

## Briefing Note

# Impact of Rooftop Solar by C&I consumers on TANGEDCO's Finances

Date: February 2021  
Author: Martin Scherfler  
Email: martin@aurovilleconsulting.com

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### Purpose

To assess the commercial impact of consumer category solar energy systems (rooftop solar under net feed-in mechanism) by commercial and industrial consumers (C&I) on TANGEDCO as per data available for FY 2018-19.

### Key messages

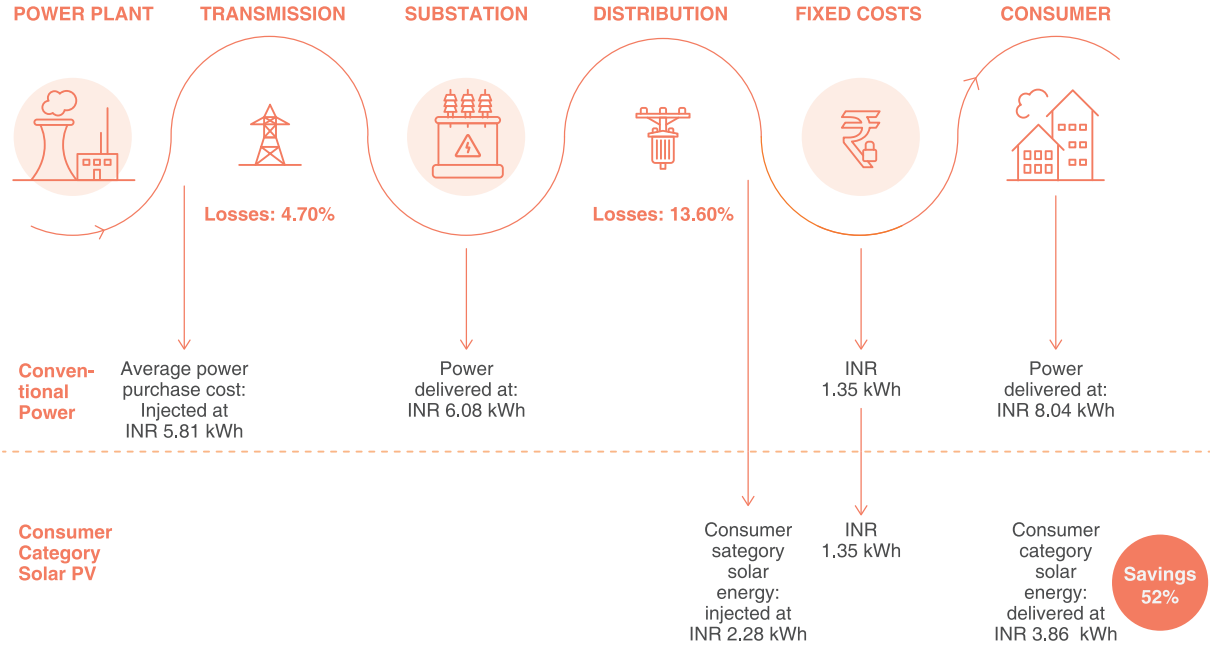
All average billing rates for C&I consumers (tariff rates LT V, LT III B, HT I-A and HT II) except for HT III (commercial) are below TANGEDCO's average cost of supply.

The current solar net feed-in tariff for consumer category solar energy systems of 2.28 INR/kWh is 60% lower than TANGEDCO's Average Power Purchase cost with 5.81 INR/kWh (TANGEDCO 2018).

Surplus solar energy from consumer category solar systems avoids transmission costs, contributes to voltage stability, and possibly defers upgradation of distribution and transmission infrastructure (CEEW 2019).

Consumer category solar energy systems for all HT and LT C&I consumers reduce TANGEDCO's cost of supply. TANGEDCO's Average Cost of Supply (including Power Purchase Cost, Transmission and Distribution losses, and fixed costs) for FY 2018-19 stood at INR 8.04 whereas surplus solar energy supplied to TANGEDCO from consumer category solar energy systems (including Power Purchase Cost, Distribution losses, and fixed costs) comes at a cost of supply of 3.86 INR/kWh. Solar energy sourced from consumer category solar energy systems, therefore, represents a reduction in the cost of supply to TANGEDCO of 52% (refer to Figure 1). This savings are expected to higher in the current financial year (FY 2020-21) as the Average Cost of Supply for TANGEDCO will have increased. This assumes that TANGEDCO is recovering its fixed cost of generation for its ongoing power purchase agreements (PPAs) from demand/fixed charges or that rooftop solar capacity added by C&I consumers is avoiding the signing of new PPA's or the addition of TANGEDCO owned new generation capacity.

Figure 1 Comparison average cost of supply vs cost of supply of solar energy export to grid from rooftop solar systems



### Background

The Tamil Nadu Solar Energy Policy 2019 excludes HT consumers from availing the net feed-in metering mechanism. This discourages a large segment of industrial, commercial, and institutional consumers from installing consumer category solar PV plants. The only option available for these HT consumers for generating solar energy on their premises is to operate the plant under paralleling, in which any excess generation has to be either curtailed or stored. Further, the parallel operation of a rooftop solar plant attracts a monthly parallel operation charge (TNERC 2019).

One key driver for excluding HT consumers from the net feed-in mechanism was a perceived revenue loss in the case of HT consumers installing rooftop solar energy systems. Under the existing cross-subsidy scheme higher tariff paying consumers are cross-subsidizing lower tariff paying consumers.

The Indian Electricity Act, 2003 (EA 2003) under section 61(g) states that the appropriate Commission must be guided with the fact that the tariff progressively reflects the cost of supply of electricity and, reduces cross-subsidies. Other sections in the Act (38, 39, 40, 42, 178 (2) (k), (m) & (r) 181 (2) (j), (m), (p) & (zc)) also refer to cross-subsidies pointing out that cross-subsidies shall be progressively reduced in the manner as may be specified by the Central Commission or State Commission. Similarly, the National Tariff Policy 2016 under section 8.3 recommends that ‘subsidies should be targeted effectively and in a transparent manner’(Ministry of Power 2018).

In the period from 2010 to 2020, tariff petitions were not submitted by TANGEDCO to TNERC for the years 2011, 2015, 2016, and 2020. The TNERC tariff order of 2017 includes tariffs for the years 2018 and 2019 as well. However, the 2017 tariff order has kept energy and demand/fixed charges stable and now tariff increase was implemented for 2018 and 2019 (TNERC 2017).

Currently, TANGEDCO recovers its cost of supply from a few consumer tariff categories only. For the majority of consumers, TANGEDCO bears a loss on every kWh of electricity supplied. In the FY 2012-13 to FY 2017-18, the average billing rate (ABR) has been consistently lower than the average cost of supply (ACoS) (Auroville Consulting 2020a).

The Tamil Nadu Solar Energy Policy sets a consumer category solar energy target of 3,600 MW by 2023. As of December 2020 6.87% of this target has been achieved. If the target of 3,600 MW is achieved by 2023 the solar energy from consumer category solar energy will represent an approximate 4% of the total electricity consumption in Tamil Nadu only (Auroville Consulting 2020b).

## Considerations

The impact on TANGEDCO's net revenue for different solar energy penetration scenarios (25% 50% and 100% in energy terms) of C&I consumers is explored.

A comparison of the financial impact on TANGEDCO between paralleling mechanism and solar net feed-in mechanism for HT C&I consumers is undertaken.

Zero export of surplus solar energy under the paralleling mechanism is assumed.

## Results

As per the TANGEDCO, the Average Cost of Supply for FY 2018-19 stood at 8.04 INR/kWh. Assuming average LT and HT C&I consumers the Average Billing Rate (including energy and fixed/demand charges) for 2 out of the 4 C&I consumer categories (tariff rates LT V, LT III B, HT I-A, and HT II) is below the Average Cost of Supply (refer to Figure 2). The Average Billing Rate includes both electricity charges and demand/charged. <sup>1</sup>

The average revenue loss per kWh supplied is highest for the LT III B consumer category with a loss of INR 1.67 per kWh. For HT III TANGEDCO receives a net billing gain of 1.16 INR/kWh (refer to Figure 3).

Figure 2 Comparison TANGEDCOs Average Cost of Supply (ACoS) vs Average Billing Rate (ABR) for C&I consumer categories

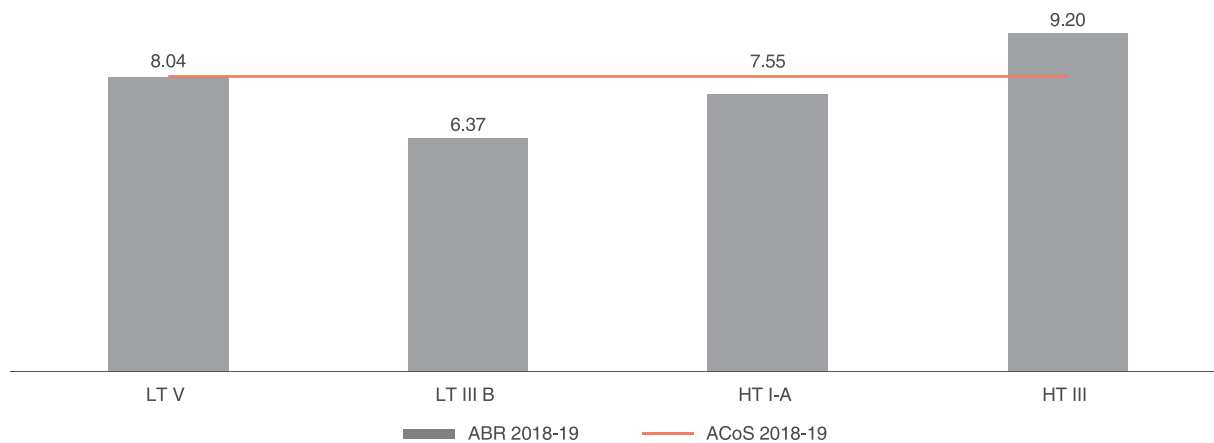
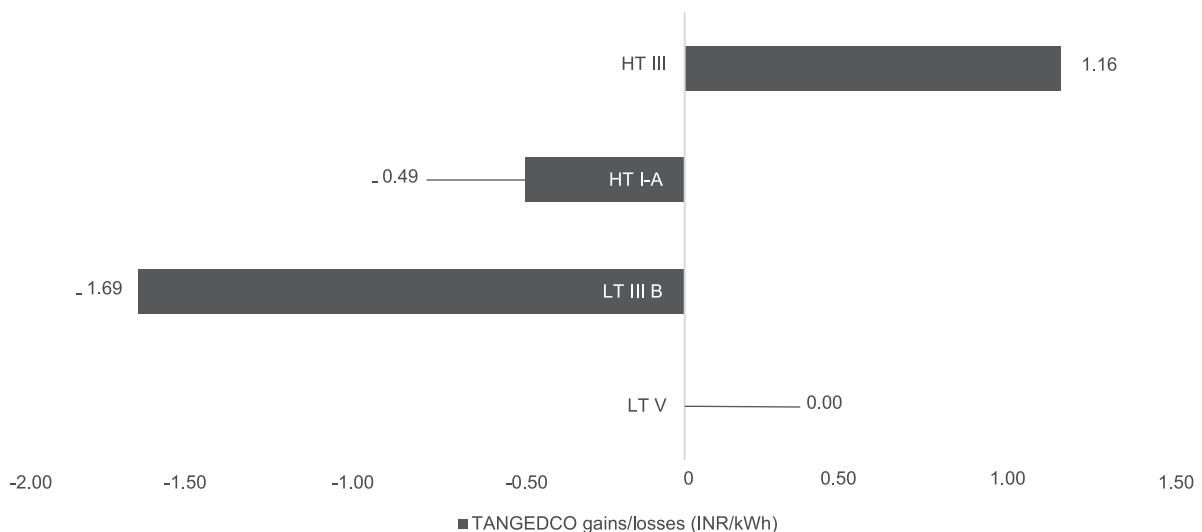


Figure 3 TANGEDCO's average revenue gains/losses per kWh supplied to C&I consumer categories



<sup>1</sup> These values have been derived by taking the average annual consumption for each LT and HT consumer category in the state and simulating the monthly Average Billing Cost.

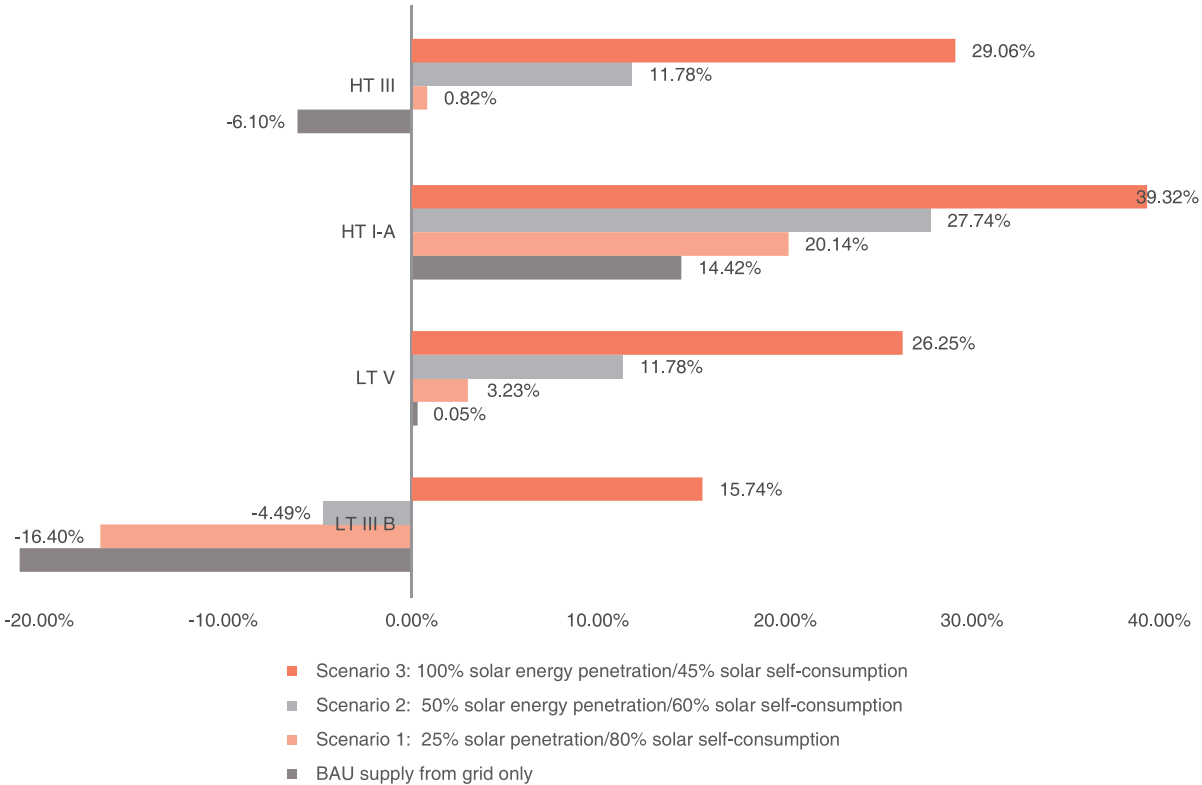
If the solar net feed-in mechanism with the current net feed-in tariff of 2.28 INR/kWh were made available for all C&I consumers including the HT consumer categories, then TANGEDCO will benefit from consumer category solar energy systems installed on the premises of C&I consumers by reducing its Average Cost of Supply and by increasing its net billing revenue. The analysis shows, that the higher the solar energy penetration, the higher the benefits to TANGEDCO (refer to Figure 4). This is on account of the fact that:

- (i) for 2 out of the 4 C&I consumer categories the Average Cost of Supply is higher than the Average Billing Rate,
- (ii) surplus solar energy exported by consumer category solar systems and delivered to another consumer comes at a cost of 3.86 INR/kWh. This is 52% below TANGEDCO's Average Cost of Supply of 8.04 INR/kWh (refer to Figure 1).
- (iii) with higher solar energy penetration the units of surplus solar from the consumer category solar energy systems injected into the grid are expected to increase, thereby increasing the volume of low-cost solar energy available to TANGEDCO.

The benefits to TANGEDCO are the highest for HT C&I Consumers, this is on account of the higher demand charges levied on HT C&I consumers as compared to LT C&I consumers.

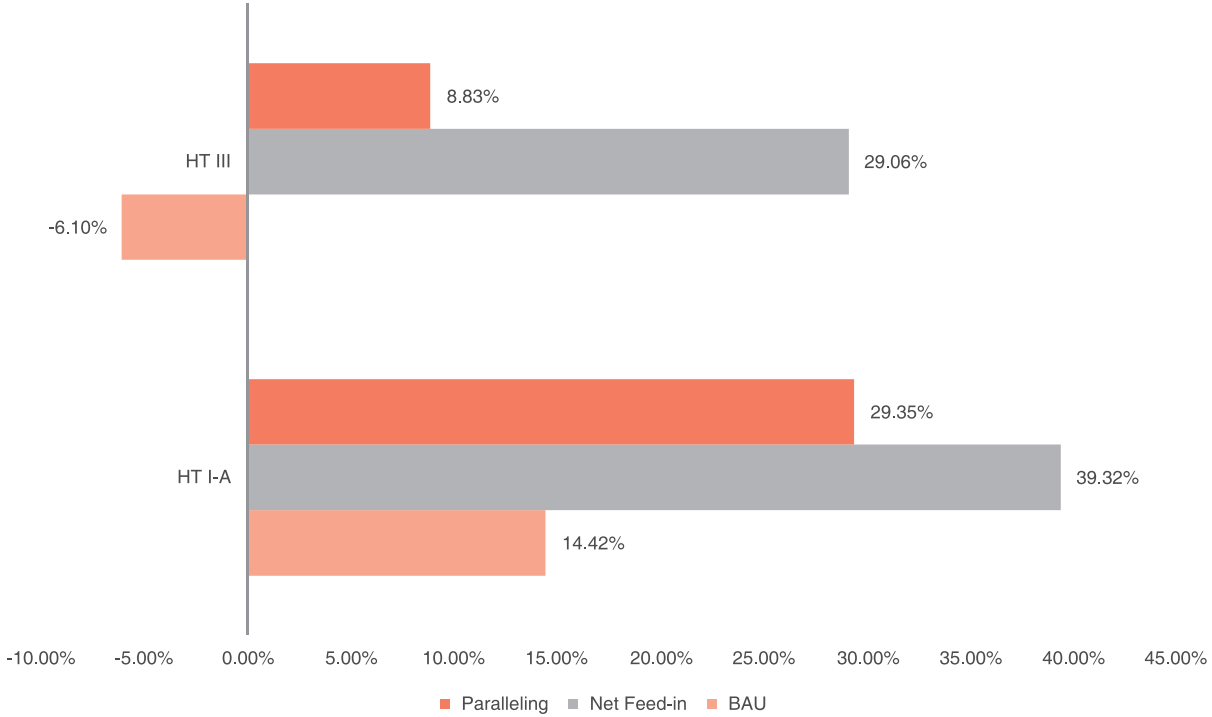
Additional technical and commercial benefits to TANGEDCO such as voltage improvements, avoided or deferred infrastructure upgradation, reduced working capital requirement or avoided generation capacity cost has not been quantified in this note.

Figure 4 Impact of different solar energy penetrations of C&I consumers on TANGEDCO's net billing revenue



Comparing the financial impacts on TANGEDCO's billing revenue between supply from the grid only (BAU), with the currently available paralleling mechanism and with the net feed-in mechanisms for HT C&I consumer categories for the 100% solar energy penetration scenario, indicates that TANGEDCO clearly benefits from consumer category solar energy systems for C&I consumers. The financially least attractive option to TANGEDCO is the Business as Usual case (supply from the grid only). The benefits to TANGEDCO are the highest, if the paralleling mechanism were to be replaced with a net feed-in mechanism (refer to Figure 5).

Figure 5 Comparison benefits to TANGEDCO for the BAU scenario compared to the 100% solar penetration with paralleling and with net feed-in mechanism



**Conclusions & Recommendations:**

Under the current schedule of tariffs, the adaptation of consumer category solar energy systems by C&I consumers presents an opportunity rather than a threat to TANGEDCO to reduce its cost of supply and improve its billing revenue. Therefore, TANGEDCO is advised to actively facilitate consumer category solar energy systems for all consumer categories.

In order to make consumer category rooftop solar a winning proposition to TANGEDCO the following is recommended:

- Petition with TNERC to permit all consumers at all voltage levels under the net feed-in mechanism;
- Ensure that the fixed/demand charges cover TANGEDCO’s fixed cost for generation and distribution;
- Introduced Time of the Day (ToD) tariffs for both generation (export of surplus solar from consumer category systems) and consumption;
- Develop a methodology to comprehensively assess the locational benefits and costs of consumer category solar energy on TANGEDCO;
- Develop utility driven or supported rooftop solar programs (e.g. Utility as RESCO for C&I consumers);
- Forecast consumer category solar energy capacity addition and including this forecast in the State’s generation capacity addition planning;

## References

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