



26th August 2005

Christian Spitzner
Synergy Wind Pty Ltd
1/10 Wilgah St
St Kilda East
VIC 3183

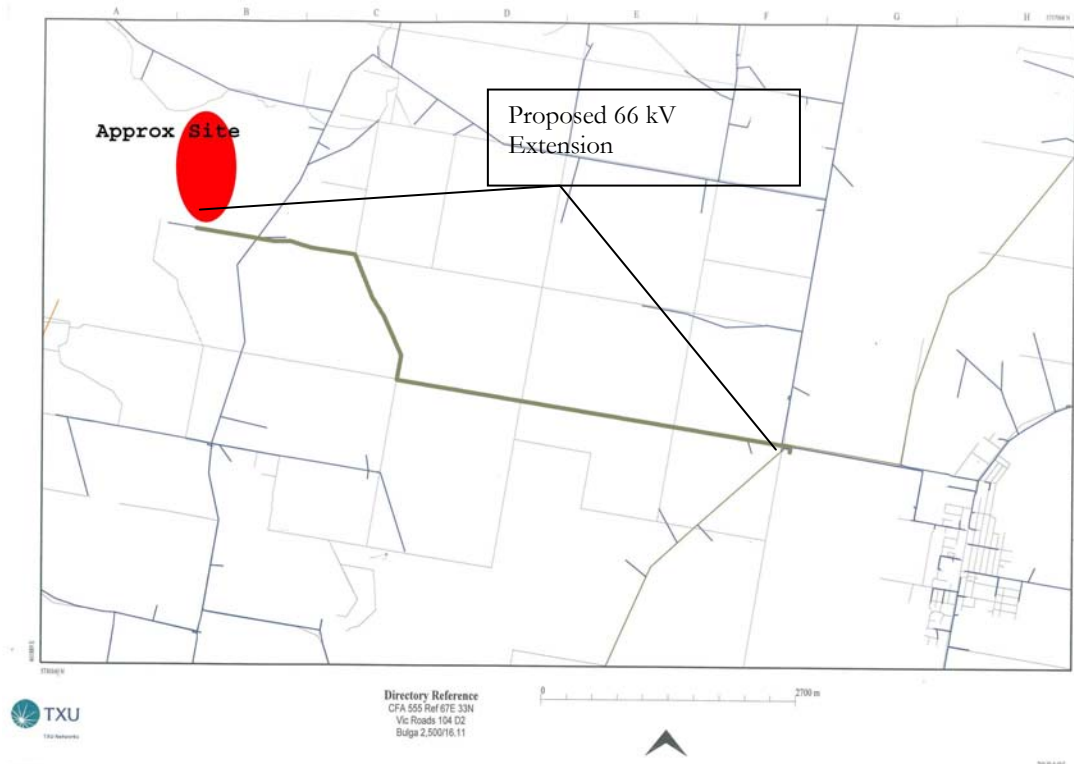
Dear Mr. Spitzner,

PROVISION OF 66 000 VOLT CONNECTION POINT, WIND FARM, YARRAM

Thank you for your enquiry regarding the supply of electricity to the property detailed below.

1.0 PROPERTY DETAILS AS PROVIDED:

Supply Location: Ingles road to the north of Yarram refer map below.



2.0 FIRM PROPOSAL

If you wish to proceed, please provide written advice requesting a Firm Proposal together with the attached forms completed.

1. “Supporting Documentation for Application for Connection of Embedded Generator”,
2. Information “S Standard Planning Data” in the Supplementary Wind Generator requirements, and
3. Proposed Performance Standards.

The Firm Proposal cannot be finalised until the *System Studies* can demonstrate that the impact of your proposed Embedded Generator on Network Performance is acceptable.

Once the system configuration is determined and your choice for contestable construction has been finalised SP AusNet will be able to prepare the *Firm Offer for Connection Services* and associated *Extension Contract*.

3.0 CONCEPTUAL DESIGN

In providing a Connection Point to accommodate 10 to 12 MW to the Yarram Wind Farm as requested, a number of *works* will need to be carried out.

These include:-

1. An approximate 8.5 km of new 66 kV line from the Morwell Terminal Station to the Foster 66kV line will need to be constructed.
2. The construction of a new 66 kV switch yard and associated protection at the tee off location at Yarram.66 kV switchyard.
3. Associated protection at the tee off location at Yarram.

Under NEMMCO Connection requirements, a new generating proponent is liable for any Network Augmentation costs associated with a connection to the system network. Based on the ‘Conceptual Design’ and construction occurring before 30th June 2006, an *indicative cost* estimate of \$4,500,000 plus \$450,000 GST totalling **AUD\$4,950,000** is to be fully funded by the customer.

These costs are meant to be indicative only and should not be regarded as firm quotations.

The *capacity* of the tee line would be approx 65 MVA although there are other limitations on the amount of embedded generation that can be connected to the 66 kV network at this location. Under certain conditions (n-1), SP AusNet will not be able to support the total proposed capacity of 10 to 12 MW.

A final design suitable to provide a three phase, 66,000 volt electricity supply suitable for the export of electricity to a maximum of 10 - 12 MVA and associated cost estimate cannot be prepared until the finalisation of appropriate system studies.

An important consideration is the requirement for the *main switch*, to be within 10 meters of the property boundary. This is usually the point of supply for practical purposes, refer also to the “66,000 Connection Point”, section below.

As a high voltage connection, the connecting generation proponent (Yarram Wind Farm) is responsible for the transformation of the output of the wind turbines to the supply voltage and internal high voltage or low voltage wiring.

Total generator ratings larger than that shown above and/or of an unusual nature could impact substantially on the works and associated costs.

Please note that electricity supply will not be made available for construction purposes and if required will need to be negotiated separately to establish a separate Extension Contract for this supply.

4.0 NEXT STEPS

If you wish to proceed and/or wish SP AusNet to prepare a detailed design and issue a Firm Proposal, please complete the attached “Supporting documentation for Application for Connection of Embedded Generator” including item 2 the Consultants Report and return it together with your payment of the **Project Fee** of **\$5,000 plus \$500 GST totalling \$5,500.00**. This fee is not refundable should you later elect not to proceed with the project.

A receipted Tax Invoice will be forwarded to you following payment of the Firm Offer Fee. Should you require a Tax Invoice prior to making payment, it will be provided upon request. **Cheques should be made payable to “SPI Networks Pty Ltd”.**

On receipt of the details requested above and payment, SP AusNet will prepare a detailed design, establish an accurate estimate of the costs and issue a Firm Proposal.

It is important that you are aware of the connection process and your rights and obligations. These are contained within the relevant Federal and State Acts, Codes and Guidelines. The **Essential Services Commission Guideline 15** that is available at their website at www.esc.vic.gov.au provides initial information.

5.0 CONTESTABLE OPTIONS

SP AusNet’s preference for contestable work is the following.

SP AusNet to undertake the following;

- Primary and secondary design and construction works within existing switch yards

Generating Proponent (Customer) to undertake the following

- All system studies
- Provision of communication arrangements
- SCADA design and construction
- Line design and construction including all allied activities
- Revenue Metering

Either party to undertake by agreement,

- New switchyards, zone substations or other major green field network assets.

Any works required on SPI Powernet assets (**Transmission**) are not subject to Victorian Code contestable requirements.

You will need to provide SP AusNet specific instructions on the works you require us to undertake and those you will be undertaking using the contestable options.

Note that *Ownership of the Network Augmentation* to accommodate the proposed windfarm, and undertaken by Customer, subject to audit, will be passed over to SP AusNet at the end of the Project.

6.0 OTHER CHARGES

The Project Fee only covers the administration, initial negotiation and the review of system studies, additional works such as *NEMMCO costs and fees, survey, specific design* or obtaining *easements* will incur additional charges. The amount of these costs will depend upon which Competitive Tendering option is selected. SP AusNet will need to invoice you for these further costs.

7.0 GOODS & SERVICES TAX (GST)

Any contract formed pursuant to this letter, will contain conditions requiring payment of GST by you the enquirer.

8.0 CONNECTION AGREEMENT

Should your Project proceed with a separate contract, a “Connection Agreement” will also need to be established between SP AusNet and yourself to form the ongoing relationship, responsibilities and charges associated with the *Connection Services*.

Prior to the finalisation of this Agreement you will also need to provide data “*D, Detailed Planning Data*” and “*R1 Registered Data*”. No connection will be made until the “Connection Agreement” is in place.

9.0 PRUDENTIAL REQUIREMENTS

Details of prudential requirements will be negotiated in the formation of the commercial conditions of the Extension Contract and the Connection Agreement. At this time SP AusNet has no immediate requirements for you to provide any commercial information.

10.0 METERING

The provision of metering transformers and metering equipment is your responsibility and a connection will not be able to proceed until compliant metering is installed. Access arrangements for this equipment will need to be established by the Connection Agreement.

11.0 66,000 VOLT CONNECTION POINT: STANDARDS & RESPONSIBILITIES

As an operator of a High Voltage system you will be required to undertake responsibilities that comply with the following.

- AS 3000 in particular Section 7.8,
- Victorian Service and Installation Rules, in particular, High Voltage Installations,
- Victorian Electricity Safety (Installation) Regulations,

The Firm Proposal cannot be finalised until these studies can demonstrate that the impact of your proposal will result in a neutral impact of the embedded generator on Network performance.

Further studies will be needed as specific requirements of the Project become evident.

In addition, the continued mutual discussion and evaluation of the outcome of these studies with SP AusNet will also assist in the preparation of the final design. **Stephen Lees, Electricity Strategy & Planning**, is able to directly negotiate with your consultants to provide additional detail and to discuss their results. He can be contacted on +61 3 8628 1045.

14.0 PERFORMANCE STANDARDS

The National Electricity Code requires all windfarms greater than 5 MW to be **Market Registered** and as a result you must provide the proposed performance standards in accordance with Section 5 of the NEC.

Attached is the following information. The shaded areas indicate information to be provided by SP AusNet.

- (1) automatic access standards;
- (2) minimum access standards;
- (3) applicable plant standards; and
- (4) for each technical requirement, whether NEMMCO will be involved in the negotiation of that requirement under clause 5.3.4A(b).

This attached list does not list all the Generator performance requirements of the NEC. Negotiated standards which reflect the generation units performance, will be negotiated in accordance with NEC Clause 5.3.4A.

15.0 EASEMENTS / LICENCES:

Any works initiated by this Project are subject to the granting of easements and licences where distribution assets cross private property and government reserves and the approval of appropriate authorities for all line routes.

16.0 GOODS & SERVICES TAX (GST)

Any contract formed pursuant to this letter, will contain conditions requiring payment of GST by you the enquirer

17.0 TREE CLEARING

When designing an extension, SP AusNet endeavours to minimise the need for tree clearing to preserve the natural environment. Trees must be cleared properly to minimise the risk and losses from bushfires for public safety and continuity of supply. Tree clearing must meet requirements set out in the Code of Practice for Electric Line Clearance (Vegetation) 1999.

Tree clearing costs are part of the cost of installing overhead lines that are paid for by the Customer and to minimise costs clearing is usually undertaken by the Customer individually or by direct contract as agreed with SP AusNet.

You are responsible for all costs associated with any tree clearing required

You will be required to obtain all tree-clearing permits from the appropriate authorities and arrange for the tree clearing to be undertaken prior to our construction commencing.

18.0 THIRD PARTIES

Any constraints placed on SP AusNet by third parties may cause additional costs and delay the expected supply availability date.

19.0 DISTRIBUTION CODE

As an Embedded Generator you are required to comply with Section 7 of the Distribution Code available from the Essential Services Commission Web site <http://www.esc.vic.gov.au>. As a result, as your Project proceeds, you will need to continue to negotiate on the technical requirements of the connection and the development of a Connection Agreement with SPAusNet.

20.0 IMPORTANT NOTE & DISCLAIMER

SP AusNet takes no responsibility for any action taken or not taken as a result of the information set out in this letter.

Nothing in this letter constitutes an offer by SP AusNet to contract with your company or otherwise deal with your company in relation to the matters contemplated in this letter, or creates any legal or financial liability on the part of SP AusNet.

SP AusNet shall not be liable for any loss damage claim or demand incurred either directly or indirectly resulting from any act or omission that was made in reliance in whole or in part upon this letter.

Yours sincerely

Con Sarantopoulos
Senior Project Engineer



SUPPORTING DOCUMENTATION FOR APPLICATION FOR CONNECTION OF EMBEDDED GENERATOR

SP AusNet requires the following information for submission with the application for connection so as to prepare a connection agreement and to assess the need for augmentations and/or extensions to its distribution system:

1. Completion of the attached Embedded Generating Unit Technical Data sheet. For items not applicable for the embedded generating unit, write N/A.
2. *Consultants report detailing the impact of the embedded generator on SP AusNets' distribution system, with reference made to the embedded generator's monitoring and control characteristics.*

SP AusNet may also require the submission of other data before making an offer to connect.

In addition to the supporting documentation, a non-refundable project fee to cover the cost of carrying out the detailed system analysis is required as per the following schedule. The project fee is refunded from the total cost of the project should the project proceed.

Project fees schedule:

Maximum Net Capacity of Embedded Generating Unit	Project Fee
Up to 100kW	\$550
Greater than 100kw and up to and including 1MW	\$2,200
Greater than 1MW and up to and including 10MW	\$4,400
Greater than 10MW	\$5,500

Generating unit design data

DATA DESCRIPTION

Diagram of Connection Point to Network	Provide text, diagram
Nominal voltage at connection to Network	kV
Total Station Net Maximum Capacity	MW
Maximum 3 phase <u>Symmetrical</u> short circuit infeed calculated by AS 3851 (1991) method at connection point	kA

Individual Generating Unit

Rated MVA (M _{BASE})	MVA
Rated MW sent out (PSO)	MW
Rated MW generated (P _{MAX})	MW
Auxiliary load at P _{MAX} (P _{AUX})	MW
Rated Reactive Output at P _{MAX} (Q _{max})	MVA _r
Minimum Load sent out (P _{MIN})	MW

Generating Unit Resistance

Stator Resistance (R _A)	% on M_{base}
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Generating Unit Reactances (unsaturated)

Direct Axis Synchronous Reactance (X _D)	% on M_{base}
Direct Axis Transient Reactance (X _{DD})	% on M_{base}
Direct Axis Sub-Transient Reactance (X _{DDD})	% on M_{base}

Generating Unit Time Constants (unsaturated)

Direct Axis Open Circuit Transient (T _{DO})	Seconds
Direct Axis Open Circuit Sub-Transient (T _{DDO})	Seconds

Generating unit design data (cont)

DATA DESCRIPTION

Generating Unit Transformer

Number of windings (GTW)	Provide text
Rated MVA of each winding (GTRn)	MVA
Principal tap rated voltages (GTTRn)	kV/kV
Positive Sequence Impedances (GTZ1n)	(a + jb) % on 100 MVA base
Negative Sequence Impedances (GTZ2n)	(a + jb) % on 100 MVA base
Zero Sequence Impedances (GTZ0n)	(a + jb) % on 100 MVA base
Tapped Winding	Provide text, diagram
Tap Change Range (GTAPR)	kV - kV
Vector Group (GTVG)	Provide text, diagram
Earthing Arrangement	Provide text, diagram

Generating Unit Reactive Capability (At machine terminals)

Lagging Reactive Power at PMAX	MVAr export
Lagging Reactive Power at PMIN	MVAr export
Leading Reactive Power at rated MW	MVAr

Generating Unit Excitation System

Rated Field Voltage at rated MVA and Power Factor and rated terminal volts and speed	V
Maximum Field Voltage	V

Generating Unit Load Controller

Maximum Droop	%
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Generating Unit Response Capability

Load Rejection Capability	MW
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Network and Plant data of equipment at or near connection point

DATA DESCRIPTION

Nominal voltage	kV
Circuit maximum current and ambient conditions under which that current applies	kA Provide text
System Earthing Method	Provide text

Network Configuration

Operation Diagrams showing the electrical circuits of the existing and proposed power station including busbar arrangements, phasing arrangements, earthing arrangements, switching facilities and operating voltages.	Provide single line diagrams
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Network Impedances

For each item of plant, details of the positive, negative and zero sequence series and shunt impedances, including mutual coupling between physically adjacent elements.	% on 100 MVA base
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Short Circuit Infeed to the Network

Maximum Generator 3-phase symmetrical short circuit infeed including infeeds from generating units connected to the SP AusNet network calculated by method of AS 3851 (1991).	kA symmetrical
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Network Plant and Apparatus Setting data

DATA DESCRIPTION

Protection Data for Protection relevant to Connection Point

Reach of all protections on transmission lines or cables	ohms or % on 100 MVA base
Number of protections on each item	Provide text
Total fault clearing times for near and remote faults	milliseconds
Line reclosure sequence details	Provide text

For each shunt reactor or capacitor bank

Method of switching	Provide text
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FACTS Installation

Data sufficient to enable static and dynamic performance of the installation to be modelled	Provide text and diagrams of control settings
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Load Characteristics at Connection Point

DATA DESCRIPTION

For all Types of Load

Type of Load (eg controlled rectifiers or large motor drives)	Provide Text
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For Fluctuating Loads

Cyclic variation of active power over period	Provide Graph of MW / time
Cyclic variation of reactive power over period	Provide Graph of MVA _r / time
Maximum rate of change of active power	MW/s
Maximum rate of change of reactive power	MVA _r /s
Shortest Repetitive time interval between fluctuations in active and reactive power reviewed annually	Seconds

Largest Step Change

In active power	MW
In reactive power	MVA _r

Wind Generation Data Requirements

The data requirements described below are consistent with the type of data and detail specified in Schedule 5.5 of the National Electricity Code (NEC) for other types of generators in the National Electricity Market.

The data requirements below are tailored specifically for wind farms and has been drawn up to be as general as possible, with some allowance for current technology trends. The data is required for operational purposes and for power system simulation to assess power system security and network operational limits by SP AusNet and others including NEMMCO and VENCORP.

In some cases, the data requested may refer to plant configurations which may not be applicable to the proposed installation. If this is the case, then this should be indicated in the your response.

Legend:

S = Standard Planning Data (S)

D = Detailed Planning Data (D)

R = Registered Data consists of data validated and agreed between SP AusNet and the Code Participant, such data being:

- (a) R1 = prior to actual connection and provision of access, data derived from manufacturers' data, detailed design calculations, works or site tests etc.;
- and
- (b) R2 = after connection, data derived from on-system testing.

1 Primary Plant Diagrams

1.1 Single line diagram of the station, including:

text, diagram S, D, R1

1.1.1 HV grid connection arrangements

1.1.2 individual generator connection arrangements

1.1.3 other primary equipment including

1.1.4 circuit breakers

1.1.5 transformers

1.1.6 capacitor banks

1.1.7 SVC's / FACTS / Converters

1.1.8 Maximum 3 phase short circuit infeed calculated by method of AS 3851 (1991)

Symmetrical kA S, D

Assymetrical kA D

Minimum zero sequence impedance % on 100 MVA D

base

Minimum negative sequence impedance % on 100 MVA D

base

1.1.9 Any other relevant plant

2 High level schematic diagram showing control system arrangements, including sources of controller input signals (text, diagram)

2.1 wind farm controls:

text, diagram S, D

2.1.1 HV grid connection controls (if interface is electronic rather than circuit breaker)

2.1.2 controls used for coordination of the farm

2.1.3 station voltage/reactive controls etc.

2.2 individual generator controls:

text, diagram S, D

- 2.2.1 induction generator
- 2.2.2 excitation, if any (e.g. variable speed controller, self-excitation arrangements, etc.)
- 2.2.3 wind turbine
- 2.2.4 pitch controller
- 2.2.5 yaw controller
- 2.2.6 over-speed protection
- 2.2.7 over/under-voltage protection
- 2.2.8 interface controls (if interface is electronic rather than circuit breaker/switch)

2.3 voltage/reactive power controls:

text, diagram S, D

- 2.3.1 capacitor bank switching controls
- 2.3.2 SVC / FACTS / Converter control arrangements

Plant Models

3.1 Wind Farm Characteristics

text, diagram S, D, R1

- 3.1.1 number of generators
- 3.1.2 total station rated MW capability (sent out into the grid)
- 3.1.3 expected range of reactive power control at station rated MW
 - if the interface to the grid is via back-back DC link or voltage source converter, provide PQ capability diagram or PQ characteristic
- 3.1.4 expected reactive power profile from zero MW to station rated MW
 - explain voltage/reactive power control strategy

3.2 Primary Plant Characteristics

- 3.2.1 for main transformers
 - refer section 3.7
- 3.2.2 for other primary plant

text S, D, R1

- MVA / MW / MVAr / Amp rating
- rated voltage
- other relevant ratings and characteristics
- refer also NEC Schedule 5.5.3 and 5.5.4

3.3 Wind farm controls and protection

(N.B. in addition to the data requirements below, protection and control requirements for all protections and controls will be required to be coordinated with the SP AusNet)

text, diagram S, D, R1, R2

- 3.3.1 text description of the control philosophy, purpose and operation of the control systems

3.3.2 identify controls under section 2.1 which can respond in timeframes faster than 10 seconds

3.3.3 provide control system block diagrams and parameters for such plant, including non-linearities (such as limits, deadbands, etc.)

- Include dynamics of any limiter controls

3.3.4 describe operation and characteristics of plant not included in the item above

3.3.5 settings of station over/under-voltage or over/under-frequency protections

3.4 individual generator controls:

text, diagram S, D, R1, R2

3.4.1 text description of the control philosophy, purpose and operation of the control systems

3.4.2 if the interface to the wind farm network is via back-back DC link or voltage source converter, provide PQ capability diagram or PQ characteristic

3.4.3 identify controls under section 2.2 which can respond in timeframes faster than 10 seconds

3.4.4 provide control system block diagrams and parameters for such plant, including non-linearities (such as limits, deadbands, etc.)

- Include dynamics of any limiter controls

3.4.5 describe operation and characteristics of plant not included in the item above

3.4.6 settings of station over/under-voltage or over/under-frequency protections

3.5 voltage/reactive power controls:

text, diagram S, D, R1, R2

3.5.1 text description of the control philosophy, purpose and operation of the control systems

3.5.2 identify controls under section 2.3 which can respond in timeframes faster than 10 seconds

3.5.3 provide control system block diagrams and parameters for such plant, including non-linearities (such as limits, deadbands, etc.)

- Include dynamics of any limiter controls

3.5.4 describe operation and characteristics of plant not included in the item above

3.5.5 settings of station over/under-voltage or over/under-frequency protections

3.6 Individual generators, for each generator type indicated in the single line diagram:

text, diagram S, D, R1, R2

3.6.1 manufacturer type designation

3.6.2 Relevant charts such as torque/speed characteristic, wind/power characteristic, sensitivity to grid frequency or voltage changes, etc.

3.6.3 generator model and parameters – static parameters

3.6.3.1 MVA rating

3.6.3.2 nominal voltage

3.6.3.3 number of poles

3.6.3.4 Rated MW (sent out into the farm network)

3.6.3.5 Rated MW (at generator terminals)

3.6.4 generator model and parameters – dynamic parameters

(models and parameters are required for power system stability studies in the frequency range for studying for electro-mechanical modes of stability – i.e. 0.05Hz-10Hz)

3.6.4.1 for example, if simple induction generator, provide

- Inertia (H)
- impedance (X)
- transient impedance (X')
- sub-transient impedance (X'')
- leakage reactance (Xl)
- saturation characteristics (E1, S(E1), E2, S(E2))
- transient time constant (T')
- sub-transient time constant (T'')

3.6.4.2 if wound rotor with excitation control, provide model and parameters to an equivalent level of detail to that required for simple induction generator, above (i.e. sufficient to model performance in the frequency range 0.05Hz-10Hz).

3.6.5 Wind turbine model and parameters

- dynamic parameters(models and parameters are required for power system stability studies in the frequency range for studying for electro-mechanical modes of stability – i.e. 0.05Hz-10Hz)
- wind speed cut-outs (high/low wind speed)

Schedule 5.2 - Conditions for Connection of Generators

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
5.2.5.1 Reactive Power Capability				
a)	Each synchronous generating unit, while operating at any level of active power output, must be capable of: (1) supplying at its connection point an amount of reactive power of at least the amount equal to the product of the rated active power output of the generating unit at nominal voltage and 0.395; and (2) absorbing at its connection point an amount of reactive power of at least the amount that would be absorbed equal to the product of the rated active power output of the generating unit at nominal voltage and 0.395.			
b)		No requirement to absorb or supply reactive power		
e)	The access standards for consumption by a <i>Generator</i> are to be determined in accordance with NEC clause S5.3.5 of schedule 5.3 as if the <i>Generator</i> were a <i>Market Customer</i>			
5.2.5.2 Quality of electricity generated				
a)	Generate Constant Voltage and when not generating, Voltage fluctuations, harmonic distortion and unbalance must be less than levels determined by NSP in accordance Sc 5.1			

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
	Automatic Stds			
b)		When generating Voltage fluctuations, harmonic distortion and unbalance must be less than levels determined by NSP in accordance with Sc 5.1 Minimum Stds		
c)			:When operating unsynchronised, each synchronous generating unit must generate a constant voltage level with balanced phase voltages and harmonic voltage distortion equal to or less than permitted in accordance with Australian Standard AS 1359 "General Requirements for Rotating Electrical Machines".	

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
5.2.5.3 Generating unit response to disturbances in the power system				
a)	Each generating unit must be capable of continuous uninterrupted operation during the occurrence of:			
	(1) <i>Power system frequency</i> at any level within the following ranges for the given duration			
	Frequency range (Hz) 47 to 49	Duration 2 minutes	[These times have been taken	

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement						
	<p style="text-align: center;">51 to 52 49 to 49.5 50.5 to 51</p> <p style="text-align: center;">49.5 to 50.5</p> <p>(2) The range of <i>connection point</i> voltage at any level within the following ranges for the given duration:</p> <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">Voltage range</td> <td style="text-align: center;">Duration</td> </tr> <tr> <td style="text-align: center;"><i>nominal voltage</i> +10% to +18%</td> <td style="text-align: center;">0.9 sec</td> </tr> <tr> <td style="text-align: center;"><i>nominal voltage</i> +/- 10%</td> <td style="text-align: center;">continuous</td> </tr> </table>	Voltage range	Duration	<i>nominal voltage</i> +10% to +18%	0.9 sec	<i>nominal voltage</i> +/- 10%	continuous	<p style="text-align: center;">2 minutes 8 minutes 8 minutes</p> <p style="text-align: center;">continuous</p>	<p>from the frequency operating standards, as the longest times that the frequency may remain within that range, based on separation events.]</p> <p>[These levels have been taken from NEC clause S5.1a.4.]</p>	
Voltage range	Duration									
<i>nominal voltage</i> +10% to +18%	0.9 sec									
<i>nominal voltage</i> +/- 10%	continuous									
b)	<p>The voltage dip caused by a <i>transmission system</i> fault which causes voltage at the <i>connection point</i> to drop to zero for up to 0.175 seconds in any one phase or combination of phases, followed by a period of ten seconds where voltage may vary in the range 80-110 percent of the nominal voltage, and a subsequent period of three minutes in which the voltage may vary within the range 90-110 percent of the nominal voltage.</p>									
c)		<p>The voltage dip caused by a transmission system fault which causes voltage at the connection point to drop to the voltage magnitude calculated by the Network Service Provider and advised to the Generator for a period of time derived from column 2 of Table S5.1a.2 corresponding to the nominal voltage of transmission at a location nearest the connection point in any one phase or combination of phases.</p>								

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
d)				YES

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
5.2.5.4 Partial load rejection				
a)	Each <i>generating unit</i> must be capable of continuous uninterrupted operation during and following a <i>loading level</i> reduction directly imposed from the <i>power system</i> in less than 10 seconds from a fully or partially loaded condition provided that the <i>loading level</i> reduction is less than 30 percent of the <i>generating unit's nameplate rating</i> and the <i>loading level</i> remains above <i>minimum load</i> .			
b)		<i>Minimum access standard:</i> Each <i>generating unit</i> must be capable of continuous uninterrupted operation during and following a <i>loading level</i> reduction directly imposed from the <i>power system</i> in less than 10 seconds from a fully or partially loaded condition provided that the <i>load</i> reduction is less than 5 percent of the <i>generating unit's nameplate rating</i> and the <i>load</i> remains above <i>minimum load</i> .		
c)				YES
5.2.5.4 Partial load rejection				

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
a)	Each <i>generating unit</i> must be capable of continuous uninterrupted operation during and following a <i>loading level</i> reduction directly imposed from the <i>power system</i> in less than 10 seconds from a fully or partially loaded condition provided that the <i>loading level</i> reduction is less than 30 percent of the <i>generating unit's nameplate rating</i> and the <i>loading level</i> remains above <i>minimum load</i> .			
b)		<i>Minimum access standard:</i> Each <i>generating unit</i> must be capable of continuous uninterrupted operation during and following a <i>loading level</i> reduction directly imposed from the <i>power system</i> in less than 10 seconds from a fully or partially loaded condition provided that the <i>load</i> reduction is less than 5 percent of the <i>generating unit's nameplate rating</i> and the <i>load</i> remains above <i>minimum load</i> .		
c)				YES
5.2.5.8 Protection of generating units from power system disturbances				

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
a)	<p>1) Subject to clause S5.2.5.8(a)(2), if a Connection Applicant requires that its generating unit be automatically disconnected from the power system in response to abnormal conditions arising from the power system, the relevant protection system or control system must not disconnect the generating unit for conditions under which it must continuously operate or must withstand under a provision of this Code.</p> <p>2) Each scheduled generating unit connected to a transmission system must have facilities to automatically and rapidly reduce its generation by at least half if the frequency at the connection point exceeds a level nominated by NEMMCO that is not less than the upper limit of the operational frequency tolerance band.</p>			
b)		No automatic standard		
d)				YES
5.2.5.9 Protection system that impact on power system security				

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
a)	<p>(1) Primary protection systems must be provided to disconnect from the power system any faulted element within the protection zones that include the connection point, the generating unit stator winding or any plant connected between them, within the applicable fault clearance time determined under clause S5.1.9(a)(1), but subject to clauses S5.1.9(k) and S5.1.9(l).</p> <p>(2) Each primary protection system must have sufficient redundancy to ensure that a faulted element within its protection zone is disconnected from the power system within the applicable fault clearance time with any single protection element (including any communications facility upon which that protection system depends) out of service.</p> <p>(3) Breaker fail protection systems must be provided to clear faults that are not cleared by the circuit breakers controlled by the primary protection system, within the applicable fault clearance time determined under clause S5.1.9(a)(1).</p>			YES

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
b)		<p>1)Protection systems must be provided to disconnect from the power system any faulted element within the protection zones that include the connection point, the generating unit stator winding and any plant between them, within the applicable fault clearance time determined under clause S5.1.9(a)(2), but subject to clauses S5.1.9(k) and S5.1.9(l).</p> <p>2)If a fault clearance time determined under clause S5.1.9(a)(2) for a protection zone is less than 10 seconds, a breaker fail protection system must be provided to clear from the power system any fault within that protection zone that is not cleared by the circuit breakers controlled by the primary protection system, within the applicable fault clearance time determined under clause S5.1.9(a)(3).</p>		YES
5.2.5.10 Asynchronous operation of synchronous generating units.				
a)	Each <i>synchronous generating unit</i> must have a <i>protection system</i> to promptly disconnect it in order to prevent pole slipping.			
b)		Each <i>generating unit</i> must not cause a voltage disturbance due to pole slipping of more than the maximum level specified in Table 7 of <i>Australian Standard AS/NZS 61000.3.7:2001</i>		

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
5.2.5.11 Frequency control				
b)	<p>A Generator must ensure that in respect of each of its scheduled generating units:</p> <p>(1) its active power transfer to the power system does not increase in response to a rise in system frequency;</p> <p>(2) its active power transfer to the power system does not decrease in response to a fall in system frequency; and</p> <p>(3) any oscillatory behaviour in respect of its active power transfer to the power system (other than authorised power system stabiliser action) is damped with a damping ratio of more than 0.4.</p>			
c)	<p>A Generator must ensure that each of its scheduled generating units is capable of automatically reducing its output:</p> <p>(1) whenever the system frequency exceeds the upper limit of the normal operating frequency band;</p> <p>(2) by an amount that is at least the smallest of:</p> <p>(i) twenty percent of its maximum operating level times the percentage frequency difference between system frequency and the upper limit of the normal operating frequency band;</p> <p>(ii) ten percent of its maximum operating level; and</p> <p>(iii) subject to the frequency recovering gradually, the difference between the generating</p>			

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
	<p>unit's pre-disturbance level and minimum operating level, but zero if the difference is negative.</p>			
d)	<p>A Generator must ensure that each of its scheduled generating units is capable of automatically increasing its output</p> <p>(1) whenever the system frequency falls below the lower limit of the normal operating frequency band;</p> <p>(2) by the amount that is at least the smallest of:</p> <p>(i) twenty percent of its maximum operating level times the percentage frequency difference between the lower limit of the normal operating frequency band and system frequency;</p> <p>(ii) five percent of its maximum operating level;</p> <p>and</p> <p>(iii) subject to the frequency recovering gradually, one third of the difference between the generating unit's maximum operating level and pre-disturbance level, but zero if the difference is negative.</p>			

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
e)		<p>A Generator must ensure that at each of its connection points in relation to its scheduled generating units:</p> <p>(1) the active power transfer to the power system does not increase in response to a rise in system frequency;</p> <p>(2) the active power transfer to the power system does not decrease more than 2 percent per Hz in response to a fall in system frequency; and</p>		
f)				YES
g)				YES
5.2.5.12 Stability				
a)	<p>A <i>generating unit</i> must have plant capabilities and <i>control systems</i>, including, but not limited to inertia, short-circuit ratio and power system stabilisers, sufficient to:</p> <p>(1) not cause any inter-regional or intra-regional power transfer capability based on:</p> <p>(i) transient stability;</p> <p>(ii) oscillatory stability; or</p> <p>(iii) voltage stability,</p>			
b)		<p>The <i>generating unit</i> must have plant capabilities and <i>control systems</i>, including, but not limited to inertia, short-circuit ratio and power system stabilisers, sufficient to not reduce any <i>inter-regional</i> or <i>intra-regional power transfer capability</i> to import into the <i>generating unit's region</i> by more than its <i>loading level</i> whenever it is</p>		

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
		<i>synchronised.</i>		
c)			The relevant requirements for short-circuit ratio in IEC 60034-3 are a <i>plant standard</i> in relation to clause S5.2.5.12(a)(1)(i).	
d)				YES
5.2.5.13 Excitation Control System				YES
	A <i>generating unit</i> must be adequately damped and is not permitted to remain in oscillation with respect to the remainder of the <i>power system</i> with a frequency of oscillation more than 2.5 Hz or less than 0.1 Hz.			
		A <i>generating unit</i> must be adequately damped and is not permitted to remain in oscillation with respect to the remainder of the <i>power system</i> with a frequency of oscillation more than 5 Hz or less than 0.1 Hz.		
				YES
5.2.6.1 Remote Monitoring				

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
a)	<p>(1)Each <i>scheduled generating unit</i> must have <i>remote monitoring equipment</i> to transmit to <i>NEMMCO's control centres</i> in real time, the quantities that <i>NEMMCO</i> reasonably requires to discharge its <i>market</i> and <i>power system security</i> functions as set out in Chapters 3 and 4 of the <i>Code</i> respectively.</p> <p>(2)The quantities may include such data as current, voltage, active power and reactive power in respect of generating unit stators, auxiliary supply and power conversion systems.</p>			
b)		<p>(1) Each <i>scheduled generating unit</i> connected to a <i>transmission system</i> must have <i>remote monitoring equipment</i> to transmit to <i>NEMMCO's control centres</i> in real time:</p> <p>(A) generating unit active power output; and</p> <p>(B) generating unit reactive power output.</p> <p>(2) Each <i>scheduled generating unit</i> connected to a <i>distribution system</i> must have <i>remote monitoring equipment</i> to transmit to <i>NEMMCO's control centres</i> in real time either generating unit active power output or active power delivered to the <i>distribution system</i>.</p>		
c)				YES
5.2.9 Fault Level				

Clause	Automatic Standard	Minimum Standard	Plant Standard	NEMMCO involvement
a)	<i>A Generator must ensure that each generating unit can limit its contribution to the fault current on the transmission network or distribution network to the level specified for that generating unit by the Network Service Provider.</i>			
b)		There is no minimum requirement.		