اللجنة الإشرافية للكود السعودي لنقل الكهرباء
GCSC
GRID CODE SUPERVISORY COMMITTEE

Recommendation Form

Date: 6 January 2022

Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: Additional paragraph to 4.4.3.1.	**Registration No.** **21A082**
Justification of the proposed modification: In the coming decade, higher penetration of renewables will be introduced in to the KSA power system. The large penetration of renewables would impact the level synchronous plants on the system. This would inherently reduce the overall system inertia and will impact the frequency performance in KSA under a major event. The fast frequency response is the power injected to the grid in response to changes in measured or observed frequency during the arresting phase of a frequency excursion event to improve the frequency nadir or initial rate-of-change of frequency. This occurs prior to primary response and governor action but after inertial response. It should be noted that this differs to synthetic inertia which aids in the inertial response and the initial fall in frequency.	
GCSC's Assessment / Views: The majority of the GCSC members approved this proposed amendment after receiving the modifications from the proposer, in accordance with the directive of the Committee during the 52nd GCSC Meeting, i.e., by adding definitions of some technical terms in the Glossary & Definitions.	
GCSC Recommendation: With majority of the members voted "Yes" via e-mail, the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A082 (11 out of 13); Member PB voted "neutral" and Member G1 was "excused".	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New item (iv) in clause 2.5.5.16; and new paragraphs in clause 2.5.5.17.	**Registration No.** **21A083**
Justification of the proposed modification: It will ensure that Battery Energy Storage System (BESS) facility remains connected with the transmission grid within the frequency range that is supposed to do so. Moreover, it will enable proper and timely disconnection while the BESS is withdrawing energy from the system during an under-frequency event. Finally, it will ensure a proper and timely disconnection while the BESS is injecting energy to the system during an over-frequency event.	
GCSC's Assessment / Views: The majority of the GCSC members approved this proposed amendment, after receiving the modifications from the proposer, in accordance with the directive of the Committee during the 52nd GCSC Meeting.	
GCSC Recommendation: With majority of the members voted "Yes" via e-mail, the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A083 (9 out of 13); Members G3, D3, and PB voted "neutral" and Member G1 was "excused".	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: Additional clause in Section 2.5.5.20.ii inserted before Figure 2.3	**Registration No.** **21A084**
Justification of the proposed modification: Momentary cessation should be minimized as this introduces significant disturbances into the network. Thus, the predictability and accuracy becomes an important aspect. Momentary cessation can be allowed to avoid BESS tripping but only if this occurs outside the non-tripping zone (in terms of voltage and frequency) to be defined by the TSP. This occurs because the power electronic firing commands are blocked, and the inverter does not produce active or reactive current.	
GCSC's Assessment / Views: The GCSC approved this proposed amendment during the 52nd GCSC Meeting.	
GCSC Recommendation: Having all members voted "Yes", the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A084 (14 out of 14).	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New section 2.4.9 Phase Jumps	**Registration No.** **21A085**
Justification of the proposed modification: Phase Jump Immunity defines the ability to correctly monitor the grid frequency during disturbances. It is vital for the derived ride through capability of the inverter. Inverter-based resource, such as BESS should be able to withstand all expected phase jumps on the power system; and is applicable during both charging and discharging operation.	
GCSC's Assessment / Views: The majority of the GCSC Members approved this proposed amendment during the 52nd GCSC Meeting.	
GCSC Recommendation: Having the majority of members voted "Yes", the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A085 (12 out of 14); Members PB and T1 voted "neutral".	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New items in Section 2.6 – System Services; and New Clause 4.4.7.7.	**Registration No.** **21A086**
Justification of the proposed modification: In the coming decade, higher penetration of renewables will be introduced in to the KSA power system. As a result, the power system behavior will change. The BESS Related Services will provide a short term solution to meeting the security standards if (a) planned investments are delayed (b) provide additional support to the control room if required (c) enhance the capability of SEC/NG SA in operating the power system.	
GCSC's Assessment / Views: The majority of the GCSC Members approved this proposed amendment, after receiving the additional modifications from the proposer, in accordance with the directive of the Committee during the 52nd GCSC Meeting.	
GCSC Recommendation: Having the majority of members voted "Yes" via e-mail, the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A086 (10 out of 13; Member PB voted "no"; member R1 voted "neutral"; while Member G1 was "excused".	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New definition in Glossary and Definitions	**Registration No.** **21A087**
Justification of the proposed modification: Having a common definition of the BESS and its components will give coherence to the rest of the amendments to the Grid Code.	
GCSC's Assessment / Views: The majority of the GCSC Members approved this proposed amendment, after receiving the additional modifications from the proposer, in accordance with the directive of the Committee during the 52nd GCSC Meeting, i.e., by adding definitions of some technical terms, e.g., Fast Frequency Response; Frequency Nadir, etc. in the Glossary and Definitions.	
GCSC Recommendation: Having the majority of members voted "Yes" via e-mail, the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A087 (11 out of 13; Member PB voted "neutral", while Member G1 was "excused".	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New Clauses 2.5.5.33 to 2.5.5.35	**Registration No.** **21A088**
Justification of the proposed modification: This is one of the unique characteristics of batteries and it is one of the most important: the state values. An accurate estimation of the SoC need to be required as well as control schemes to maintain it within the acceptable limits depending on the use case and the chemistry of the batteries. Thus, the SoC of a BESS affects the ability of the BESS to provide energy or other ancillary services to the grid. SOC limits affect the ability of the BESS to operate as expected. These limits and how they affect BESS operation should be defined by the equipment manufacturers and plant developer in agreement with the TSP.	
GCSC's Assessment / Views: The Committee approved this proposed amendment during the 52nd GCSC Meeting.	
GCSC Recommendation: Having all members voted "Yes", the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A088 (14 out of 14).	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New Appendix A3.2.3: Detailed Planning Data	**Registration No.** **21A089**
Justification of the proposed modification: SEC/NG_{SA} has the responsibility for maintaining & updating models for internal assessment & planning (static & dynamic behaviour of the grid). These models are necessary for predicting the behaviour of the power system as well as mitigation solutions. The models are necessary to ensure that the correct behaviour of the plant is modelled and verified against the onsite performance.	
GCSC's Assessment / Views: The GCSC approved this proposed amendment during the 52nd GCSC Meeting.	
GCSC Recommendation: Having all the members voted "Yes", the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A089 (14 out of 14).	**Chairman's Signature:** **Bassam T. Bukhari**

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Amendments to the Saudi Arabian Grid Code	
Section(s) of the Code to be affected by the proposed modification: New subsection 2.4.10; new clauses 2.5.5.6 & 3.3.6.3	**Registration No.** **21A090**
Justification of the proposed modification: An issue which is present in high inverter based networks, is the System Strength which affects the stability of the KSA grid. System strength is a more appropriate terminology for the concepts usually named short-circuit level or short-circuit ratio (SCR). The issue of SCR will become more evident in future years as more inverter-base Resource facilities connect to the system.	
GCSC's Assessment / Views: The GCSC approved this proposed amendment during the 52nd GCSC Meeting.	
GCSC Recommendation: Having majority of the members voted "Yes", the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A090 (13 out of 14); Member R1 voted "neutral".	**Chairman's Signature:** **Bassam T. Bukhari**

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Section(s) of the Code to be affected by the proposed modification: New item (ix) in Subsection 2.3.5.	**Registration No.** **21A091**
Justification of the proposed modification: A clear distinction on the technical requirements between a stand-alone facility and a hybrid facility should be outlined in the grid code.	
GCSC's Assessment / Views: The GCSC approved this proposed amendment during the 52nd GCSC Meeting.	
GCSC Recommendation: Having all members voted "Yes", the Committee is hereby recommending to WERA, the approval of Proposed Amendment No. 21A091 (14 out of 14).	**Chairman's Signature:** **Bassam T. Bukhari**