



Response to Licensing Arrangements for Generators in South Australia

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1 Background

1.1 Tilt Renewables

Tilt Renewables owns and operates a wind generation portfolio with an installed capacity of 582MW, representing approximately 11% of market share by installed wind capacity in Australasia. Installed capacity is made up of 307 operating turbines across 7 wind farms and includes both Australia's second largest, and New Zealand's largest wind farms. Our pipeline of development projects has the potential to produce more than 2000MW of additional renewable generation capacity, both wind and solar.

Tilt Renewables owns and operates Snowtown 1 (101MW) and Snowtown 2 (270MW) wind farms in South Australia. Tilt Renewables is presently developing Palmer Wind Farm and some solar developments in South Australia.

1.2 The Enquiry

The Essential Services Commission of South Australia (the Commission) is presently undertaking an inquiry into the licencing arrangements for generators in South Australia. The inquiry is intended to review the special licence conditions and technical standards applicable to electricity generators. In particular, from reference [1], the Commission is inquiring into:

- Whether the current licence conditions for the grid connection of wind-powered electricity generators should be removed, retained or varied, and
 - Whether any additional or amended technical requirements should be imposed on other grid-scale inverter-connected electricity generators (such as solar generation) or other generation technologies and sources (including conventional synchronous generation).
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1.3 AEMO Advice

The Commission has engaged the Australian Energy Market Operator (AEMO) to provide technical advice with regards to this Inquiry. After publishing interim advice [2] in February, AEMO released to the Commission its Recommended Technical Standards for Generator Licensing in South Australia [3] on 31 March 2017. The Commission and AEMO have since engaged with stakeholders in formal and informal forums to present its opinions and to hear alternative positions that other stakeholders may hold.

1.4 This Response

Tilt Renewables is presenting this response to the Commission to assist it in understanding the impacts of the proposed licence conditions on both proponent and existing renewable energy generators.

The response attempts to address the areas of interest raised by AEMO in reference [3] with consideration of the Commissions intentions as set out in reference [1].

2 Reactive Power and Voltage Control

2.1 Reactive Power Requirements

Tilt Renewables agrees with AEMO that an appropriate level of dynamic and switched reactive support should be available at each generator to enable the control of its voltage and to support the system during fault conditions. Tilt Renewables is supportive of AEMO's recommendation to link the reactive requirements of generators to the levels required to support the power system through transient faults.

AEMO notes (reference [3], page 21) that a power system "...requires reactive support in many forms and locations". Tilt Renewables agrees and references section 4.5(f) of the National Electricity Rules (NER, reference [5]) that notes there are other mechanisms that should be used to ensure reactive support is located well for the whole system. This acts as a reminder that the connection of generators and associated requirements for reactive capability should not be a substitute for good reactive support planning. Tilt Renewables was pleased to see that ElectraNet installed 50MVAR reactors at Para in response to the Northern Closure and Tilt Renewables would encourage continued planning of the reactive requirements to ensure economical distribution and magnitudes of reactive support are delivered throughout South Australia.

2.2 Voltage Control

AEMO recommends that the existing licence requirements relating to voltage control are reworded as described in section 2.3.3. of reference [3].

Tilt Renewables is supportive of requiring voltage control at generators as this will greatly assist the system with regards to stability. Tilt Renewables considers that negotiation around each of the automatic access standard clauses is reasonable whilst allowing the flexibility in the control characteristics supported by AEMO.

3 Disturbance Ride Through Capability

3.1 General

Tilt Renewables supports AEMO's position that generators should be able to ride through a number of repeated disturbances and that the actual ride-through capability needs to be communicated to AEMO.

3.2 Reactive Power and Active Power Injection Requirements

Tilt Renewables acknowledges AEMO's recommended reactive current injection and active power injection requirements. Tilt Renewables is not in a position to comment on the capability of all generators to meet the requirements but believes many modern wind turbines should be capable of meeting them. Tilt Renewables is less certain of solar inverter capabilities and recommends that the Commission actively seek input from solar inverter Original Equipment Manufacturers (OEMs) if none have responded to the Commission's Inquiry.

3.3 Voltage Withstand

AEMO recommends that generators should be required to withstand higher voltages than is presently required. Tilt Renewables refers to Figure S5.1a.1 in the NER (reference [5]) which can be considered *good electricity industry practice*. If AEMO is suggesting that every connected generator is required to ride through voltages in excess of Figure S5.1a.1, it would suggest that *good electricity industry practice* may not be being achieved by the Network Service Providers (NSPs). By making the generators ride through such voltages, the lack of voltage control maintained by the NSPs failing to adhere to *good electricity industry practice* may be imposing undue costs on the industry or Registered Participants which is contrary to the aims of the System Standards as per S5.1a.1(d) and the National Electricity Objective (NEO). Although turbine/inverter suppliers will probably be able to meet the requirements, the need for them indicates problems on the South Australian network that may need intervention by the NSP.

Tilt Renewables recommends against imposing licence conditions on generators that assume *good electricity industry practice* will be routinely ignored. Tilt Renewables recommends that the Commission considers imposing licence conditions on networks in South Australia could be used to require that *good electricity industry practice* be adhered to such that users of the network can expect and plan for voltages as per figure S5.1a.1.

4 Inertia and Fast Frequency Response

Tilt Renewables is supportive of AEMO's recommendation to not require minimum inertial levels on generators but to consider other sources of inertia. Tilt Renewables also supports AEMO's recommendation that further assessment of Fast Frequency Response needs to be undertaken before it can be understood and relied upon.

5 System Strength

As more inverter connected generators join the NEM, the system strength, as measured by the Short Circuit Ratio (SCR) will tend to reduce. Solar inverters, in particular, have a fault current only marginally greater than their load current and that reduces their contribution to the SCR.

As the SCR trends downwards, NSPs and other Participants may find that over-current protection relays are no longer the correct choice for protection. Traditional protection systems may need to be replaced with unitised (differential) protection systems. This is many years off yet and there is significant time to plan for such replacement. Such planning would ensure that the replacement of legacy protection systems could be completed gradually rather than as a costly, knee-jerk reaction.

It would be interesting to assess the behaviour of the generator control systems (voltage control/reactive control and so on) as more inverter connected generators join the NEM. Although the SCR will reduce, they may work well with each other despite the lowering of the "traditional" measure of system strength.

Tilt Renewables is supportive of requiring NSPs to coordinate the system strength requirements.

Tilt Renewables encourages the Commission to include a detailed description of the methodology for calculating changes in system strength before it can agree or disagree with the proposed requirements to negotiate performance standards considering changes to system strength. That proposal has the potential to either economically support the system or to make connection of new generation uneconomical depending on its formulation.

6 Active Power and Frequency Control

AEMO mentions that it is unsure how frequency will be managed into the future. AEMO then recommends requiring new generators to register for the FCAS markets, even though it is unsure how the controls will apply into the future. At this time, renewable energy is not presenting a problem with regards to regulation frequency control (AEMO is currently investigating this) compared with the impact of system demand variations. Tilt Renewables contends that AEMO is recommending a short term fix to a non-existent problem. The existing issues surrounding frequency are being investigated by AEMO now and early indications suggest the problems are to do with governor settings, not new generators. Tilt Renewables recommends against the Commission adopting requirements with regards to frequency control.

The MASS in its present form is difficult to understand and implement from a renewable energy generator's perspective. AEMO is presently addressing the MASS and Tilt Renewables encourages further work in that area. Tilt Renewables recommends that AEMO encourages participation in Ancillary Services markets through good design and description of the markets and ready availability of data to assess the value of such participation.

There is some concern within the industry that increasing the number of participants in the FCAS market could lead to further frequency instability, particularly if AEMO uses its powers to direct FCAS contributions from participants who may not have intended to participate in the market at a particular time. There is some evidence of occasional frequency oscillations with a frequency of 4 seconds – possibly suggesting that the AGC system is inadequately damped. Additional participants responding to signals in the regulation (4 second) market may make the magnitude of such oscillations worse and possibly unstable.

Tilt Renewables recommends that the Commission's licence conditions be targeted at correcting identified problems only, not non-existent nor poorly described problems.

Regarding the rate of change of active power limits, Tilt Renewables recommends that this is clarified. Tilt Renewables understands that the intent was to limit ramp-rates associated with bidding but, as written, it could be interpreted to also apply to fuel source variability.

7 Concluding Remarks

Tilt Renewables appreciates the opportunity offered by the Commission to engage in this inquiry. Tilt Renewables shares the Commission's stated goal of promoting resilience and security of the South Australian power supply and looks forward to working with the Commission to ensure its projects achieve that.

A1 References

- [1] “Inquiry into the licensing arrangements for generators in South Australia, Draft Report”, the Commission, May 2017
- [2] “Interim advice on licencing recommendations”, letter from David Swift of AEMO to Adam Wilson of the Commission, 24 February 2017
- [3] “Recommended Technical Standards for Generator Licensing in South Australia”, AEMO, 31 March 2017
- [4] “Black System South Australia 28 September 2016”, AEMO, March 2017
- [5] “National Electricity Rules”, AEMC
- [6] “Electricity Generation Licence – Model Terms and Conditions”, the Commission, http://www.escosa.sa.gov.au/ArticleDocuments/800/100503-ElectricityGeneration-ModellLicenceConditions_2010.pdf.aspx?Embed=Y