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To: Australian Energy Market Operator

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Regarding: ERC0222 - Reactive current response during high voltage, and hunting issue.

Reference document : DRAFT RULE DETERMINATION

National Electricity Amendment (Generator technical performance standards) Rule 2018

VERSION: 31 May 2018

#### QUESTION 1:

Huawei identifies very high dynamic reactive current injection requirement during high voltage status. The draft rule determination, in Section 10.4.7, requires the following:

1. *over 130% of normal voltage for a period of at least 0.02 seconds*
2. *125% to 130% of normal voltage for a period of at least 0.2 seconds*
3. *120% to 125% of normal voltage for a period of at least 2 seconds*
4. *115% to 120% of normal voltage for a period of at least 20 seconds*
5. *110% to 115% of normal voltage for a period of at least 20 minutes*
6. *90% to 110% of normal voltage continuously*
7. *80% to 90% of normal voltage for a period of at least 10 seconds, and*
8. *70% to 80% of normal voltage for a period of at least 2 seconds.*

As one of the top international solar inverter manufacturer, Huawei considers the rule is **overly demanding and ambiguous for the situation of “over 130% of normal voltage”**.

The wording “over 130%” may range up to any possible number, and may lead to confusion to rule interpretation. Meanwhile, Huawei’s experience in solar industry is that solar inverter can keep continuous operation for a duration longer than the time as per the draft rule when the voltage exceeds 130%, but **generating inductive reactive power under that circumstance is hazardous to inverter**. Imposing “over 130%” reactive current response requirement in the automatic access standard will thus delay the progress of inverter-based solar generation to be accepted.

#### QUESTION 2:

Dynamic reactive power injection “hunting” during low-voltage contingencies. The rule requires the following in Section 9.5.5

*reactive current response thresholds must be set within 85% and 112% of the nominal voltage, with the actual thresholds to be agreed between AEMO and the network service provider*

However, based on in-house dynamic simulation experience, Huawei doubts if the range is adequate to eliminate the hunting behavior of dynamic reactive current response. In circumstances such as weak network connections (large POC impedance) or large pre-contingency reactive power being generated (which will be cleared), dynamic reactive current response may result in significant voltage leaps (LVRT) / drops (HVRT), which would cause the generating unit to quit LVRT / HVRT, or even enter the opposite status repetitively. That is, “hunting”.

Therefore Huawei argues the “85% to 112% threshold” range is too narrow, especially for generating systems with low SCR or generating large reactive power. Imposing the range may not

be helpful to avoid the hunting risk.