

To whom it may concern,

Following the public consultation process and due to the interest of SENER (<http://www.engineeringandconstruction.sener/>) in entering the renewable electric market in the Northern Territory (through Sener Engineering and Systems Pty Ltd), please find enclosed our comments to the Network Technical code and Network planning criteria v4, released for public consultation. These comments are based on our knowledge as an experienced international Power EPC contractor (please see attached references) and it is to our understanding that the proposed changes will not undermine the objective of the Code itself and help to bring make it in line with international state of the art powerplants.

- Network Technical Code and Planning Criteria:

- o Paragraph 3.3.5.3 (b): The wording “continuous uninterrupted operation” implies that this is only applicable to the “normal operating frequency band”, but not to “abnormal frequency band” and “transient frequency limit”, as these concepts are defined as temporary events and not for continuous operation. It is proposed to re-write the paragraph 3.3.5.3 (b) as follows: “(b): The automatic access standard is a generating system and each of its generating units must be capable of continuous uninterrupted operation for frequencies in the range between the lower and upper bound of the operating normal frequency band”. Additionally, the requirements of operation for the “abnormal frequency range” and “transient frequency limit” would be defined excluding the concept “continuous uninterrupted operation”.
  
- o Paragraphs 2.2.2, 3.3.5.3 (b) and 16.3: The value of the stabilization time for the “abnormal frequency band” should be indicated. This is not either referred in other sections or the NTC or other known documents. The definition of “stabilisation time” in section 3.3.5.3 (a) refers to frequency operating standards that apply in the region in which the generating unit is located, but section 5.3 of System Control Technical Code does not indicate any value for the stabilization time. This value is needed to properly define the operative capabilities of the generators.
  
- o Paragraph 3.3.5.3 (b): The underfrequency requirement for transient frequency limit of 2 seconds between 45 and 47 Hz can provoke cumulative damage effects of steam turbines blade sections due to resonance effects that increase the stress and vibrations fatigue. It is proposed to state that the transient frequency time value is 0.2 seconds. in the case of steam turbines.
  
- o Paragraph 3.3.5.4 (a)(7), (8) and (9): The voltage ride-through capability requirements for the indicated voltage ranges and time lapses are not possible for synchronous generators, as they will fall into loss of synchronism and pole slip that will disconnect the generator from the grid to avoid further damages in the generator. It is proposed to state the requirement for the case of synchronous generators as follows:

§ "(7): 80% - 90% of normal voltage for a period of at least 1.5 seconds

§ (8): 70% - 80% of normal voltage for a period of at least 0.7 seconds

§ (9): 0% - 70% of normal voltage for a period of at least 0.15 seconds"

o Paragraph 3.3.5.5(c)(3): The requirement should be coordinated with the voltage ride-through capability conditions of section 3.3.5.4

o Paragraph 3.3.5.5(d): The capability of a synchronous generator to withstand the quantity and strict conditions defined in this section are not possible, because they involve constructive features that are far beyond the recognized common industry standards for rotating machinery and electric generators. The requirements of this section imply thermal conditions that make the design of the generators be far from non cost-effective.

o Paragraph 3.3.5.5(e)(1): The requirement of reactive current for the support of voltage during the fault is not possible for the voltage ride-through capability conditions of paragraph 3.3.5.4. For example, in the case of 0% voltage dip indicated in paragraph 3.3.5.4(a)(9), this requirement implies that the reactive current to be provided from the generator will be  $0.04 \times 100 \times I_{rated} = 4 \times I_{rated}$ . This value will provoke the trip of generator protections.

o Paragraph 3.3.5.5(m) and (n): It is not understood the event or disturbance conditions in which the requirements of paragraphs 3.3.5.5(m) and (n) must be applied with respect of the conditions of the whole section 3.3.5.5. Note that version 119 of NER makes the distinction between automatic, minimum and negotiated access standards that are not mentioned in the case of this NTC.

o Paragraph 3.3.5.10(a)(1): It is assumed that the compliance with this requirement will release the generator to comply with the requirements indicated on paragraphs 3.3.5.4 and 3.3.5.5

Thank you for the opportunity to contribute to this important consultation process.

Regards,

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Craig Aspinall

Australian Representative

SENER Engineering and Systems Pty Ltd (ABN 39 615 586 635)

Unit 3, 25-31 Darley Street East, Mona Vale, NSW, Australia