

**TAMIL NADU ELECTRICITY REGULATORY COMMISSION**  
**(Constituted under section 82(1) of the Electricity Act, 2003)**  
**(Central Act 36 of 2003)**

**PRESENT:**

**Thiru M. Chandrasekar** ... **Chairman**  
**Dr. T. PrabhakaraRao** ... **Member**  
**and**  
**Thiru K. Venkatasamy** ... **Member (Legal)**

**M.P. No.29 of 2020**

Solar Energy Developers Association SALEM,  
Regd No.188/2018 dated 29.08.2018  
No.37, Trichy Main Road,  
Gugal, Salem – 06, Represented by its  
Authorised Signatory S. Sagayaraju

... **Petitioner**  
(ThiruS.P.Parthasarathy  
Advocate for the Petitioner)

Vs.

1. The Chairman  
Tamil Nadu Generation and Distribution  
Corporation Ltd.,(TANGEDCO)  
10<sup>th</sup> Floor, 144, Anna Salai,  
Chennai – 600 002
2. The Director Distribution  
No.144, Anna Salai,  
Chennai – 600 002.
3. The Tamilnadu Energy Development Agency (TEDA)  
E.V.K. SampathMaligai  
College Road, Nungambakkam  
Chennai – 600 003.

...**Respondents**  
(ThiruM.Gopinathan,  
Standing Counsel for TANGEDCO  
for R1 & R2 and ThiruSankaraNarayaan,  
General Manager, TEDA for R3)

**Dates of hearing** : **13-10-2020; 27-10-2020; 03-11-2020;**  
**10-11-2020 and 24-11-2020**

**Date of order** : **22-12-2020**

The M.P.No.29 of 2020 came up for final hearing on 24-11-2020. The Commission upon perusal of the petition and connected records and after hearing the submissions of the petitioner hereby makes the following:-

### **ORDER**

**1. Prayer in M.P. No.29 of 2020:-**

The prayer of the petitioner in M.P. No.29 of 2020 is to issue an order of clarification with respect to para '7.0 LT Connectivity' in 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25-03-2019 passed by the Commission and also to issue necessary directions for use of single phase inverters in Rooftop Solar Power Plants with capacity of upto 4 KW irrespective of whether it is connected to a single phase service connection or three phase service connection at the option of the consumer.

The petitioner has also filed an I.A. in the said M.P. No. 29 of 2020 with a prayer to restrain the 2nd 3rd Respondent, their men, agents, from any manner seeking to enforce 3<sup>rd</sup> Respondent's Tender reference No.TEDA/2345B/Phase II GCRTS/2019 dated 10.09.2020 with respect to the specification provided in para 12.8 alone which specifies that for single phase service connection single phase inverter 230v and for three phase service connection three phase inverter 415v, pending disposal of the Petition and pass such further or other Orders as the Commission may deem fit and proper in the facts and circumstances of the case.

## **2. Fact of the case:-**

This petition has been filed to issue a clarification with respect to para '7.0 LT Connectivity' in 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25.03.2019 passed by the Commission and also to issue necessary directions for use of single phase inverters in Rooftop Solar Power Plants with capacity upto 4KW irrespective of whether it is connected to a single phase service connection or three phase service connection at the consumer's end.

## **3. Contention of the Petitioner:**

3.1. The Petitioner Association is espousing the interest of its members who are all solar system developers in the State of Tamil Nadu. The Petitioner Association is a Registered Society bearing Regd No. 188/2018 dated 29.08.2018, involved in solar system development in the State of Tamil Nadu. Almost all the rooftop solar systems for both LT and HT Consumers have been successfully developed by the members of the Association and have majorly contributed for the solar development in the State of Tamil Nadu. The petitioner is therefore vitally interested in the present proceedings

3.2. The present petition is filed seeking a clarification with respect to para '7.0 LT Connectivity' in 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25.03.2019 of the Commission and consequently to

direct the Respondents to implement the said order by issuing necessary working instructions regarding the LT Connectivity establishing solar power plants within their premises for captive use in line with para 7.0 of the Commission's Order No.3 of 2019 dated 25.03.2019. This Petition also seeks necessary directions to the 2<sup>nd</sup> Respondent for use of single phase inverters in Rooftop Solar Capacity upto 4KW irrespective of whether it is connected to a single phase service connection or three phase service connection at the consumers end. The Association has filed the present petition in order to redress the grievance of its members, who are all solar energy/system developers in the State of Tamil Nadu, who had been seriously discriminated by the 2<sup>nd</sup> Respondent's misinterpretation of the Commission's Order No.3 of 2019 dated 25.03.2019 with respect to LT connectivity and the consequential letter of the 2<sup>nd</sup> Respondent dated 15.11.2019 which is contrary to para 7.0 of the Commission's Order No.3 of 2019 dated 25.03.2019. Such wrong interpretations would make the entire roof top solar scheme, which scheme is encouraged by the State Government of Tamil Nadu in its Solar Energy Policies and by the Commission in its Rooftop Solar Orders, as impractical and unviable resulting in huge financial loss to the members of the petitioner association who supply/develop/erect the solar plants and the individual developers having invest in such power plants taking financial aid/loans from banks.

3.3. In order to reduce carbon emission and encourage Renewable Energy

Resources in the State, the Government of Tamil Nadu approved the Tamil Nadu Solar Energy Policy, 2012 and under Section 108 of the Electricity Act, 2003 the Government also issued a policy directive to the Commission. Consequently, the Commission issued a suo motu order entitled 'issues relating to Tamil Nadu Energy Policy' vide Order No.1 of 2013 dated 07.03.2013 in line with the Tamil Nadu Solar Energy Policy, 2012.

3.4. The above order of the Commission in Order No.1 of 2013 covered various issues relating to solar purchase obligation to be met by various category of consumers, its enforcement mechanism, and net metering for domestic rooftop solar generators. In the said order, the Commission directed the Respondent TANGEDCO to submit a detailed procedure on net metering covering specified issues like standards and location of meters, tariff for excess generation/lapsed units, LT connectivity etc. and to obtain approval from the Commission. The procedure submitted by TANGEDCO was hosted in the Commission's website and stakeholder's comments were obtained. The Petitioner Association also filed their comments and participated in the above proceedings before the Commission. Considering the procedure submitted by TANGEDCO and the comments by the Petitioner Association and other stakeholders, the Commission issued Order No.3 of 2013 dt.13.11.2013 on 'Order on LT connectivity and net metering in regard to Tamil Nadu Solar Energy Policy 2012'. The order covered eligibility of

consumers under net metering, commercial arrangements, metering standards and location, LT connectivity, standards, operation and maintenance of Solar Power Generators (SPGs) etc.

3.5. While so, the Respondent filed a petition vide M.P No.9 of 2017 before the Commission seeking its approval for a revised commercial settlement mechanism. The Respondent TANGEDCO was directed by the Commission to web host and invite stakeholder's comments. The Petitioner had also filed their comments for the consideration of the Commission. Meanwhile, the Government of Tamil Nadu issued a new Tamil Nadu Solar Policy 2019 with effect from 04.02.20 19 which set a target of 9000 MW to be achieved by 2023 of which 40% is earmarked for consumer category solar energy systems. One type of Solar energy grid feed-in mechanism prescribed at Clause 8.1.2 of the 2019 Policy is the Solar energy net feed-in mechanism for the consumer category. The revised accounting methodology proposed by Respondent TANGEDCO in M.P No.9 of 2017 was similar to the mechanism in the Solar Policy of 2019. Based on the petition of TANGEDCO, comments received from the Petitioner Association and the stakeholders, the Commission passed orders in M.P No.9 of 2017 on 25.03.2019 for implementing the new mechanism for Rooftop Solar Generation. Consequently, in exercise of the powers conferred by section 86 (1) (e) of the Electricity Act, 2003, (Central Act 36 of 2003), read with the National Electricity Policy, the Tariff Policy, TN Solar

2019, the Commission issued 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25.03.2019 which shall come into effect from 25.03.2019 i.e., the date of passing of order in M.P No.9 of 2017. Further Order No.3 of 2019 passed by the Commission is applicable to all consumers under Low Tension category, except Hut and Agricultural category of tariff.

3.6. The order of the Commission in 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25.03.2019 elaborately covers all the issues such as metering at para 5.0, commercial arrangement at para6.0 and LT connectivity at para7.0 etc. The para 7.0 LT connectivity of Order No.3 of 2019 provides as follows:-

"7.0 LT connectivity

7.1 The technical standards of connectivity shall be as specified in the CEA's (Technical Standards of Connectivity for the Distributed Generation Resources) Regulations 2013 and as amended from time to time.

7.2 The maximum capacity for interconnection with the grid at a specific voltage level shall be governed by the Supply/Distribution code as amended from time to time. The interconnecting voltage levels of distributed generating sources relevant to capacity range is as follows:

Capacity	Connecting voltage
Upto 4 kW	240 V - single phase or 415 V Three phase at the option of the consumer
Above 4 kW and upto 112 kW	415 -Three phase

3.7. From the above it is clear that the Commission at para 7.0 of the order dated 25.02.2019 has specified that for distributed generating sources i.e., the Solar Power Panels & its inverter, having capacity upto 4KW the interconnecting voltage level can be 240V - single phase or 415 V three phase at the option of the consumer and for distributed generating sources i.e., the Solar Power Panels & its inverter having capacity of above 4KW the interconnecting voltage level must be 415V-three phase only.

3.8. Further, the Ministry of New & Renewable Energy (MNRE) vide its clarification dated 05.10.2019 states that as long as the solar PV power plant is in accordance with the contracted Alternating Current (AC) Capacity and meets that range of energy supply based on Capacity Utilisation Factor (CUF) requirements, the design and installation of solar capacity on the Direct Current (DC) side should be left to the generator/developer. It is also clarified that even if the installed DC capacity in a solar PV power plant (i.e., the capacity of solar panels) is in excess of the value of contracted AC capacity (i.e., the capacity of the inverters which converts DC to AC) there is no violation, as long as the AC capacity of the solar PV power plant set up by the developer corresponds with the contracted AC capacity and that, at no point, the power scheduled from the solar PV power plant is in excess of the contracted AC Capacity. Therefore the term distributed generating sources used at para 7.0



of the Commission dated 25.02.2019 means the solar Power Panels & its inverter's AC capacity and hence the capacity mentioned in para 7.0 i.e., upto 4KW or above 4KW relates to the contracted AC capacity (i.e., the capacity of the inverters which converts DC to AC). Therefore, for solar PV plants with inverter up to 4KW capacity the interconnecting voltage level can be 240V - single phase or 415 V three phase at the option of the consumer and for solar PV plants with inverter above 4KW capacity the interconnecting voltage level must be 415V - three phase only.

3.9. Based on the above the Order No.3 of 2019 dated 25.02.2019 the Respondent TANGEDCO has not issued any working instructions to the field level officers and due to lack of clarity among the field level officers various difficulties were faced by the Petitioner Association in implementing the above order of the Commission. In order to redress various hurdles faced by the members of the Petitioners Association in establishing the roof top solar systems in line with Order No.3 of 2019, the Petitioner Association sent a detailed representation dated 13.09.2020 to the 2<sup>nd</sup> Respondent seeking clarification on various issues and one such important issue is the clarity on the LT Connectivity (i.e.,) the maximum capacity for interconnection with the grid at a specific voltage level and the interconnecting voltage levels of distributed generating sources relevant to its capacity range as provided in para 7.0 of the order dated 25.02.2019.

3.10. While so, to the suddenshock and surprise of the Petitioner Association the 2<sup>nd</sup> Respondent vide letter dated 15.11.2019 at para 9(a) has stated that, Instructions are *issued* to field that single phase invertors should be used for single phase service connections and three phase inverters should be used for three phase service connections which is illegal, arbitrary and directly contrary to orders passed by the Commission at para 7.0 of Order No.3 of 2019 dated 25.03.2019.

3.11. As per the order of the Commission dated 15.11.2019, solar PV plants with inverter capacity up to 4 KW can install single phase inverters at the option of the consumers/developers whose connected voltage is 240v single phase or 415v three phase. However, with respect to solar PV plants with inverter capacity above 4KW only three phase invertors should be installed by the consumers/developers whose connected voltage is 415v three phase. While so, the action of the 2<sup>nd</sup> respondent vide her letter dated 15.11.2019 has issued instructions contrary to the order of the Commission that single phase invertors should be used for single phase service connections and three phase inverters should be used for three phase service connections irrespective of the distribution generating source's capacity arbitrary and contemptuous. For example, as per the 2<sup>nd</sup> Respondent's instruction dated 15.11.2019, if a Domestic consumer connected to 415v

three phase service connection wants to install a 1KW Roof Top Solar Plant, he has to fix a three phase inverter instead of single phase inverter which is contrary to para 7.0 of Order No.3 of 2019 dated 25.03.2019.

3.12. The Petitioner has also sent detailed representations dated 04.05.2020 and 22.05.2020 to the 1<sup>st</sup> and 3<sup>rd</sup> Respondent respectively on the above issue. Upon receipt of the said representations to the 1<sup>st</sup> and 3<sup>rd</sup> Respondents, the office bearers of the Petitioner Association approached the Respondents and tried explaining to them that the stand of the 2<sup>nd</sup> Respondent in letter dated 15.11.2019 that single phase inverters should be used for single phase service connections and three phase inverters should be used for three phase service connections irrespective of the distribution generating source's capacity is without jurisdiction, not contemplated in any Act, Rules or Regulations and has the effect of rewriting the orders of the Commission. However, this did not evoke any positive response from them and they refused to reconsider their decision.

3.13. The petitioner gave representation dated 28.05.2020 for which 2<sup>nd</sup> Respondent has provided a reply dated 21.07.2020 stating that Order No.3 of 2019 dated 25.03.2019 of the Commission do not mandate any provision of usage of single phase or three phase inverters based on the capacity of Solar PV Plant and usage of single phase inverters in three phases causes imbalance in the load circuit, hence usage

of single phase inverter in single phase service connection and three phase inverter in three phase service connection is being insisted. Such a stand of the 2<sup>nd</sup> Respondent is nothing but misinterpretation of the order of the Commission and contrary to para7.0 of the order dated 25.02,2019 which clearly provides the interconnecting voltage levels for distributed generating sources i.e., for solar PV plants with inverter up to4KW capacity the interconnecting voltage level-can be 240V - single phase or 415 V three phase at the option of the consumer and for solar PV plantswith inverter above 4KW capacity the interconnecting voltage level mustbe 415V - three phase only.

3.14. Even assuming for a moment, without admitting, that the stand of the 2<sup>nd</sup> Respondent in letter dated 21.07.2020 that the Commission in order dated 25.03.2019 has not mandated any provision of usage of single phase or three phase inverters based on the capacity of Solar PV Plant is correct, then the 2<sup>nd</sup> Respondent ought to have filed a petition before the Commission seeking clarification in this regard. The Petitioner further submits that the Respondents are in the habit of issuing such communications on their own by giving wrong interpretations, without the approval of the Commission and accordingly, such communications issued by the Respondents have been quashed by the Commission, after heavily making comments in issuing such unilateral instructions without the approval of the State Commission. Such instances could be traced from

various orders of the Commission in MP No. 10 of 2012 dated 22.09.2014 and DRP No.19 of 2013 dated 19.01.2015 etc. Hence, the Respondents, never care to go by the procedures in such matters and they have been in the habit of issuing instructions on their own, without verifying whether the powers to such an instructions are available to them and only after the State Commission heavily coming on such instructions, either they are withdrawing or such instructions are set aside. The communications of the 2<sup>nd</sup> Respondent dated 15.11.2019 and 21.07.2020 is of that type. The whole effort of the Respondent is amounting to prevent the LT consumers from availing Rooftop solar power and making them compelled to come for TANGEDCO power only for their power needs, which stand is totally opposed to the scheme of Solar Policies and Rooftop Solar orders issued by the Commission.

3.15. The 2<sup>nd</sup> Respondent in letter dated 21.07.2020 has stated that the table provided at para 7.0 of the Order No.3 of 2019 dated 25.03.2019 shows only the level of voltages for solar consumers and not the usage of single phase or three phase inverters which is contrary to the above order passed by the Commission. Para7.0 of the order dated 25.02.2019 has specified that for distributed generating sources i.e., the Solar Power Panels & its inverter, having capacity upto 4KW the interconnecting voltage level can be 240V - single phase or 415 V three phase at the option of the consumer and for distributed generating sources i.e., the Solar Power

Panels & its inverter having capacity of above 4KW the interconnecting voltage level must be 415V - three phase only. Further, the Ministry of New & Renewable Energy (MNRE) vide its clarification dated 05.10.2019 has clarified that even if the installed DC capacity in a solar PV power plant (i.e., the capacity of solar panels) is in excess of the value of contracted AC capacity (i.e., the capacity of the inverters which converts DC to AC) there is no violation, as long as the AC capacity of the solar PV power plant set up by the developer corresponds with the contracted AC capacity and that, at no point, the power scheduled from the solar PV power plant is in excess of the contracted AC Capacity. Therefore the term distributing generating sources used at para7.0 of the Commission dated 25.02.2019 means the solar Power Panels & its inverter and hence the capacity up to 4KW or above 4KW means the contracted AC capacity (i.e., the capacity of the inverters which converts DC to AC). Therefore, for solar PV plants with inverter up to 4KW capacity the interconnecting voltage level can be 240V - single phase or 415 V three phase at the option of the consumer and for solar PV plants with inverter above 4KW capacity the interconnecting voltage level must be 415V- three phase only.

3.16. The 3 phase inverters with less than 4KW capacity is not available in the market and even if it is procured the cost of such inverters will be very high making the entire rooftop solar scheme commercially unviable. Further the benchmark cost of solar plants notified and followed in

tenders is arrived based on the MNRE's recommendations. Hence the benchmark cost cannot be met with if 3 phase inverters are insisted for plant capacity of less than 4KW. It is also pertinent to mention here that single phase inverters can work efficiently for a solar plant of capacity less the 4KW without difficulties.

3.17. While so, the Respondent TANGEDCO has authorised the 3<sup>rd</sup> Respondent TEDA, the State Nodal Agency as the implementing Agency for implementation of Phase II of Grid Connected Rooftop Solar Programme(GCRTS). NINRE has allocated the capacity of 5MW for residential sector to TANGEDCO under Phase II of GCRTS. As being an implementing agency, the 3<sup>rd</sup> Respondent vide Tender document dated 10.09.2020 has called for rate contract tender for empanelment of vendors for design, supply, installation, testing & commissioning including obligated warranty and 5 years comprehensive maintenance of cumulative capacity of 5MW Grid Connected Rooftop Solar PV Plants for all domestic consumers in Tamil Nadu under Phase II of GCRTS.

3.18. To the surprise of the Petitioner, the 3<sup>rd</sup> Respondent in tender document dated 10.09.2020 under Section-D 'Technical Specifications' at para 12.8 'solar grid inverter' has provided the detailed specifications of the solar grid inverters wherein under operation AC voltage it mentioned that for single phase service connection single phase inverter 230v and for three phase

service connection three phase inverter 415v which is contrary to para7.0 of the order dated 25.02.2019 which clearly provides the interconnecting voltage levels for distributed generating sources for distributed generating sources i.e. for solar PV plants with inverter upto 4 KW capacity the interconnecting voltage level can be 240 V- Single phase or 415 V three phase at the option of the consumer and for solar PV plants with inverter above 4 KW capacity the interconnecting voltage level must be 415 V- three phase only.

3.19. Being aggrieved by the 3<sup>rd</sup> Respondents tender document dated 10.09.2020 the Petitioner gave a detailed objection dated 28.09.2020 that the specification provided in para 12.8 of the tender document that for single phase service connection single phase inverter 230v and for three phase service connection three phase inverter 415v which is contrary to para 7.0 of the order dated 25.02.2019. However, this did not evoke any positive response from them and they refused to reconsider their decision. Infact the 3<sup>rd</sup> Respondent is proceeding to open the tender bids on 09.10.2020 at 3.15PM.

3.20. The Petitioner is filing an interim prayer petition vide Regulation 32 of The Tamil Nadu Electricity Regulatory Commission (Conduct of Business) Rules, 2004.



3.21. The Petitioner has made out a prime facie case and the balance of convenience is in favour of the Petitioner. Therefore, unless the 3<sup>rd</sup> Respondents, their subordinates, men and agents are restrained from proceeding further in Tender reference No.TEDA/2345B/Phase II GCRTS/2019 dated 10.09.2020 with respect to the specification provided in para 12.8 alone that for single phase service connection single phase inverter 230v and for three phase service connection three phase inverter 415v, the members of the Petitioner Association would be put into great hardship and irreparable loss.,. On the other hand, no prejudice would be caused to the Respondents for granting such interim orders.

#### **4. Contention of the Respondent :**

4.1. Table in para 7.0 of Order No.3 dated 25.3.2019 shows the maximum capacity for interconnection with the grid at a specific voltage level and not the usage of single phase or three phase inverters. The consumer can choose the voltage level for their service connections of single phase or three phase upto 4 KW of PV installations.

4.2. The said order of the Commission in the Tamil Nadu Electricity Supply/Distribution Codes and the Ministry of New and Renewable Energy (MNRE) guidelines do not mandate any provision of usage of single phase or three phase inverters based on the capacity of Solar PV plants.

4.3. The usage of single phase inverters in any one of the three phases causes imbalance in the load circuit. In order to balance the consumption and the generation across the phases and to maintain secure, quality and stable power supply to the consumers, usage of single phase inverters for single phase service connections and three phase inverters for three phase service connections is being insisted.

4.4. Inline with the Commission's Tamil Nadu Electricity Supply and Distribution Codes and Order on Rooftop Solar Generation Order No.03 of 2019, dt.25.03.2019, TANGEDCO has issued the instruction vide Memo No.CE/ComI/SE/EE-2/AEE-2/F-SolarNFI/D322/19, Dt.15.11.19 insisted for the usage of single phase inverters in single phase service connections and three phase inverters in three phase service connections to balance the generation and consumption across the phases.

4.5. This may cause unbalance voltage in the distribution system which results unequal distribution of single phase loads and the system impedance also becomes unequal. If one or two users installed Single phase inverter in a three phase system in a particular distribution system for instance in the Distribution Transformer of an L.T. network, the result of the impact on the Unbalance voltage to the electrical system is negligible. If the

distribution network has many such Solar PV plants using Single phase inverters in Three phase service, the voltage unbalance becomes excessive which causes serious impact on the power quality and the current unbalance is several times higher than the level of voltage unbalance. Such an unbalance in the line currents can lead to excessive line losses besides malfunctioning of protective relays and also reduces the life of Distribution Transformer thereby reducing the efficiency and quality of the system.

4.6. Moreover, the load imperfections on the distribution network causes current unbalance which travels to the transformer and causes unbalance in the three phase voltage. Even minor unbalance in the voltage at transformer level disturbs the current waveform significantly on the loads connected to it.

4.7. For example, if a 100 KVA Transformer is connected with 50 KVA load in each phase i.e. in a balanced condition, the flow of current will be 66.5 Amps in each phase. Assuming a resistance of 1 ohm, the  $I^2R$  loss in the transformer will be 13.267 KW. But, if any one of the phases is loaded with 50 KVA and the other two phases with 25 KVA each, then the power dissipation will be 23.762 KW which is approximately two times the loss in the balanced condition. Since, higher voltage unbalance, greater will be the loss, the phase balancing is very much essential to reduce the distribution losses.

4.8. In replying to the various queries raised by Tamil Nadu Solar Energy Developers Association (TNSEDA) vide their representation dated 13.09.2019 along with the query for the usage of multiple inverters, it has been clarified that single phase inverters for single phase service connection and three phase inverters for three phase service connections are to be used in order to balance the generation and consumption across the phases.

4.9. The petitioner's averment that the Respondent TANGEDCO has not issued any working instructions to the field level officers based on the Order No.3 of 2019 dated 25.03.2019 is not true. Based on the above order of the Commission's, the Respondent TANGEDCO had issued working instructions to the field level officers vide Memo.No.CE/Comml/EE/R&C/AEE1/F.Solar-NFI/D.099/19,dt.10.05.2019 and Memo.No.CE/Comml/SE/EE/R&C/AEE1/F.Solar-NFI/D.118/19,dt.21.05.2019. Various queries such as time frame for processing the applications, insisting safety certificate, additional load, fixing net meters, insisting solar generation meter, allowing gross meters, inadequate features of net meters, placement of inverters, multiple inverters, exemption from CEIG approval upto 500 KVA capacity requirement of 900 sq.m for erection of transformer, monthly meetings and awareness of TANGEDCO field officials were raised by Tamil Nadu Solar Energy Developers Association

vide their representation dated 13.09.2019. In this juncture it is to be stated that Tamil Nadu Solar Energy Developers Association had not raised any clarification regarding the usage of single phase and three phase inverters. However TANGEDCO while replying to the query raised by the Tamil Nadu Solar Energy Developers Association for multiple inverters, it has been clarified that single phase inverters for single phase service connection and three phase inverters for three phase service connections are to be used in order to balance the generation and consumption across the phases. Based on the clarification issued to the Tamil Nadu Solar Energy Developers Association, instruction has been issued to the field officials vide Memo.No.CE/Coml/SE/EE-2/AEE-2/F-Solar NFI/D 322/19, Dt. 15.11.2019.

4.10. The petitioner's contention that installation of solar PV plants with inverter capacity up to 4 KW with single phase inverters at the option of the consumers/developers who's connected to voltage is 240V single phase or 415V three phase based on the Commission's order is baseless. The level of voltages specified by the Commission's Order No.3 dt.25.03.2019 is the interconnecting voltage levels of distributed generating sources. Accordingly instruction has been issued to the field officials vide memo dated 15.11.2019. Further the above said instruction is in line with the above said Commission's order.

4.11. In order to balance the generation and consumption across the phases, reply has been sent to the Tamil Nadu Solar Energy Developers Association to use single phase inverters for single phase service connection and three phase inverters for three phase service connections.

4.12. Regarding the MNRE norms for usage of single phase and three phase inverters clarification has been requested from MNRE on 30.05.2020. The Scientist / MNRE replied in mail dated 02.06.2020 that the respective State Electricity Regulations/Electricity codes as prevalent or amended from time to time need to be followed regarding single phase /three phase inverters issue.

4.13. It is explicit that unequal distribution of loads between the three phases of the system causes flow of unbalanced currents that produces unbalanced voltage drops on the lines. Such an unbalance in the line currents and voltage causes excessive power loss in the system, losses in the motors of the connected load, malfunctioning of the protective relay circuits, causing permanent damages to the connected equipments and the system. Hence, three phase balance is the ideal situation for maintaining secure, quality and stable power supply to the consumers.

4.14. The extract of Central Electricity Authority (CEA) notification dated 30.09.2013 in S.No.4 (6) for Technical Standards for Connectivity of

the Distributed Generation Resources Regulations, 2013 (now, named as Connectivity below 33 Kilo Volts as amended by CEA notification dt.06.02.2019) as below:

*“The appropriate licensee shall carry out the inter-connection study to determine*

*(a) the point of inter-connection required interconnection facilities and modifications required on the existing electricity system if any, to accommodate the interconnection.*

*(b) the maximum net capacity of the distributed generation resource at a particular location for single phase and three phase generators connected to be shared single phase system or three phase system respectively, based on the capacity and configuration of the electricity system and imbalance in the power flows that distributed generation resource may cause.*

*(c) likely impact, if any on the Quality of the service to consumer connected to the electricity system and measures to mitigate the same.”*

4.15. The stand taken by TANGEDCO to use single phase inverters for single phase service connections and three phase inverters for the three phase service connections to mitigate the impact of imbalance in the power caused by the distributed generation resources (i.e.) the solar PV plant to supply quality power to consumers connected to the grid is in line with the above referred CEA regulations.

4.16. As the usage of single phase/three phase inverters based on the capacity of Solar PV plants has not been mandated either by MNRE or by TNERC, the instructions already issued on 15.11.2020 regarding usage of single phase inverters for single phase service connections and three phase inverters for the three phase service connections *to avoid imbalance in the load and generation across the phases was*

*continued and* Tamil Nadu Solar Energy Developer Association had been informed accordingly on 21.07.2020.

4.17. Three phase inverters with less than 4KW capacity are available in the market. The petitioner's contention that the benchmark cost cannot be met with if 3 phase inverters are insisted for plant capacity of less than 4KW is baseless. In the agenda notes received from NINRE for the meeting conducted on 09.10.2020 at 3.30 pm through video conferencing under the Chairmanship of the Secretary MNRE regarding the pending issues pertaining to RE sector in the state of Tamil Nadu, it has been stated by MNRE that the Central Financial Assistance (CFA) would be limited to 40% / 20% of the benchmark cost or the LI cost discovered through tender. Further it has also been stated that there is restriction on the matter that LI cost should be less than benchmark cost.

4.18. The Tamil Nadu Energy Development Agency (TEDA), the State Nodal Agency is the implementing Agency for implementation of Phase II of Grid Connected Rooftop Solar Programme (GCRTS) for TANGEDCO. As per the remarks communicated to TEDA regarding usage of inverters in single phase and three phase service the <sup>3d</sup> Respondent TEDA has insisted the same in the Tender document dated 10.09.2020 for rate contract tender for empanelment of vendors for design, supply, installation, testing & commissioning including obligated warranty and 5 years comprehensive maintenance of cumulative capacity of 5MW Grid



Connected Rooftop Solar PV Plants for all domestic consumers in Tamil Nadu under Phase-II of GCRTS.'

4.19. With reference to various averments in the respective petition that they are made on presumptions and assumptions and prayer in this petition are premature.

**5. Rejoinder filed by the Petitioner:-**

5.1. Present petition is filed seeking a clarification with respect to para '7.0 LT Connectivity' in 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25.03.2019 of the Commission and consequently to direct the Respondents to implement the said order by issuing necessary working instructions regarding the LT Connectivity establishing solar power plants within their premises for captive use in line with para 7.0 of the Commission's Order No.3 of 2019 dated 25.03.2019. This Petition also seeks necessary directions to the 2<sup>nd</sup> Respondent for use of single phase inverters in Rooftop Solar Capacity up to 4KW irrespective of whether it is connected to a single phase service connection or three phase service connection at the consumers end. The Association has filed the present petition in order to redress the grievance of its members, who are all solar energy/system developers in the State of Tamil Nadu, who had been seriously discriminated by the 2<sup>nd</sup> Respondent's misinterpretation of the Commission's Order No.3 of 2019 dated 25.03.2019 with respect to LT

connectivity and the consequential letter of the 2<sup>nd</sup> Respondent dated 15.11.2019 which is contrary to para 7.0 of the Commission's Order No.3 of 2019 dated 25.03.2019. Such wrong interpretations would make the entire roof top solar scheme, which scheme is encouraged by the State Government of Tamil Nadu in its Solar Energy Policies and by the Commission in its Rooftop Solar Orders, as impractical and unviable resulting in huge financial loss to the members of the petitioner association who supply/develop/erect the solar plants and the individual developers having invest in such power plants taking financial aid/loans from banks.

5.2. The Commission in Roof top Solar Order No:3 dated 25-03-2019, has specifically classified the inter connecting voltage levels and the connectivity of Distributed Generation Sources for relevant capacities. Here the capacity of Distributed Generation Sources means only the Capacity of Inverter which is part of Solar Installations that is getting connected to the Alternative Current (AC) supply extended to TANGEDCO to the consumer. Hence the capacity mentioned in clause 7.2 is clearly the capacity of the inverter without any doubt. As per Order No:3, dated 25-03-2019 the connectivity of Solar plant in practical sense refers to capacity of Solar plant only.

5.3. The Commission is clear in usage of Inverter as per the clause 7.2 of order No.3, dated 25-03-2019.

5.4. The contention of Respondent on imbalance is entirely wrong and without application of mind. In Domestic three phase loads, the loads may be equally distributed i.e., water heaters in one phase, A/C in another phase and lights in one phase. The usage of Heaters will be in the morning when lights and A/cs will not function. When A/Cs function in the night the heater and lights will not function. Hence if three phase inverter is given it will increase the un-balance in loading. Further it is duty of TANGEDCO to balance the loads in more scientific way.

5.5. TANGEDCO's instruction to use three phase inverters only in three phase services is against the Commission Order No:3 of 25-03-2019. As per the order consumer have the option of single-phase inverter or three phase inverter up to 4 kw capacity. In net effect TANGEDCO circular nullifies the option allowed by the Commission. Assuming for a moment without admitting that, even if three phase inverters are connected, it will not balance the loads, as the loads operate at different time intervals and the generation is balanced which will cause un-balance. Hence the TANGEDCO submission is not correct and TANGEDCO has not substantiated their averment with proper field study data.

5.6. As net feed-in tariff is implemented consumers will connect single phase inverter in the phase where loads are operative during generation hours. This will ultimately reduce or nullify the loads. In net effect this

will reduce the losses to TANGEDCO and also Improve the tail end voltage. Technically this would be best option for TANGEDCO.

5.7. Loss Calculation: The example given by TANGEDCO is technically incorrect. A 100 KVA transformer cannot be loaded with 50Kva in each phase and the transformer will get over loaded. The current calculated for 50 Kva in each phase will work out to be 217 Amps and not 66.5 Amps. The calculation of load loss is entirely wrong and against basic principles of electrical engineering. From this calculation it is seen that TANGEDCO lags in basic Engineering and basic mathematics. By furnishing this data TANGEDCO is misleading the Commission with improper data.

5.8. However, for better understanding of the principles of transformer loss, a chart is furnished below:

<b>200 KVA Transformer</b>						
	<b>Balanced Load of 50Kva</b>			<b>Un-balance Load</b>		
<b>Phase</b>	<b>R</b>	<b>Y</b>	<b>B</b>	<b>R</b>	<b>Y</b>	<b>B</b>
<b>Load inKva</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>50</b>	<b>25</b>	<b>25</b>
<b>Current in Amps</b>	<b>217</b>	<b>217</b>	<b>217</b>	<b>217</b>	<b>108</b>	<b>108</b>
<b>I<sup>2</sup> R Loss in watts as per IS 1180</b>	<b>380</b>	<b>380</b>	<b>380</b>	<b>380</b>	<b>95</b>	<b>95</b>
<b>Total Loss in Kw</b>	<b>1.14</b>			<b>0.57</b>		

5.9. The loss calculated by a manufacturer as per IS1180 is attached for reference. Even if we go by the TANGEDCO methodology in calculating Transformer loss allowing single phase solar inverter will reduce losses by 50%, The contention of TANGEDCO that loss will increase due to un-balance load in transformer is wrong and the wrong data has been furnished is to mislead the case.

5.10. Single phase inverter will better balance the loads rather than three phase inverter as explained earlier. Respondent issued circular with an intention to misinterpret the order of the Commission as it clearly specifies at para 7.0 of the order dated 25.02.2019 that for distributed generating sources i.e., the Solar Power Panels & its inverter, having capacity upto 4KW the interconnecting voltage level can be 240V - single phase or 415 V three phase at the option of the consumer and for distributed generating sources i.e., the Solar Power Panels & its inverter having capacity of above 4KW the interconnecting voltage level must be 415V – three phase only.

5.11. The Ministry of New & Renewable Energy (MNRE) vide its clarification dated 05.10.2019 states that as long as the solar PV power plant is in accordance with the contracted Alternating Current (AC) Capacity and meets that range of energy supply based on Capacity Utilisation Factor (CUF) requirements, the design and installation of solar capacity on the Direct Current (DC) side should be left to the generator/developer. It is also

clarified that even if the installed DC capacity in a solar PV power plant (i.e., the capacity of solar panels) is in excess of the value of contracted AC capacity (i.e., the capacity of the inverters which converts DC to AC) there is no violation, as long as the AC capacity of the solar PV power plant set up by the developer corresponds with the contracted AC capacity and that, at no point, the power scheduled from the solar PV power plant is in excess of the contracted AC Capacity. Therefore the term distributing generating sources used at para 7.0 of the Commission dated 25.02.2019 means the solar Power Panels & its inverter's AC capacity and hence the capacity mentioned in para 7.0 i.e., upto 4KW or above 4KW relates to the contracted AC capacity (i.e., the capacity of the inverters which converts DC to AC). Therefore, for solar PV plants with inverter up to 4KW capacity the interconnecting voltage level can be 240V - single phase or 415 V three phase at the option of the consumer and for solar PV plants with inverter above 4KW capacity the interconnecting voltage level must be 415V - three phase only.

5.12. The CEA notification dated 30.09.2013 quoted by the respondent not related to the present case in hand and does not require any specific reply. Three phase inverters for capacity 1Kw and 2 KW are not available in the market and even if it is procured the cost of such inverters will be very high making the entire rooftop solar scheme commercially unviable. That is the reason why TANGEDCO is insisting on the same with a *malafide* intention

to curtail the roof top solar projection in the State of Tamil Nadu.

5.13. The 3<sup>rd</sup> Respondent TEDA as an agency to implement MNRE programs does not evaluate the market and technology independently. It simply endorses TANGEDCO's view without any application of mind. For example, even the absolutely wrong calculation of transformer loss calculation is endorsed by the technical head of TEDA without independently assessing the situation.

5.14. Therefore, the Petitioner prays that the Commission may be pleased to issue an order of clarification with respect to para '7.0 LT Connectivity' in 'Order on Rooftop Solar Generation' Order No.3 of 2019 dated 25.03.2019 and also to issue necessary directions for use of single phase inverters in Rooftop Solar Power Plants with capacity of upto 4KW irrespective of whether it is connected to a single phase service connection or three phase service connection at the option of consumer.

**6. Written Submission filed on behalf of the Respondents 1 and 2:-**

6.1. The petitioner in the rejoinder has calculated the loss in a 200 KVA transformer @ 400 Volts of power supply and resistance @ 8 milliohms/phase at a total load of 150 KVA (for a balance load of 50 KVA in each phase) and at a total load of 100 KVA (under unbalanced load of 50, 25 & 25 KVA in each phase) is not correct. The total load of Distribution

Transformer in balanced load and unbalanced load condition should be the same for the purpose of comparison.

6.2. By calculating the loss for the 200 KVA transformer for total load 150 KVA in both balance and unbalance condition for various combinations @ 415 Volts and Resistance @7.627mΩ/phase, the following loss statement is furnished:

Phase	Balanced load			Unbalanced load											
	R	Y	B	R	Y	B	R	Y	B	R	Y	B	R	Y	B
Load in KVA	50	50	50	50	70	30	50	60	40	50	55	45	100	25	25
Current in Amps	208	208	208	208	292	125	208	250	166	208	230	188	417	104	104
Amps Loss (I <sup>2</sup> R) in Watts	331	331	331	346	682	125	346	500	220	346	423	283	1326	82	82
<b>Total loss in Watts</b>	993			<b>1153</b>			<b>1046</b>			<b>1052</b>			<b>1490</b>		

**0.007Ω/phase**

From the above, it may be clearly seen that the loss in the Distribution transformer increases according to the severity of unbalance.

6.3. Allowing many of such solar rooftop may widen the unbalance and increase the losses further. Maintaining quality power supply and balancing the grid is the duty of TANGEDCO. Usage of single phase inverters in single phase service connections and three phase inverters in the three phase service connections is insisted to balance the consumption and the generation across the phases and to maintain quality power supply.



6.4. Three phase inverters for capacity 1 KW, 2 KW and 3 KW are available in the market with few players. If the Commission orders favorably, then more players will come into the market making the prices of three phase inverters in the lower capacity range more competitive.

6.5. The petitioner's contention that the benchmark cost cannot be met with if three phase inverters are insisted for plant capacity of less than 4KW is baseless. It has been stated by MNRE that the Central Financial Assistance (CFA) would be limited to 40% / 20% of the benchmark cost or the LI cost discovered through tender. Further, it has also been stated by MNRE that there is no restriction on the matter that LI cost should be less than bench mark cost.

6.6. As per Tamil Nadu Solar Energy Policy, 2019, a target of 3600 MW is to be achieved by 2023. Moreover, sanction has been given to TANGEDCO by MNRE under Phase II of grid Connected Solar Rooftop Scheme, for capacity of 5 MW of grid connected solar rooftop installations (for 2019-20) under domestic category. The target is to be achieved before 31.03.2021 by TANGEDCO. TEDA has been nominated as the implementing agency by TANGEDCO for availing 20 to 40 % Central Financial Assistance (CFA) for the domestic category consumers.

6.7. The due date of opening the bid for the tender floated by TEDA for empanelment of vendors and finalising the rate contract for this scheme is postponed to 09.12.2020 due to the pendency of the inverter issue before the Commission.

6.8. Considering the present scenario of implementation of Phase-II grid connected solar rooftop scheme and also the implication of integration of more solar rooftop installations into the grid in future, TANGEDCO is insisting usage of single phase inverters in single phase service connections and three phase inverters in the three phase service connections to reduce the loss due to unbalance and to maintain quality power supply.

6.9. Unbalance of load in distribution transformer and network affects the quality of power supply and also causes failure of equipments, breakdowns or malfunctions of machines, overheating of machines leading to reduced useful life, damage to sensitive equipment like computers, control systems, disturbance in electronic communication to the consumers besides increased distribution system losses to TANGEDCO.

6.10. Unbalance loads affect the stability of grid. Maintaining quality power is also the prime duty of TANGEDCO by rendering uninterrupted reliable quality power supply to all the categories of consumers throughout the State to the satisfaction of the consumers. Every

effort is being taken by TANGEDCO to maintain the power supply quality at the specified voltage, frequency and waveform conforming to the standards.

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## **7. Findings of the Commission:-**

The Commission carefully considered the arguments of the counsels of both sides and perused the materials submitted:-

7.1. The petitioner seeks clarification on technical terms of LT connectivity of Roof Top Solar Generating Units specified in the Commission's order No.3 of 2019 dated 25.03.2019, in view of respondent's subsequent supplementary stipulation for the same order of the Commission *that single phase inverter should be used only in single phase but not in three phase*, whereas the respondent Licensee defends their supplementary stipulation on technical grounds.

7.2. Before proceeding to consider other commercial issues involved, a review on the Order of the Commission in "Order on Rooftop solar Generation" Order No.3 of 2019 dated 25.03.2019 is considered to be the pre-requisite to settle the issue on connectivity.

7.3. The relevant clause of the said Commission's order specifies:

*7.0 LT connectivity*

7.1 The technical standards of connectivity shall be as specified in the CEA's (Technical Standards of Connectivity for the Distributed Generation Resources) Regulations 2013 and as amended from time to time.

7.2 The maximum capacity for interconnection with the grid at a specific voltage level shall be governed by the Supply/Distribution code as amended from time to time. The interconnecting voltage levels of distributed generating sources relevant to capacity range are as follows:-

<i>Capacity</i>	<i>Connecting voltage</i>
<i>Upto 4 kW</i>	<i>240 V – single phase or 415 V Three phase at the option of the consumer</i>
<i>Above 4 kW and upto 112 kW</i>	<i>415 V- Three phase</i>

7.4. The term “Maximum Capacity” for interconnection with the grid, used in the above clause 7.1 refers to the capacity of a distributed generation source in general. Roof top solar power plant unit, being involved in the subject dealt is one of the distributed generated sources. The maximum capacity of the solar power generating unit refer to the unit as a whole in which the associated PV modules, and co-existing inverter are part and parcel of the plant unit. While Modules converts light energy in to Direct Current power, Inverter changes the Direct Current power into Alternating Current Power as ultimate output. Thus, they are inseparable in their coherent functioning of the unit from receiving light as input and delivering the AC power as output.

7.5. The respondent's contention that the capacity stipulated in the tabulation is for interconnection with the grid and not for the inverter is misplaced. The expression 'capacity' refers to the generating unit that essentially includes inverter. Without inverter, the unit cannot operate and hence loses the very meaning of being named as solar generating unit or solar generating plant.

7.6. Clause 14 in Regulation 12 of the CEA (Technical Standards for Connectivity to grid) ( Amendment ) Regulation 2013 specifies as follows:-

*“In case of Solar Photovoltaic Generation Station each inverter along with associated modules will be reckoned as a separate generating unit”*

7.7. Having concluded as above that inverter is an integral part of the solar unit there cannot be any further need of explanation for the terms given in Para 7.0 of Order No.3 dated 25.03.2019 reproduced above, with clear tabulation with respect to the relevant parameters of capacity, voltage, single phase (or) three phase in correlation which each other.

7.8 The first row of the tabulation vividly and explicitly specifies *that up to capacity of 4 KW, the connecting voltage can be 240 voltage single phase or 415 voltage three phase at the option of the consumer.* A plain reading of this stipulation would suggest any reader with clarity that the consumer is given a choice of his own to connect a single phase inverter up to 4 KW capacity of his

solar roof top unit either with a 240V single phase service or 415V three phase service at his option.

7.9. When the connectivity conditions is thus settled and ordered by the Commission already vis-à-vis, capacity , voltage and single phase / three phase, further orders issued by the licensee by vitiating the said stipulation and unilaterally inserting a new condition without quoting statutory authority and legal jurisdiction could only be inferred as trespassing in to the domain of the Commission, which at the best would serve only to complicate the settled issue and delay the planned schedule of implementation of the schemes.

7.10 Turning on to the commercials side both the petitioner and respondents concur to an appreciable extent of consensus that three phase inverters is not freely available in market for smaller roof top solar plant of 1 KW-2KW range and even if consumer manages to find out an optimum capacity of a three phase inverter to a small solar plant of such range predominantly being used by the consumers, the consumers would have to bear the brunt of extra expenditure to several fold , without a technical necessity nor a legal necessity to comply with any statutory stipulation. Such a sweeping discouragement does not augur well for a scheme aimed by the Government with ambitious targets with large scale public participation.

7.11. Both the petitioner and respondent engaged themselves in their respective rejoinder and written statements with an interesting tussle on load analysis on

determining the loss owing to unbalance of loads. There cannot be any dispute on the ill effect of unbalanced load profile in a grid. But it is wiser to tackle the cause than repair the damage. The Commission takes different call and simply suggests that instead of connecting the single phase loads in an unbalanced manner in three phases of a Distribution Transformer and projecting the loss calculation, nothing prevents the Licensee in taking little care and prudence in connecting the same numbers of single phase loads equally in all phases of the Distribution Transformer and smartly averts the scope of the loss itself.

7.12. Presence of single phase load is an inherent characteristic feature of LT grid, given the fact that most of the domestic appliances and commercial apparatus are traditionally factory-designed to operate in single phase system with 230-240 volt ratings. The unbalance caused by single phase loads in the LT grid is not a newly discovered phenomenon to be introduced by the single phase roof top solar units. It has been in existence already, inevitable by nature of electrical system. Millions of consumers with single phase services in various categories are already kept connected to grid all these years of ages. In fact, even in an installation of three phase service connection, the loads cannot be expected to be practically balanced in all three phases merely for the sake of it being a three phase service connection. The unbalanced current created by unbalanced load of end user is going to confluence ultimately in the grid no matter such unbalanced current flows through single phase service connection or three phase service connection. In effect, connecting a single phase inverter in a

three phase service connection is equalent to the routine practice of giving a single phase service connection fed by an LT network of a three phase Distribution Transformer , barring direction of power flow.

7.13. When respondent Licensee is convinced that they are able to manage the unbalanced load of 1 KW to 4 KW fed into the grid through a single phase inverter through single phase service connection, Commission sees no technical difference in connecting same load of 1 KW to 4 KW of same single phase service inverter in a three phase service connection, simply because the resultant status of the receiving LT grid is going to be similar by impact of both cases.

7.14. The consumer cannot be expected to be imposed with discriminate conditions of jeopardy to their interest in the name of load balancing. No Regulation imposes such kind of impractical load balancing stipulations on consumers. It is the Licensee who has to devise methodologies to balance the loads taking into account of the consumer mix , load and voltage profile and formulate a mechanism for load and voltage balancing, one of the prominent activities involved in Demand Side Management.

7.15 Clause (a) of Regulation 4(6) of The CEA (Technical Standards for connectivity of the Distribution Generation) Regulation 2013 cast responsibilities on the Licensee to study to determine the modification required on the 'existing



electrical system' to accommodate the inter connections of the distribution generation resources as follows:

*“The appropriate licensee shall carry out the inter-connection study to determine:-*

*the point of inter-connection, required interconnection facilities and modifications required on the existing electricity system, if any, to accommodate the interconnection”*

Clause (b) of the same regulation insists the Licensee to study to determine the imbalance in every load pockets as below:

*“the maximum net capacity of the distributed generation resource at a particular location for single-phase and three phase generators connected to a shared single & phase system or three phase system respectively, based on the capacity and configuration of the electricity system, and imbalance in the power flows that distributed generation resource may cause”*

7.16 By the said regulation, the Licensee is obligated to study the maximum net capacity of solar / non solar conventional loads in each phase at a particular location, say distribution transformer wise locations, to determine the imbalance of load and voltage.

7.17. After such determination of net capacity in each phase, the Licensee is expected to mitigate the same by a set of procedure and scientific control measures, modifications in service tapping phases / Inter-connections in cut point locations etc., in the LT network of respective locations and ensure overall balance and uniform voltage profile within stipulated range.

7.18 This apart, TNERC Distribution Code, Regulation 13(1) inter-alia specifies as follows:-

*“Licensee shall exercise proper voltage monitoring and control in the distribution system beyond the point of interconnection so as to maintain voltage at all levels in accordance with the Standards of Performance specified by the Commission. The means adopted shall include-*

*b. Balancing of loads between phases of the LT Network.*

7.19. A conjoint reading of above set of Regulations categorically implies that the responsibility of balancing the load and voltage squarely lies with the Distribution Licensee by formulating a mechanism / making required technical inter-connection modifications and control measures in their network system.

7.20 Thus the respondent is mandated to function with responsibilities cast by the statutory regulations, and not arbitrarily impose conditions stemmed from their own perception beyond the purview of the stipulations made in the regulations.

7.21. This apart, the allied intent to burden the consumers by imposing undue expenditure in buying and installing a three phase inverter for a single phase solar unit of less than 4KW, does not appear to be in true interest of advancement of objectives of the solar policy of the Government and timely fulfillment of 5 MW target set by MNRE in the residential roof top category.

7.22. In the context of the clear specification of the regulations laid for connecting the distributed generating sources and the respondent, Licensee has no jurisdiction in contemplating additional conditions of connectivity, not to mention the unreasonable commercial implications on the consumer, the conditions imposed by the respondent to employ three phase inverter for single phase solar roof top solar units up to 4KW is struck down with a clarification that the SPG unit up to 4 KW can be connected to 240V single phase service connection or 415V three phase service connection at the option of the consumer as clearly set out in Commission's Order No.3 of 2019 dated 25-03-2019. All executive orders of the Licensee and tender specification shall be in accordance with the above orders of the Commission in letter and spirit.

With the above orders, this petition is finally disposed of.

(Sd.....)  
**(K.Venkatasamy)**  
**Member (Legal)**

(Sd.....)  
**(Dr.T.PrabhakaraRao)**  
**Member**

(Sd.....)  
**(M.Chandrasekar)**  
**Chairman**

/True Copy /

Secretary  
Tamil Nadu Electricity  
Regulatory Commission