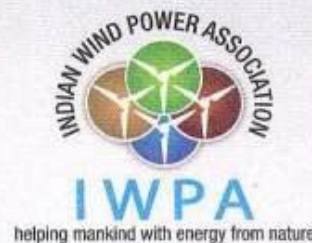


Prof. Dr. K Kasthurirangaian
Chairman

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The Secretary
Tamil Nadu Electricity Regulatory Commission
19-A, Rukmani Lakhshmi Pathi Road, Egmore
Chennai – 600 008.

4th January 2017

Dear Sir,

Sub: Order No 3 of 2016 dated 31 -03- 2016 – Difficulties in Implementation of Harmonics Norms – Direction to TANGEDCO to postpone the implementation requested - Reg.

1. At the outset, we thank the Honourable Commission for the issuance of Comprehensive Tariff Order No 3 of 2016 dated 31 -03- 2016 on Wind Energy in time taking into account the observations made by the Honourable APTEL in its order dated 24.5.2013. In the said order, the Honourable Commission issued the following direction in connection with implementation of Harmonics norms.

“10.13. Harmonics

10.13.1 Some of the stakeholders have sought for reduction of compensation charges from 15% to 5%. Few other stakeholders have requested to grant a period of 12 to 24 months for installation of harmonic filters. Harmonics being detrimental to the network and to other consumer installations, a compensation charge of 15% of applicable generation tariff is reasonable.

10.13.2 The WEGs shall follow the CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013 in respect of harmonics. It is the responsibility of the generator to provide adequate filtering mechanism to limit the harmonics within the stipulated norms. It shall be done before connecting the generator to the grid and the harmonics shall be measured by the respective distribution licensee during the commissioning. If the WEGs inject the harmonics beyond the stipulated limit, they shall pay a compensation of 15% of applicable generation tariff rate to the distribution licensee in whose area the plant is located till such time it is reduced within the stipulated limit. The distribution licensee is responsible for measurement of harmonics with standard meters and issue notices for payment of compensation charges if the harmonics is beyond the stipulated limit.

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A minimum of 15 days' notice period shall be given for payment of compensation charges.

10.13.3 In case of existing WEGs, an initial notice shall be issued to the wind generators by the distribution licensee for implementing harmonic norms within three months. The harmonics shall be measured by the Distribution Licensee after the three month notice period. The enforcement mechanism will come into force after the three month notice period and after such measurement."

2. Accordingly, the field Superintending Engineers of TANGEDCO issued letters to all the WEGs to implement the harmonics norms with immediate effect during October 2016. In this connection, in the last task force meeting held between WEGs and TANGEDCO, our Association represented wide our letter dated 14-11-2016 (a copy of which is enclosed) about the practical difficulties in implementing the norms and requested the TANGEDCO to postpone the implementation till December 2017. In response, the TANGEDCO officials advised the WEGs to approach the Honourable Commission.

3. In the above circumstances and since it is impractical to implement the norms at this stage for the reasons detailed herein under, we have no other option except to approach the Honourable Commission for relief. We furnish below the genuine difficulties in implementing the harmonics norms as directed by the Commission.

4. It is pertinent to submit that the Commission's said order specifies that the WEGs shall follow the **CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations, 2013** in respect of harmonics. In Regulation 11, the said CEA Regulations specifies that the Harmonic current injections from a generating station shall not exceed the limits specified in **IEEE 519**.

5. The important harmonic measurement procedure and voltage/current harmonic norms prescribed under IEEE 519 are reproduced below.

"4.4 Statistical evaluation

Very short and short time harmonic values should be accumulated over periods of one day and one week, respectively. For very short time harmonic measurements, the 99th percentile value (i.e., the value that is exceeded for 1% of the measurement period) should be

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calculated for each 24-hour period for comparison with the recommend limits in Clause 5. **For short time harmonic measurements**, the 95th and 99th percentile values (i.e., those values that are exceeded for 5% and 1% of the measurement period) **should be calculated for each 7-day period for comparison with the recommended limits in Clause 5.** These statistics should be used for both voltage and current harmonics with the exception that the 99th percentile short time value is not recommended for use with voltage harmonics.

5.1 Recommended harmonic voltage limits

At the PCC, system owners or operators should limit line-to-neutral voltage harmonics as follows:

- Daily 99th percentile very short time (3 s) values should be less than 1.5 times the values given in Table 1.
- **Weekly 95th percentile short time (10 min) values** should be less than the values given in Table 1.

All values should be in percent of the rated power frequency voltage at the PCC. Table 1 applies to voltage harmonics whose frequencies are integer multiples of the power frequency.

5.2 Recommended current distortion limits for systems nominally rated 120 V through 69 kV

The limits in this sub clause apply to users connected to systems where the rated voltage at the PCC is 120 V to 69 kV. At the PCC, users should limit their harmonic currents as follows:

- Daily 99th percentile very short time (3 s) harmonic currents should be less than 2.0 times the values given in Table 2.
- Weekly 99th percentile short time (10 min) harmonic currents should be less than 1.5 times the values given in Table 2.
- Weekly 95th percentile short time (10 min) harmonic currents should be less than the values given in Table 2.

All values should be in percent of the maximum demand current, IL. This current value is established at the PCC and should be taken as the sum of the currents corresponding to the maximum demand during each of the twelve previous months divided by 12. Table 2 applies to harmonic currents whose frequencies are integer multiples of the power frequency."

6. As the system owner or utility has to limit their voltage harmonics within limits, utility has to fix power quality meters in their substations / feeders for measurement & monitoring and real time data shall be shared with the generators. Power Quality has to be a joint responsibility of the utility and the generator simultaneously as in the case of LVRT.

7. As per IEEE 519 norms, even short time voltage harmonic measurement requires **one week continuous measurement** of data and that of current harmonic requires **one year measurement of maximum demand current**. Hence, it is impractical to implement the harmonics norms with immediate effect as per the notice issued by the TANGEDCO. The maximum demand current as prescribed in IEEE 519 can be measured only during next wind season. Assuming that the measurement will be done for the whole season if not for an year in the next wind season and notice is given after that, the WEGs require another 6 months to procure and install the filters.

8. Secondly, harmonics measurement and data collection is relatively a difficult procedure and that is why Regulation 1(3) of the said CEA Regulation mandates that the existing WEGs and the licensees concerned shall mutually discuss and agree on the measures to meet the technical standards specified in the Regulations. Such provision has been made to analyse, understand and agree with the difficulties in implementing the standards. Such important meeting has not taken place till date and that is a prerequisite to implement the standards.

9. Thirdly, CEA Regulation specified by the Honourable Commission in its order deals with only current harmonics and is applicable only for the WEGs connected in 11kV and 22kV networks. WEGs connected to 33 kV and above come under the purview of CEA (Technical Standards for Connectivity) Regulations 2007. CEA is under the process of modifying the Regulations 2007 and has issued draft amendment to CEA (Technical Standards for Connectivity) Regulations 2007 inviting comments till 31-12-2016. CEA may take some more time to issue the final Regulations and it may not be appropriate to implement the standards partially for certain group of WEGs before finalising the Regulation 2007 by CEA.

10. Fourthly, considering the complicated procedure of measurement adopting different Regulations/norms for different voltage / load current, a detailed procedure for implementing the harmonics norms is very essential. The commission may approve such procedures submitted by TANGEDCO after inviting comments from the stakeholders.

11. In view of the above, TANGEDCO, if it was to proceed in an appropriate manner should have activated the issues immediately after the passing of the Tariff Order and proceeded with the necessary formalities before the Wind Season commenced in order that measurements could have been made during the Wind Season. In view thereof, considering the developments set forth above, we request the Honourable Commission to issue an appropriate directions to TANGEDCO giving it a time-table for implementing the harmonics order and the manner in which it is to be carried out since TANGEDCO is proceeding in a completely unscientific and haphazard manner, ignoring the real purpose and intent of this Hon'ble Commission's orders and directions and has failed to take into account the technical aspects

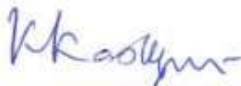
12. We also seek an appointment to meet the Honourable Chairman and Members of the Commission to personally explain the difficulties faced by the WEGs in implementation of harmonic norms.

13. We once again request the Honourable Commission to issue favourable orders early considering the above genuine grievances.

Thanking you Sir,

With kind regards,

For Indian Wind Power Association



Prof. Dr. K Kasthurirangaian
Chairman