Smart Energy, Sustainable Future

CONSULTATION PAPER FOR PROPOSED MODIFICATIONS TO THE TRANSMISSION CODE

Closing date for submission of representations:
19 May 2017, 5 p.m.

20 APRIL 2017

ENERGY MARKET AUTHORITY
991G Alexandra Road
#01-29 Singapore 119975
www.ema.gov.sg

Please direct any enquiries by e-mail to: **EMA_ES@ema.gov.sg**

Disclaimer:

The information in this Consultation Paper is not to be treated by any person as any kind of advice. The Energy Market Authority shall not be liable for any damage or loss suffered as a result of the use of or reliance on the information given in this Consultation Paper.

1 Introduction

1.1. The Transmission Code sets out the rights and obligations of the Transmission Licensee, together with the rights and obligations of users of the Transmission System. The Transmission Code also sets out the technical requirements to be met by those who seek to connect and operate installations on the Transmission System.

2 Proposed modifications to the Transmission Code

2.1. Pursuant to Section 1.6 of the Transmission Code, EMA seeks representations on the proposed modifications to the Transmission Code as set out in Appendix 1.

2.2. The proposed modifications are to provide clarity and update to the technical requirements of the Transmission Code relating to solar photovoltaic installations.

3 Invitation to submit representations

3.1. EMA invites written representations on the proposed modifications to the Transmission Code as set out in Appendix 1.

3.2. Please send your written representations by e-mail to:

EMA_ES@ema.gov.sg

Alternatively, you may send your written representations by post/fax to the following address:

Electricity System Branch
Industry Regulation Division
Energy Market Authority
991G Alexandra Road, #01-29
Singapore 119975.
Fax: (65) 6 835 8020

Please use the form set out in Appendix 2 for your representations.

3.3. Anonymous representations will not be considered.

3.4. All representations must be in writing and must reach EMA by 5 pm on 19 May 2017.

3.5. EMA will acknowledge receipt of all submitted representations electronically. Please contact Mr Vincent Siow at 6376 7694 or Mr Lim Wee Kiat at 6376 7756

if you have not received an acknowledgement of your submitted representation within two business days.

3.6. EMA reserves the right to make public all or any part of any representation and/or to disclose the identity of the party who made the representation. Where a respondent considers any part of his representation to be confidential, he shall clearly mark and place such part of his representation as an annex.

3.7. This Consultation Paper shall constitute notice of the proposed modifications to the Transmission Code set out in Appendix 1, for the purpose of Section 1.6 of the Transmission Code.

~ End ~

Appendix 1

Table 1: Proposed Modifications to the Transmission Code

Modification Ref. No.	Clause	Original Text	Modified Text	Reasons
TC/2017/1	6.12.7	Owners of solar photovoltaic installations with an installed capacity of 100 kWac or above at each site/facility which is connected to the grid, shall provide the Power System Operator with the following signals which is sampled and transmitted at 1 minute intervals. Detailed requirement shall be provided by the Power System Operator upon request. • Active Power (gross) at the AC-side of the solar photovoltaic installation.	~~Owners~~ *Connected person* with ~~of~~ solar photovoltaic system of ~~installations with an~~ installed capacity ~~of~~ equal to or exceeding 1MWac ~~100 kWac or above~~ at each site/facility ~~which is connected to the grid~~, shall provide the Power System Operator with the following signals ~~which is~~ sampled and transmitted at 1 minute intervals. ~~Detailed requirement shall be provided by the Power System Operator upon request.~~ • Active Power ~~(gross) at the AC-side of the solar photovoltaic installation.~~ ; and • Solar irradiance. Detailed requirement are stated in Section H4.3.	The proposed modification to the requirement is to reduce the regulatory burden for small solar PV systems with installed capacity below 1MWac as Power System Operator is now able to have fairly good estimates of the power output of these geographically dispersed small PV systems using solar irradiance measurements from various weather stations. To further improve accuracy of the PV output estimation and ensure good correlation with solar irradiance measurements, Power System Operator will require power output and solar irradiance measurements from the larger Solar PV systems i.e. 1MWac and above, to calibrate and fine-tune power output estimations of the smaller PV systems so as to derive the near real-time estimated System total PV power output, and to constantly balance supply and demand of electricity.

Modification Ref. No.	Clause	Original Text	Modified Text	Reasons
TC/2017/2	H4.1	Substation and Switchhouse The status of the following equipment shall be provided: (f) Transformer taps (with the exception of 66/22kV transformers); (g) Solar global irradiance (applicable only to Transmission Licensee) that comply with the following minimum specifications. Transmission Licensee shall seek advice from the Power System Operator on the location of the transmission substation(s) for installation of Solar global irradiance measurement. • Irradiance range: 0 – 2000Wm^{-2}or better • Accuracy of direct output: >90% for clear sky • Directional response (for beam irradiance): +/- 20Wm2 • Response time to reach 95% response: < 30 seconds; and (h) Other quantities, as required.	Substation and Switchhouse ~~The~~ Status of the following equipment shall be provided: (f) Transformer taps (with the exception of 66/22kV transformers)<u>; and</u> ~~(g) Solar global irradiance (applicable only to Transmission Licensee) that comply with the following minimum specifications. Transmission Licensee shall seek advice from the Power System Operator on the location of the transmission substation(s) for installation of Solar global irradiance measurement.~~ ~~• Irradiance range: 0 – 2000Wm-2 or better~~ ~~• Accuracy of direct output: >90% for clear sky~~ ~~• Directional response (for beam irradiance): +/- 20Wm2~~ ~~• Response time to reach 95% response: < 30 seconds; and~~ ~~(h)~~(g) Other ~~quantities~~ <u>status</u>, as required.	More appropriate to move H4.1(g) Solar global irradiance measurement requirement to section on 'measurements' in clause H4.1 instead of under 'status of equipment' in clause H4.1 (see TC/2017/3 below).

Modification Ref. No.	Clause	Original Text	Modified Text	Reasons
TC/2017/3	H4.1	Substation and Switchhouse The following measurements shall be provided: (f) Transformer taps (with the exception of 66/22 kV transformers); and (g) Other quantities, as required.	Substation and Switchhouse The following measurements shall be provided: (f) ~~Transformer taps (with the exception of 66/22 kV transformers)~~ Solar global irradiance (applicable only to Transmission Licensee) that comply with the minimum requirements as specified in Section H4.3(b). Transmission Licensee shall consult the Power System Operator on which transmission substation(s) require Solar global irradiance measurement device; and (g) Other ~~quantities~~ measurements, as required.	More appropriate to move H4.1 (g) Solar global irradiance measurement requirement under section on 'measurements' to replace the item (f) Transformer Taps which is already in the 'status' section.

Modification Ref. No.	Clause	Original Text	Modified Text	Reasons
TC/2017/4	H4.3	New section	Solar Photovoltaic System The following measurements shall be provided: (a) Active Power (gross) at the AC-side of the solar photovoltaic system; and (b) Solar irradiance from sensor installed in close proximity to the PV panels. The solar irradiance sensor shall comply with the following minimum specifications: • Irradiance range: 0 – 2000Wm^{-2} or better • Accuracy of direct power output: >90% for clear sky • Directional response (for beam irradiance): +/- 20Wm^{2} • Response time to reach 95% response: < 30 seconds	To state measurements from solar photovoltaic system to be provided to the Power System Operator.

Appendix 2

Representations on the Proposed Modifications to the Transmission Code

Name: _____ Designation: _____

Company: _____ Email: _____

Role (Generation Licensee/ Retailer/ Consumer):

_____

Submission Date: _____ (dd/mm/yy)

Modification Ref. No.	Section*	Comments

* Reference to the section of the Transmission Code where change has been made in the version dated on May 2016 as published on the EMA website.