed by blowdown to leave the pump runner spinning in air. • Complete trip of the unit to standstill. • Occasionally, rapid transfer from full load pumping to full load generating by removal of load through closure of the guide vanes to speed-no-load, trip circuit breaker, followed by the runner changing rotation, the unit re-synchronising and ramping up to maximum power under governor control. |
| Frequency Regulation and Load Following | The units may be required to operate for frequency regulation. This will include operation of the Plant in a part load generation condition and allowing changes in loading over the range zero to full load to correct as necessary for frequency deviations. The plant will be capable of increasing power output to the rated capacity within a short time period following a sudden fall in frequency when spinning in water at no-load in the generate direction. |

| | |
|--|--|
| | In the pumping and generating mode, both units will be able to operate over the full head range within the system normal frequency range of 49.85 to 50.15 Hz. |
| Automatic Generation Control (AGC) | The station will be part of the AEMO Automatic Generation Control (AGC) system whereby the station's unit governors load reference setting will receive adjustments via the National Dispatch and Security Centre (NDSC) SCADA at prescribed intervals. |
| Spinning Reserve | <p>The station will be capable of operating in spinning reserve operation (Synchronous Condenser Operation, SCO) with a dewatered runner in both generation and pump directions of rotation.</p> <p>When spinning in air synchronised in the generate direction, the units will be able to achieve, over the entire range of head operation, a fast increase in power output up to the rated output. The station will be capable of withstanding any change of operation or trip condition in any mode of operation which affects both units either individually or simultaneously.</p> |
| Black Start Generation | <p>The plant will be able to provide black start generation capability, to be eligible for System Restart Ancillary Services (SRAS). In the event of a total collapse of the power grid, or the station becomes disconnected, it will be possible to re-start the station units and connect onto a dead bus. This will be performed with the assistance of a diesel generator to get the first unit rotating in the generate direction and provide local power to the system.</p> <p>It will be possible to energise the transmission lines and provide a voltage and frequency reference for the grid controller as necessary to reinstate the power system generation.</p> <p>The units will also be capable of running into an islanded network continuously.</p> |
| Voltage and Power Factor Correction | The unit will be capable of undertaking power system voltage and power factor correction. |

3 Suitability of applicant to hold a licence

Applicants must answer all questions in this section.

3.1 Standard of honesty and integrity shown by Applicant

In deciding whether the applicant is a suitable person to hold a licence, the Commission may:

- ▶ consider the applicant's previous commercial and other dealings, and
- ▶ the standard of honesty and integrity shown in those dealings.

Please provide information that will assist the Commission in its consideration of this matter. If the applicant:

- ▶ has been found guilty of any criminal offence,
- ▶ has 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) or
- ▶ has been the subject of disciplinary action,
- ▶ has been the subject of any past or present administrative or legal actions in relation to an authorisation, authority, or licence in any industry,

details of such matters must be disclosed. Failure to disclose such information or misrepresent any matter relevant to such information may result in the cancellation of a licence.

The Commission may use the service of an external expert to assist with the assessment of the applicant's standard of honesty and integrity.

Pumped Hydro (SA) is an established entity and 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; or
- 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

Applicants should address responses to this question in the same manner as 3.1 above except here it relates to officers and major shareholders of the applicant.

Please also supply details of any policies and procedures addressing the probity and competence of officers and other key management staff.

There are no matters regarding criminal, civil, legal, disciplinary or administrative actions that would be relevant to the Applicant's Officers or to Altura Group that require disclosure to the Commission with respect to the Commission's consideration of this application.

The Officers of the Applicant are all persons of honesty, integrity and competence.

Further, Altura also requires a high standard of honesty, integrity and competence from its Officers, employees and business partners.

Altura's core values and working methodologies are captured in our How We Work document which describes what our business partners might expect from us in our dealings with them, as well as what we might expect from our business partners.

A copy of Altura's How We Work document is attached as Annexure C.

3.3 Names and addresses of the Officers of Applicant

State the names and addresses of the officers of the applicant. "Officers" of the applicant include the applicant's directors and secretary, and other persons who make or participate in making decisions that affect a substantial part of the business of the applicant.

Full Name: Christian Reilly

Date of Birth: [REDACTED] Office Held: Director

Address: 8B Alice Lane, Newtown.....

.....

State: NSW..... Post Code: 2042

Full Name: Rosahlana Robinson.....

Date of Birth: [REDACTED] Office Held: Director

Address: 170 Plucks Road, Arana Hills

.....

State: Qld..... Post Code: 4054

3.4 Names and addresses of major shareholders of Applicant

State the full names and addresses of the major shareholders of the applicant

Name: Altura Group Pty Limited, ABN 79 615 855 724

Date of Birth (if applicable): n/a..... Office Held (if applicable): n/a.....

Address: Level 2, 340 Adelaide Street, Brisbane

State: QLD Post Code: 4000

3.5 Details of the group members

This is information about entities controlled by the applicant, or by the ultimate parent entity of the applicant (if applicable).

The Applicant does not control any entities.

The ultimate parent entity of the Applicant is Altura Group Pty Limited; ABN 79 615 855 724 of which the Applicant is a wholly owned subsidiary.

Altura does not control any other subsidiaries other than the Applicant.

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

Provide information about the financial resources available to the applicant. If the applicant is a company, please also enclose:

- ▶ copies of all audited profit and loss statements and balance sheets for the last three financial years (including all notes), and

- ▶ director's declaration that the financial statements comply with accounting standards, give a true and fair view, have been made in accordance with the Corporations Act and that there are reasonable grounds to believe the company/entity will be able to pay its debts as and when they fall due; and
- ▶ the director's report and the audit opinion.

If the applicant is a subsidiary company, please also provide:

- ▶ copies of all audited profit and loss statements and balance sheets of the applicant's parent company for up to the last three financial years.

The applicant should also submit copies of:

- ▶ its business plans including at least strategic direction and objectives, identified opportunities in the market place and forecast results; and
- ▶ evidence of capital and liquidity support in place, including any bank or cross guarantees, to support the business and evidence of negotiations with the network service provider concerning credit support arrangements.

As detailed in Section 3.8, Altura has entered into a Development Agreement with Sunset Power International (trading as Delta Electricity) for the development of the Goat Hill Pumped Storage Hydro Project. Delta is financing the development and enjoys exclusive rights to take a financial close decision on the project and continue to construct and operate the project. As such, copies of Delta Electricity's audited financial statements for the last three financial years are attached as Annexure D1, D2 and D3.

3.8 Additional Details of Structure of Applicant

If the applicant is part of a group of related companies, and/or party to a partnership, joint venture or alliance agreement with another company, please provide:

- ▶ contractual arrangements (e.g. alliance contracts, associate contracts, establishment contracts) that define relationships within the group – including shared resources, guarantees, revenue flows, obligations and or responsibilities.

Altura has entered into a Development Agreement with Sunset Power International (trading as Delta Electricity) for the development of the Goat Hill Pumped Storage Hydro Project. In terms of the agreement, Altura are responsible for project development against a defined set of project deliverables. Delta is financing the development and enjoys exclusive rights to market the Project and is the anticipated project constructor, owner and operator of the facility.

A copy of a letter of support from Delta Electricity is attached as Annexure E.

3.9 Human resources available to the Applicant

Provide information about the human resources available to the applicant. This includes:

- ▶ the experience and qualifications of those employees outlined in the organisational chart (see point 1.6); and
- ▶ if the applicant will employ contractor/s to assist with the licensed operations, the name of that contractor/s, details about the experience of the contractor/s in such operations and details of the processes in place to ensure the contractor/s complies with the regulatory obligations imposed by the licence.

Altura Group

All human resources required by the Applicant for the development of the project are provided by Altura Group. The experience and qualifications of the Altura team are as follows:

Christian Reilly (Director):

Christian is an energy professional with significant power industry experience from strategy and inception, to development, construction and operational phases. Christian is responsible for all technical aspects of the development, including external relationships with major equipment manufacturers, civil contractors and technical service providers for the project.

Rosahlena Robinson (Director):

Rosahlena is a highly experienced leader specialising in business strategy and integration, joint venture & board management & reporting, sustainable development, project approvals, stakeholder engagement and HSE in complex project and operating environments. She has extensive experience in energy development, construction and operations, recently focused in project development of utility scale renewable and gas energy projects in Chile, and previously in upstream oil, gas and LNG exploration, development & production. Expertise in covering full development lifecycle; due diligence, project feasibility, planning, approvals, contracting strategy, engineering, construction, operations, rehabilitation within companies Origin Energy, Shell Australia and Santos. Rosahlena is responsible for all operations, approvals, HSE and governance for the project.

Peter Bennett (GM Commercial Development):

Peter is a power generation project development and delivery professional with over 30 years in the development and delivery of major energy infrastructure projects, both from the perspective of Owner/Developer and Contractor/Project delivery entity. Peter has extensive Australian as well as international experience including Africa, South America and Europe having successfully delivered over 4GW of power plants for large multinationals such as Siemens and Alstom with more recent experience in Australia with John Holland, Lend Lease and Origin Energy. Peter has deep experience in a broad range of technologies from conventional fossil-fired generation (coal & gas) to renewable energy including solar photovoltaic, hydro, pumped-storage, geothermal and solar thermal coupled with strong commercial and financial skills and experience. Peter is responsible for electrical engineering, transmission and major contract formation, negotiation and settlement.

Sinja Pejanovic (Senior Project Engineer):

Sinja is a chartered mechanical engineer with experience in the energy and coal seam gas industries including project development, construction and operations. Most recently, Sinja has worked in Chile to develop baseload energy projects such as utility scale solar PV, pumped storage hydro, and gas energy projects. Her previous experience includes design, field and project engineering for upstream coal seam gas projects with companies such as Worley Parsons and Origin Energy. She also has extensive experience with contractor management for design, fabrication, construction and commissioning phases including domestic and international providers. Sinja is responsible for coordination the engineering activities of Jacobs and engagement with the OEMs.

Mark Endersby (Manager, Environment & Approvals):

Mark is an experienced environment planning professional with over 25 years in his field, encompassing project development, construction and operational capabilities. Mark specialises in project managing the many facets of successful planning approval delivery, including planning approval strategies, contractor management, environmental, heritage and social impact assessments, and stakeholder engagement. This is complimented by Mark's technical understanding of environmental and compliance issues derived from over 10 years in operational roles including hydro, mining and consulting. Mark has extensive experience in jurisdictions throughout Australia and overseas and has a practical understanding of international standards and sustainable practices. His recent project experience has focused on renewable energy (including hydro, solar and wind), and thermal power stations. Mark is responsible for the full scope of Project Approvals.

Delta Electricity

Delta enjoys exclusive rights to market the Project and is the anticipated project constructor, owner and operator of the facility. As such, all human resources required for the operation of the facility will be provided by Delta. The experience and qualifications key members of the Delta team are as follows:

Anthony Callan – Executive Manager Marketing

Anthony is the head of Delta Electricity's Marketing Group which is responsible for the trading of electricity and environmental products across Australia as well as managing Delta Electricity's physical electricity production through the NEM dispatch processes. Anthony has worked in the National Electricity Market since its inception and carries oversight of Delta Electricity's direct contract sales including the negotiation of potential new large industrial supply agreements when required and the management of customer relationships. Anthony holds a Bachelor of Engineering, Master of Business Administration and a Diploma of Financial Markets.

Bruce Cameron – Manager Sales and Trading

Bruce is the Head of Sales and Trading and oversees all electricity and environmental product hedging, trading and sales activities. Bruce has also worked in the National Electricity Market since its inception, mainly with Delta Electricity but also including a period working with The Electricity Market Operator (NEMMCO - AEMO's precursor body) in a role of improving the NEM market design. Bruce has a deep understanding of the Australian electricity markets having filled roles in both the trading and hedging of electricity derivatives, environmental products as well as the physical dispatch of a complex generator portfolio. Bruce is primarily responsible for Delta Electricity's trading and hedging function and customer relationships. Bruce holds a Bachelor of Engineering, Master of Engineering Management, GAICD and a Diploma of Financial Markets (AFMA).

Angela Riley – Sales Manager

Angela has worked with Delta Electricity since the inception of the NEM, initially in IT and Project Management roles connected with market trading and settlement systems giving Angela a unique perspective on the risk management task. Angela has eleven years of trading and risk management experience in the Australian electricity derivative and environmental markets including responsibility for the management of major customer relationships. Angela was a certified Project Manager with the Australian Institute of Project Management (2003-2011) and holds a Graduate Certificate of Commerce, a Diploma of Financial Markets (AFMA) and is currently completing a Master of Business Administration.

Steve Gurney – Company Secretary

Steve joined Delta Electricity in 2005 and since December 2015 has had Executive responsibility for Corporate Governance, Compliance, Human Resources, Work Health & Safety, Payroll, Communications and Community Relations. As part of the transition from a State Owned Corporation to private ownership, Steve has completed a full review of Delta's Compliance Management System to ensure that appropriate control measures are in place for adherence to internal policies and procedures as well as compliance with legislation and regulations, such as competition and consumer laws, fraud and corruption protection and workplace health and safety laws. Steve holds qualifications in Employment Relations and Corporate Governance and is currently completing a Bachelor of Laws through Southern Cross University.

Peter Wormald - Manager Regulation, Risk and Strategy

Peter has 16 years' experience in the electricity industry across a range of roles including market trading and forecasting, engineering, and regulatory advocacy. In his current role, Peter is responsible for Delta's risk management processes including executive and board level reporting of Delta's risk position. He also coordinates Delta's strategic planning processes and formulates Delta's position on regulatory policy issues. Peter holds a Bachelor of Engineering degree from the University of Newcastle and Master of Business degree from the University of Sydney.

Vince Azzopardi – Chief Financial Officer

Vince is the Chief Financial Officer of Delta Electricity with extensive experience in finance and accounting having worked in finance roles in the electricity industry for 23 years. Vince established Delta's finance function following the acquisition of the Vales Point business from the NSW

Government and is responsible for accounting, tax, financial management and statutory reporting, insurance, purchasing, material supply and treasury and settlements functions. Vince holds a Bachelor of Accounting from the University of Technology, Sydney and is a Certified Practicing Accountant.

Luke Donovan – Executive Manager Market Development

Luke is the Executive Manager Market Development at Delta Electricity and is responsible for developing and securing energy related opportunities that leverage the market experience and asset management capability of Delta. Prior to joining Delta, Luke spent 11 years at Origin Energy where he held a number of wholesale portfolio management roles across gas, oil, power and renewables. Luke has extensive experience in contracting renewables, trading energy derivatives and optimising one of Australia's largest integrated energy portfolios.

Phillip Colebourn – Energy Market Analyst

Phillip worked in the National Electricity Market since its inception. Prior to retirement in 2015 Phillip was Delta's National Sales Manager with oversight of all Delta's electricity and environmental product hedging, trading and sales activities and was a Responsible Manager under Delta's AFSL license. For two years following the sale to Energy Australia of the dispatch rights to Wallerawang and Mt Piper Power Stations, Phillip managed the associated Gentrader agreements. Phillip has many years experience with the design and implementation of complex customized hedging products and the drafting and management of major derivative and direct sales contracts including responsibility for the management of major customer relationships. Phillip presently works part time in Delta's Marketing Business Unit and holds Bachelor of Science and Bachelor of Engineering degrees from the University of NSW, and a Master of Business Administration from Sydney University.

3.10 Technical resources available to the Applicant

Applicants for a generation licence are asked to provide details about the availability of technical resources to be used in carrying out the operations for which a licence is sought. The information should include details about the technically qualified staff available to the applicant and (if relevant) details of experience gained in similar operations.

Where applicants are relying on a third party to provide staff and resources to meet the technical requirements of the generation licence, please provide:

- ▶ a list of all functions and activities being proposed to outsource;
- ▶ details of any formal agreement/s to provide services, including confirmation that the third party possess relevant technical competencies to conduct the proposed activities;
- ▶ a summary of the third party's technical capacity to meet relevant obligations, including relevant accreditations; and
- ▶ a summary of the third party's experience and knowledge in the relevant area.

Development

Altura is well supported by the following additional technical resources for the development of the Project:

Jacobs Engineering – Hydro mechanical engineering, civil and concept design.

Golder Associates – Geotechnical studies, environmental studies, earthworks, reservoir, embankments, roads and lining systems concepts and design.

Aurecon – Grid connection studies and power system modelling

Bestec – Powerhouse building services concepts and design.

Operation

For the operation and maintenance of the facility, Delta has in-house expertise from Vales Point which will be selectively trained in the operation of Goat Hill with additional support as follows:

Operation of the facility will be self-performed by Delta.

First line maintenance will be self-performed by Delta.

An LTSA will be negotiated with the hydro-mechanical OEM for maintenance of the pump/turbines and motor/generator. Remoted support facilities will also be provided.

Monitoring, inspection and maintenance of the reservoirs and water conveyance systems will be performed by Delta using local contractors as required.

3.11 Quality of Electricity Produced/Connection Agreement

The Commission may not issue a generation licence unless it is satisfied that the generating plant (or proposed generating plant) will generate electricity of the appropriate quality for the relevant transmission or distribution network. The Commission will be satisfied that the electricity is of an appropriate quality if the applicant has entered into a connection agreement which meets the Commission's technical requirements with the licensed operator of the relevant transmission or distribution network. Applicants are therefore required to submit a copy of such a connection agreement.

The Connection Application for Goat Hill was lodged with ElectraNet on 17th August 2018 and is currently in the process of due-diligence by ElectraNet and AEMO.

ESCOSA's technical requirements as detailed in the 2017 model licence conditions for new generators, were considered during the performance of the grid connection studies. The results of the studies with respect to each of the criteria included in the model licence conditions are included in the NER Compliance Report attached as Annexure F.

The results of the studies show that the generating plant will generate electricity of the appropriate quality for the relevant transmission network.

A copy of the Generator Performance Standards for the facility is also attached as Annexure G.

3.12 Risk Management

Provide confirmation and reasonable evidence that the applicant's management has identified the risks associated with electricity operations and has established, utilises and relies upon risk management systems and processes which are adequate, accurate and current to address those risks. A copy of the applicant's risk management strategy should be submitted.

The Applicant has used a rigorous risk management process throughout the development of the Goat Hill Project which aligns to ISO 31000:2018 - Risk Management.

The Applicant will also require the successful EPC construction contractor to fully implement a risk management system, plan and practices compatible with ISO 31000 for the construction of the project. This risk framework will also be used as part of the HAZOP and in essential construction plans and procedures such as the Health and Safety Management Plan, and environmental management plans (see below).

More broadly, the project owner, Delta Electricity, employs corporate risk management processes as an integral part of the normal operation of its business (including 1,320MW Vales Point Power Station in NSW), and these would be adopted during the operational phase of the project.

Of note, the Development Approval (010/V083/17) requires the Applicant to develop several risk-based construction and operational management plans in consultation with relevant Government

Agencies, and then submit these plans to the Planning Minister for approval. These construction and operational plans include, but are not limited to, environmental management plans, traffic management plans, bushfire management plans and emergency response management plans. All such plans will utilise the above risk management framework.

3.13 Development Act Approval

Please advise if the applicant has or is applying for approval under the Development Act 1993 (SA). If so, provide details, including the date on which approval was or will be granted.

The Applicant applied for and secured Crown Sponsorship from the Department of the Premier and Cabinet on 18 September 2017 enabling the Project to be submitted under Section 49 of the Development Act 1993 as public infrastructure (Annexure H1).

The Applicant therefore applied for development approval under Section 49 of the Development Act 1993 (SA) on 14th December 2017; Application Number: 010/V083/17.

Development Approval was granted on 30th April 2018. A copy of the Development Decision Notification is attached as Annexure H2.

The Office of the Technical Regulator (OTR) assessed the Goat Hill Project under Section 37 of the Development Act 1993, and subsequently received approval on the 2 August 2017 certifying that the proposed development complies with the requirements of the OTR in relation to the security and stability of the State's power system (Annexure H3).

3.14 Registration with AEMO

Please advise if the applicant will apply to register with AEMO. If so, provide details. Applicants for a wind generation licence should note that registration as a semi-scheduled market participant is required for all new generators and all expansions to existing wind generation plant.

The Applicant applied and is registered with AEMO in the National Electricity Market in the Participant Category: Intending Participant – Generator, with effect from 9th July 2018. A copy of the AEMO Registration Approval is attached as Annexure I.

3.15 Licences held by the Applicant in other Australian jurisdictions.

If the applicant holds, or has previously held, electricity and/or gas licences in other Australian jurisdictions please provide details. If a licence previously held has been suspended or cancelled, please provide details.

Not applicable. The Applicant does not hold, and has not previously held, 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.

Not applicable. The Applicant has not applied for an electricity or gas licence in another Australian jurisdiction.

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.

Delta Electricity holds the following electricity licences:

Generation Licence (NSW – Vales Point)

Retail Licence (NSW)

Retail Licence (Victoria)

3.18 Compliance Plans

Applicants are required to submit a copy of their Compliance Plan which demonstrates how the compliance systems the applicant has (or will have) in place will ensure compliance with all of the applicable regulatory obligations imposed by the relevant licence.

The Applicant is in the process of establishing a compliance framework to manage the operation of the facility. A Compliance Plan will be established in the form of a Safety, Reliability, Maintenance and Technical Management Plan using the format and content suggested by the Guidelines for Generators as published by the Office of the Technical Regulator. The Compliance Plan will include a generator compliance program as per the template published by the AEMC Reliability Panel.

A copy of Delta's Compliance Policy is attached as Annexure J, which details the number of standards, policies and procedures that are maintained by Delta to address relevant compliance obligations for the organisation. Please note that the Compliance Policy is itself under revision to align with ISO 19600. This new version is in the final stages of approval.

3.19 Additional Information

The Commission encourages applicants to provide any additional information they consider would be of assistance in supporting the application. Please provide below.

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4 Factors specified in the Essential Services Commission Act 2002

In considering a licence application, the Commission must have as its primary objective protection of the long term interests of consumers with respect to the price, quality and reliability of electricity supply, and must also have regard to the need to:

- (a) promote competitive and fair market conduct;
- (b) prevent misuse of monopoly or market power;
- (c) facilitate entry into relevant markets;
- (d) promote economic efficiency;
- (e) ensure consumers benefit from competition and efficiency;
- (f) facilitate maintenance of the financial viability of regulated industries and the incentive for long term investment;
- (g) promote consistency in regulation with other jurisdictions.

If the applicant believes that information about their application would assist the Commission in its consideration of these factors, the applicant should provide such information below.

The Goat Hill Pumped Storage Hydro Project fully supports the Commission's primary objective of protection of the long-term interests of consumers with respect to the price, quality and reliability of electricity supply.

Goat Hill operates as both a load and a generator operating as a 230MW load in pumping mode and as a 230MW generator when in generation mode. These modes of operation will serve to reduce volatility in market pricing by providing generation into a market experiencing high demand and providing load into a market experiencing low demand.

The facility also has the capability to provide frequency support to the grid and may also be operated as a synchronous condenser. The generators provide real inertia to the grid from rotating synchronous machines (as opposed to synthetic inertia provided inverter based generation) making a significant contribution to system strength. The facility will also have black-start capabilities in the event of a grid failure.

The Project will therefore provide reliable, economic energy storage and flexible generation and is also consistent with both State and Commonwealth strategic priorities. The development of a pumped storage hydro facility will help provide energy security to facilitate the growth of renewable energy in South Australia and reduce South Australia's reliance on energy imports from Victoria.

Direct and indirect benefits will be delivered to South Australia through development of the Project:

- Provides reliable, economic energy storage and flexible generation
- Supports a high penetration of renewable resources
- Provides enough energy storage to power 135,000 homes annually (based on Clean Energy Council average house figures)
- Represents significant investment to the South Australia economy through the provision of local and regional jobs during construction
- Provides indirect economic benefits for local businesses during construction and operation, leveraging the strength of the South Australian civil contracting industry.

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

I ROSAHLENA ROBINSON

of 170 PLUCKS RD ARANA HILLS QLD

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 13 DECEMBER 2018

Signature RR Robinson

(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: Mitchelton this 13 day of December 2018

Karen Coombs JP (Qual)

Before me: KACoombs

(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;

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.

- (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)

- 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 ± 10 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)

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.

- 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 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.

¹⁴ The exact duration will be specified by the Commission at the time the licence is issued.