

# Assessing The Impact of Tamil Nadu's Electricity Tariff Policies on TANGEDCO's Financial Performance

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## ACKNOWLEDGEMENT

This publication forms part of the **Sustainable Energy Transformation, Tamil Nadu (SET-TN)** series of documents and activities. SET-TN aims to facilitate higher clean energy deployment in the State by working with all stakeholders in order to find sustainable and equitable solutions. SET-TN is a collaborative initiative by Auroville Consulting (AVC), Citizen Consumer and civic Action Group (CAG) and the World Resources Institute India (WRI).

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## EXECUTIVE SUMMARY

TANGEDCO (Tamil Nadu Generation and Distribution Corporation Limited) is a Tamil Nadu State-owned electricity generation and distribution corporation. It is the only electricity distribution licensee in the State. TANGEDCO has accumulated debt of INR 1,01,173 Crore as on FY 2019 (Crisil 2020) and continues to run into losses year after year. This paper analyses the impact of electricity tariffs (determined by the Tamil Nadu Electricity Regulatory Commission - TNERC) on the financial performance and health of TANGEDCO.

One of the key factors that contribute to TANGEDCO's poor financial performance is a consumer electricity tariff structure that includes a cross-subsidy mechanism. Cross-subsidy refers to the mechanism whereby there are different electricity tariffs for different consumer categories. The high tariff paying consumers cross-subsidise the low tariff paying consumers, which results in high tariff consumers (e.g. industries, commercial establishments) migrating to power purchase from third parties (through a facility known as "open access") or shifting their establishment to other states. Another key factor is the omission of annual electricity tariff revisions. Other important factors such as billing and collection efficiency and power purchase costs are not scope of this analysis.

The consequences of this are:

- The migration of industrial and commercial entities to other states with lower tariffs, resulting in a tax revenue loss to the State Government as well as the reduction in employment opportunities in the State;
- An increasing number of HT (high tension) consumers that procure power from third parties through the open access system, thereby resulting in reduction of TANGEDCO's revenue;
- A reduction in high tariff revenue, which disturbs the cross-subsidy mechanism;
- Accumulation of outstanding payments by TANGEDCO to independent power producers resulting in the participation in competitive biddings for power supply to TANGEDCO (for both conventional and renewables) nearly coming to a stand-still. This also results in job losses and affecting the entire power value chain in the State.
- Accumulation of outstanding payments by TANGEDCO to their vendors. This results in a higher costs since vendors have to factor payment delays into their price.

This report analyses the electricity tariff policy of Tamil Nadu and its financial implications on TANGEDCO as follows:

- Analyse tariff subsidy allocation for Agriculture and Domestic consumers.
- Analyse the energy charges and net revenue by consumer category.
- Understand what percentage of the actual fixed costs for generation and distribution is recovered.
- Quantifying the impact of cross-subsidization.

## TABLE OF CONTENTS

1. INTRODUCTION	2
2. LOW TENSION CATEGORY	5
2.1 Trend of LT Energy Charges	5
2.2 Compound Annual Growth Rate of Energy Charges	9
2.3 TANGEDCO Revenue and Loss	12
2.4 Analysis of Subsidy	16
3. HIGH TENSION CATEGORY	21
3.1 Trend of HT- Energy Charges	21
3.2 Revenue from Sales	23
3.3 HT Consumers Cross-Subsidizing LT Consumers	25
4. CLASSIFICATION OF COSTS AND RECOVERY OF ARR	29
5. MIGRATION TO OPEN ACCESS	32
6. KEY INSIGHTS	34
7. CONCLUSION	35
8. REFERENCES	36
9. ANNEXURES	39



## 1. INTRODUCTION

Electricity consumption is one of the most telling indicators to assess a nation's economic development. A financially robust and vibrant electricity sector is pivotal for economic growth and is considered vital for a nation's overall development (Rural Electrification Corporation Limited 2019a). The per capita consumption of Tamil Nadu has always been above the national average. In the FY 2018-19, Tamil Nadu's per capita consumption was 1,467 kWh while the national average was 1,181 kWh (Energy Department of Tamil Nadu 2020).

Contributing nearly 8.40% of India's GDP, Tamil Nadu is one of the most urbanized and industrialized states. (Ministry of Power 2019c). It has the third highest electricity generation capacity of 31.05 GW (CEA 2019) and a 100% electrification rate. (Rural Electrification Corporation Limited 2019b).

### TANGEDCO's debt accumulation

Tamil Nadu is one of the states with free electricity for agriculture. Electricity tariffs for several other consumer categories such as domestic, huts, etc., are subsidized by the Government of Tamil Nadu. In addition to the electricity subsidy provided by the Government, TANGEDCO cross-subsidises the lower consumer tariffs from higher tariffs

revenue. However even with the combination of Government of Tamil Nadu subsidies and cross-subsidies, revenue is significantly lower than costs.

In 2015-16 TANGEDCO's cumulative revenue gap was INR 30,884.15 Crore (TNERC 2017a) (Refer to Table 1). The trued-up<sup>1</sup> revenue gap for the subsequent years is not available in the public domain, but the revenue gap is expected to have increased as no tariff revisions took place after the year 2017.

TANGEDCO has accumulated substantial losses and outstanding debt over the years. TANGEDCO's overall debt increased from INR 65,897 Crore (S.Rajaraman, 2019) in FY 2017 to INR 1, 01,173 Crore in FY 2019 (Crisil 2020). As of May 2020<sup>3</sup>, TANGEDCO had INR 16,917 Crore of overdue payments to Generation Companies (GENCOs), this is more than 15 months of power purchase (Ministry of Power 2019). Delaying payments to generators has helped TANGEDCO to manage its working-capital cycles, to meet short term obligations, and to avoid costly working-capital loans. TANGEDCO consistently fully utilized its working capital limit during the 2018 calendar year and it uses over 90% of its capital limits (S.Rajaraman, 2019).

Table 1: Approved Cumulative Revenue Gap FY 2011-12 to 2015-16<sup>2</sup>

Financial year (FY)	2011-12	2012-13	2013-14	2014-15	2015-16
Revenue gap (INR Crore)	7,377.93	12,145.68	19,350.08	25,643.71	30,884.15

Source: (TNERC 2017a)

<sup>1</sup> True-up: The actual cost and sales estimates are presented to the electricity regulatory commission by the distribution company. The true-up process is that at the end of the tariff period, the distribution company comes to the electricity regulatory commission and presents their actual costs and revenues. These are the costs that are actually incurred and the tariff that was actually charged. During the process of 'true-up', the electricity regulatory commission asks for justification of any deviation from the approved performance from the distribution company (Prayas Group Energy 2019).

<sup>2</sup> The revenue gap of a financial year is added with an interest of 11% and the carrying cost. The final value becomes the opening balance of the next financial year upon which the FY's revenue gap is further added along with the interest and carrying cost. Thus revenue gap gets cumulated this way since FY 2011-12 till 2015-16

<sup>3</sup> Data taken from PRAAPTI portal

To address the serious payment delays by DISCOMS to GENCOS, the Ministry of Power, Government of India issued an order in June 2019, which makes it mandatory for DISCOMS to maintain letters of credit (LC) as payment security mechanisms for power purchase agreements (PPA's). National and Regional Load Dispatch Centres have been directed to dispatch electricity only up to the quantity equivalent to the value of the letter of credit (Ministry of Power 2019b). Underlying the poor financial performance of TANGEDCO is the State's electricity tariff policy and its repeated omission in determining annual tariff revisions.

### Grant of Subsidy and Cross-Subsidization to make electricity affordable

The State Government provides electricity subsidy aimed at supporting poor and marginal consumers to eliminate regional disparities in the state (Ministry of Power 2019b,c). There are two types of subsidies at play; subsidy by the State Government and cross-subsidy levied on certain consumer categories.

Direct subsidies by the State Government are mostly determined on a per kWh basis and are directly disbursed by the State Government to TANGEDCO. Cross subsidies are determined by the Tamil Nadu Regulatory Commission (TNERC). Cross subsidies are levied among certain consumer categories such as the commercial and industrial which results in a higher cost of electricity and are meant to ensure that TANGEDCO can supply affordable electricity below the actual cost of supply to various other consumer categories such as domestic, agriculture, etc., without registering an overall net revenue loss.

As the Tripartite Memorandum of Understanding (also known as "UDAY memorandum of understanding") (Ministry of Power 2017) amongst the Ministry of Power, India, Tamil Nadu Government, and TANGEDCO suggests, timely filing of yearly tariff orders is to be ensured. This

requires the DISCOM to submit tariff petitions supported with Annual Revenue Requirement (ARR) calculations. In the period from 2010 to 2020, tariff petitions were not submitted by TANGEDCO to TNERC for the years 2011, 2015, 2016, 2018 and 2020. The TNERC tariff order of 2017 includes tariffs for the years 2018 and 2019 as well. But they are not yet trued-up. The tariff determination process by TNERC takes into consideration all cost components: power procurement, transmission charge, operating cost, depreciation, interest, and return on equity. This results in TNERC-approved energy charges (INR/kWh) and fixed/ demand charges (INR per service connection or INR per kW / KVA) for various consumer categories.

### Mismatch between cost of supply and billing rate

Electricity tariffs have two components, energy charges and fixed/demand charges. Energy charges is the cost per unit of power consumed. Fixed charges are either levied based on the consumer connected load or in the case of most LT consumers are a fixed bi-monthly amount. Energy charges are meant to cover TANGEDCO's variable costs of procurement and delivery of energy. Fixed charges are meant to cover fixed costs including costs relating to the operation and maintenance of the distribution and transmission network. In its tariff orders, the TNERC determines both energy charges and fixed/demand charges for each consumer category.

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<sup>4</sup> (ABR) has been consistently lower than the average cost of supply (ACoS) (Refer to Table 2). No data is available for financial years 2018-19 and 2019-20 but as there was no tariff revision since 2016, it can be assumed that the revenue gap further increased.

<sup>4</sup> Average Billing Rate (ABR) is a measure of the average revenue received per unit of energy sold (Prayas Group 2019).





## 2. LOW TENSION CATEGORY

Table 2: Ratio between the average billing rate and the average cost of supply from TNERC

Year	ACoS TNERC	ABR Approved Tariff	Total ABR/ACoS TNERC (%)
	(INR/kWh)	(INR/kWh) <sup>5</sup>	
2012-13	4.99	4.99	100.00%
2013-14	5.24	4.89	93.30%
2014-15	5.77	5.74	99.50%
2015-16	6.23	5.74	92.10%
2016-17	6.09	5.74	94.30%
2017-18	5.85	6.54	111.70%

Source: TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

Chapter 2 of this report addresses TANGEDCO's revenue losses on account of electricity supply to LT consumer categories and the underlying tariff and subsidy structures. TANGEDCO's revenue gains/losses from HT consumer categories

are discussed in chapter 3. Chapter 4 outlines TANGEDCO's fixed cost and fixed charges or demand charges collected from consumers while chapter 5 discusses the migration of the HT consumers to open access.

Low Tension (LT) consumers are those who are connected to 415 V three phase or 240 V single phase. There are 13 different LT tariff categories (Refer to Annex 2). This chapter traces the trend of TANGEDCO's ACoS and compares it with the energy charges of selected LT consumer categories from 2012 to 2019. ACoS is the utility's cost of delivering one kWh of electricity to the consumer. ACoS comprises of the following costs: Average Power Purchase Cost (APPC), Transmission & Distribution losses and TANGEDCO's fixed costs.

### 2.1. Trend of LT energy charges

#### Two different ways in determining the cost of supply

It may be noted that ACoS calculated with two different methodologies are used in this study: one determined by TNERC using the Aggregate Revenue Required (ARR) for the number of units sold – herewith called ACoS TNERC, and one determined on the basis of TANGEDCO's total

expenditure for the units sold mentioned in their annual profit & loss (P&L)<sup>6</sup> account - hereafter called ACoS P&L. The difference between the two is that ACoS TNERC does not factor in certain expenses of TANGEDCO<sup>7</sup> and therefore is typically lower<sup>8</sup> than ACoS P&L. Figure 1 presents the two ACoS in relation to the existing LT consumer energy charges for the year 2017 (the latest year for which energy charges were determined by TNERC).

As it can be seen, all LT energy charges are below ACoS P&L except LT V slab 2 (commercial) and only four LT energy charges are higher than ACoS TNERC, these are LT-IA slab 7, LT II-A, LT II-B (2), LT III-B. Effectively, energy charges below ACoS P&L result in a loss to TANGEDCO on every kWh of electricity delivered to the consumers (Refer to Figure 1). When the energy charges of LT categories are below the cost of supply, there is a need for recovering the deficit from another source.

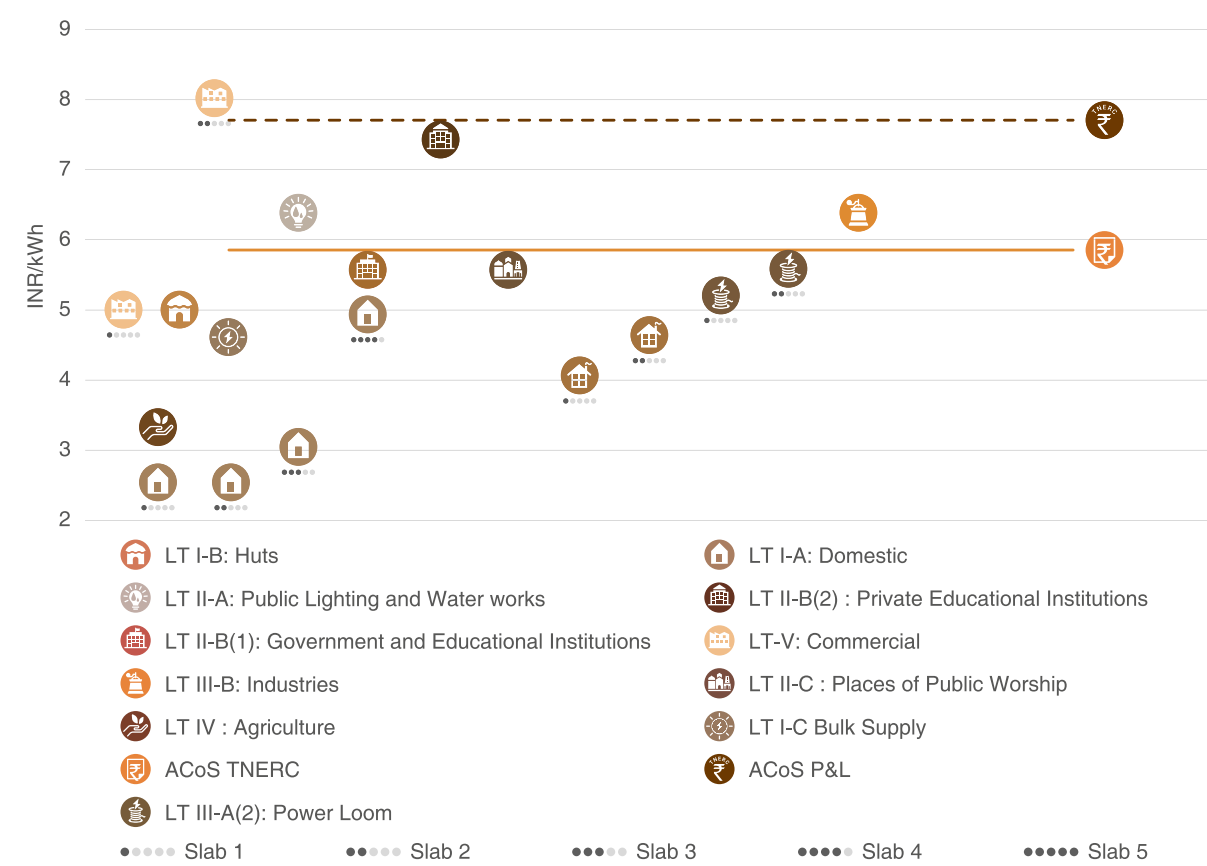
<sup>5</sup> The data for the Average Billing Rate is taken from the TNERC orders. For the years the data is not available, the data of previous years are assumed. For 2017-18, the average of the Average Billing Rate of all the individual categories are taken.

<sup>6</sup> From FY 2014 up until FY 2017 the profit and loss statement available from TANGEDCO is used. From FY 2011 up until FY 2013, cost of supply from (India Research and Ratings 2014) , whose source is TANGEDCO, is used. Since TANGEDCO's balance sheets are not available in online.

<sup>7</sup> To determine the Net ARR, TNERC includes factors such as other income, non-tariff income, net prior period income and expenses and capital cost of generation during trial stage.

<sup>8</sup> Not all the expenditures submitted by TANGEDCO are accepted by TNERC during the process of trueing up. This results in omitting some percentage of the expenses in all the categories of TANGEDCO leading towards a Net ARR calculated by TNERC being lower.

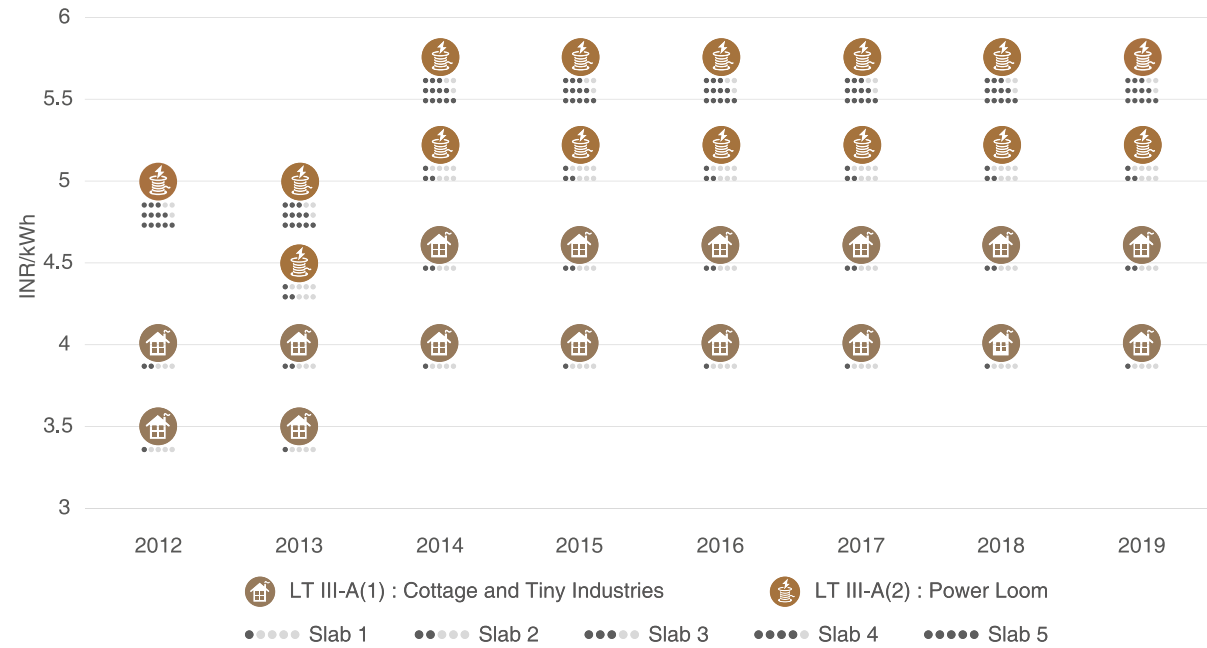
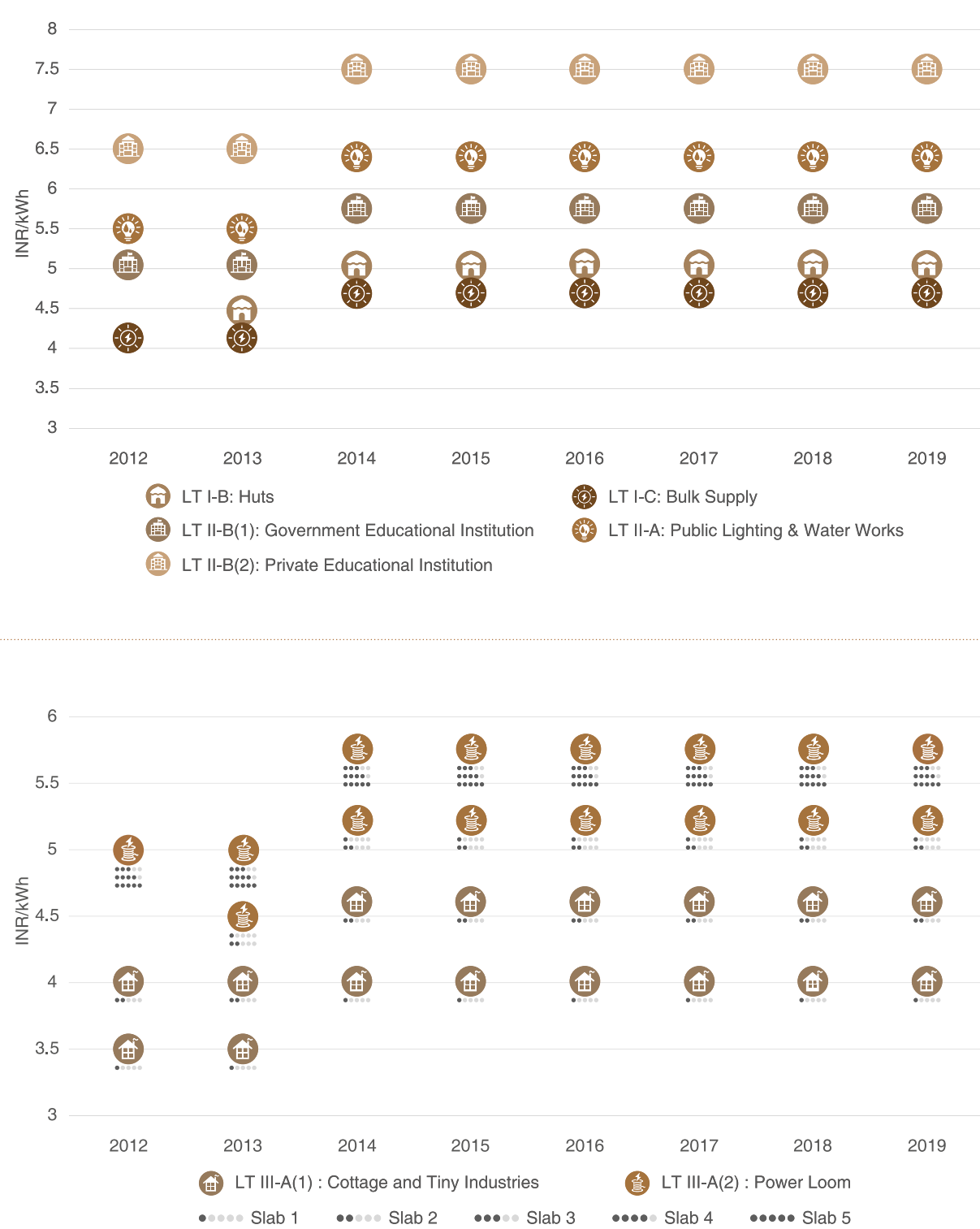
Figure 1: Approved energy charges of LT for the year 2017-18 along with the ACoS TNERC and from ACoS P&L

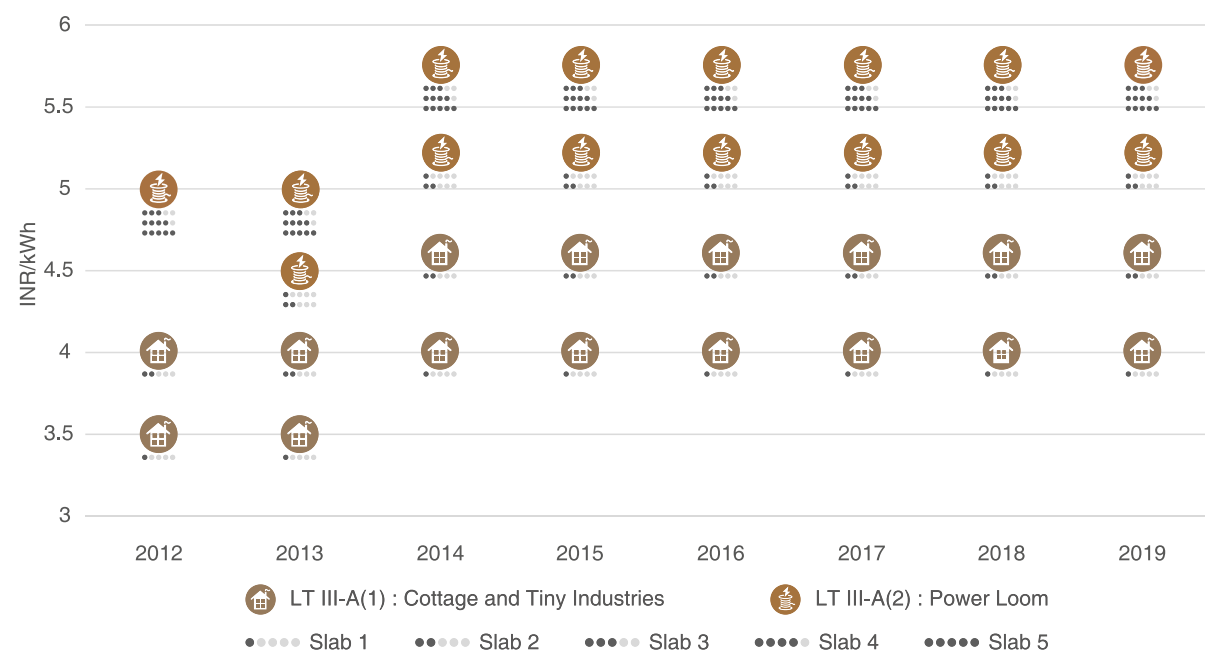


Source: TNERC (2017a) and India Research and Ratings (2014)

The energy charges for most of the LT categories with the exception of Domestic, have not changed since FY 2014-15. For the Domestic category the energy charges actually decreased with the tariff revision in FY 2017 (Refer to Figure 2 and Figure 4).

Figure 2: Trend of selected LT energy charges





Source: TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

## 2.2. Compound Annual Growth Rate of Energy Charges

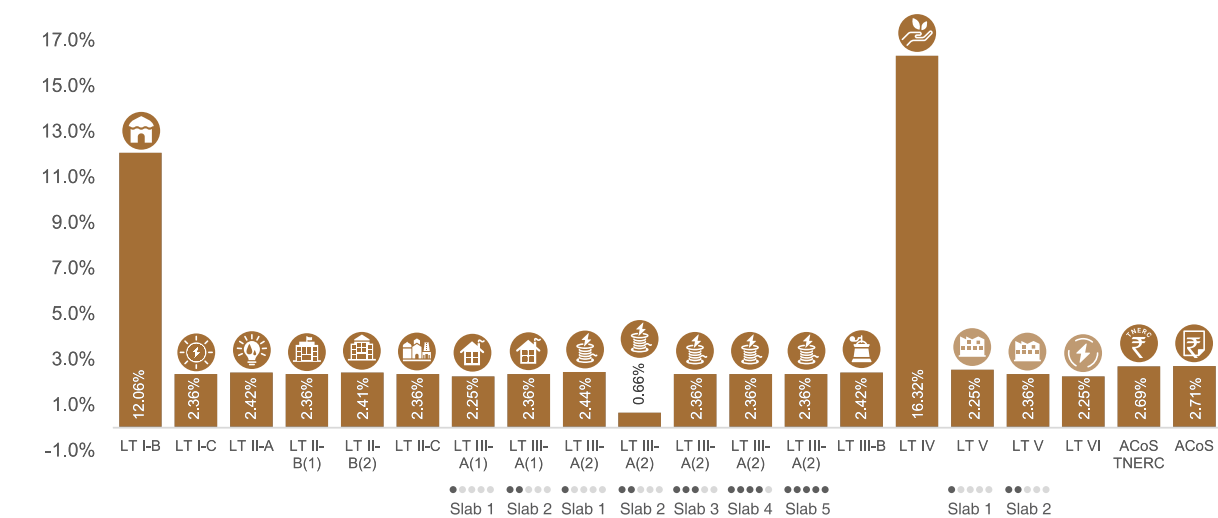
### Energy charges of certain LT categories fall short of the cost of supply

The Compound Annual Growth Rate (CAGR) of energy charges of all the LT categories are compared with the Cost of Supply. From FYs 2012-2018 the CAGR for most energy charges is found to be between 2.30% to 2.50%. On the higher end, the energy charges of LT-I B (Huts in Panchayats) and LT IV (Agriculture) show a CAGR of 12.06 % and 16.32% respectively. On the lower end, energy charges of LT II-A (2) - Power loom, has a CAGR of 0.66%. Compared to that, the CAGR of both ACoS TNERC and ACoS

P&L stands at 2.69% and 2.71% respectively (Refer Figure 3). A lower difference between CAGR of ACoS and many of the LT categories indicates that gradually the gap between the cost of supply and revenue is reducing.

The Domestic category consists of four different slabs. Slabs I, II, and III are for consumers whose consumption is up to 50 kWh/month, 100 kWh/month, and 250 kWh/month respectively. Consumers with a consumption of more than 250 kWh/month fall under Slab IV. The first three slabs show a negative CAGR of energy charges. In slab 4 Domestic energy charges increase at a positive rate similarly to other LT energy charges (Refer to Figure 4).

Figure 3: CAGR of approved LT energy charges vs. ACoS 2012-2018.

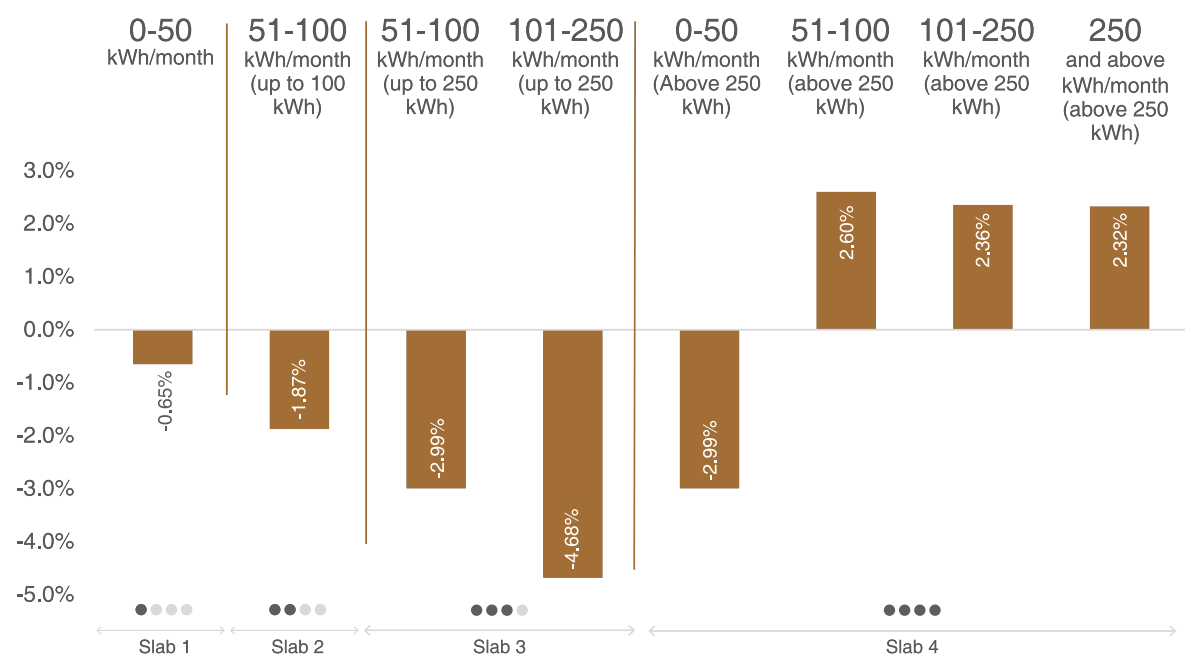


Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a).

Disclaimer: TNERC approved energy charges plotted in the graph are energy charges payable to TANGEDCO. This included energy charges payable by the electricity consumers and the electricity subsidy contributed by the State Government per kWh of electricity.



Figure 4: CAGR of approved Domestic energy charges by slab vs. ACoS 2012-2018<sup>9</sup>



Source: TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

The average energy charges of all the Domestic tariff slabs are below the ACoS (TNERC and P&L). This indicates that the Domestic consumer category as a whole causes losses to TANGEDCO (Refer to Figure 5). It is also to be noted that after the tariff revision of 2017, the energy charges for all the slabs within the Domestic tariff category decreased. Already before the tariff revision of 2017, cross-subsidization was in place. The

reduction in Domestic energy charges with the tariff revision of 2017 further increased the need to cross-subsidize Domestic energy consumption, thereby increasing the pressure on some of the other tariffs to compensate the revenue gap. The TNERC approved domestic tariffs in 2017 (TNERC 2017a) is, if taken as a percentage value on ACoS P&L (2017), 39.67% for Slab I, and 56.21 for Slab IV. (Refer to Table 3).

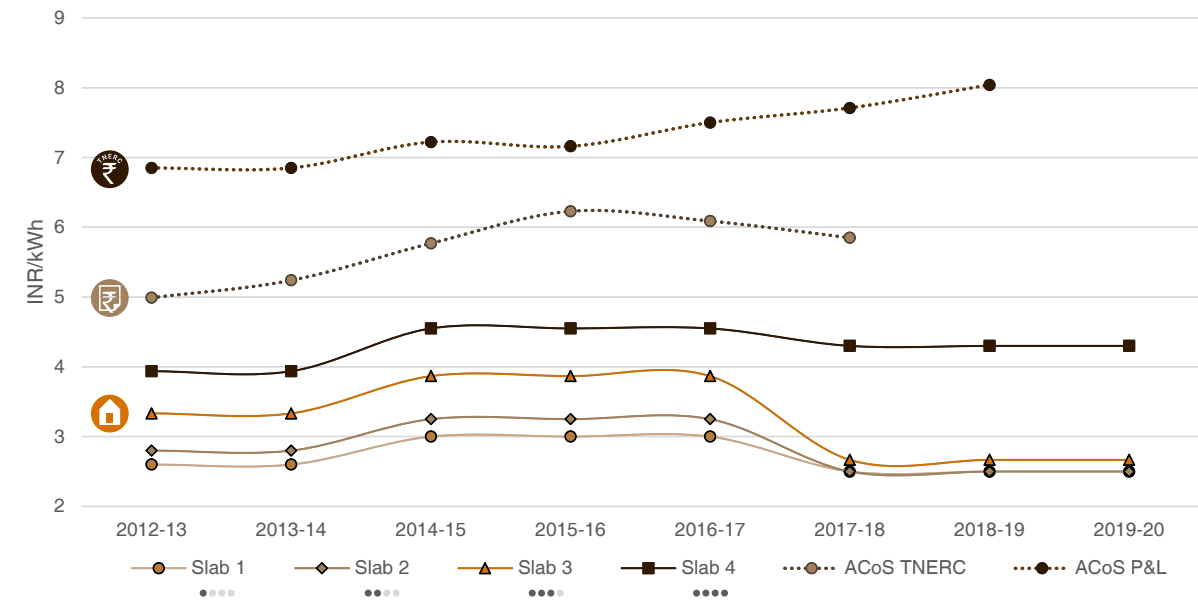
Table 3: Percentage of Approved tariff in the ACoS P&L for various Domestic slabs

Domestic Slabs	Slab I	Slab II	Slab III	Slab IV
Approved Tariff (Energy Charges + Fixed Charges) /ACoS P&L	39.67%	34.71%	37.03%	56.21%

Electricity supply for agriculture is free of cost to the farmers as it is partially covered by the subsidy from the State Government and additionally cross-subsidized by TANGEDCO. The majority of agricultural service connections have no energy meter. For these connections the subsidy paid by the Government of Tamil Nadu to TANGEDCO is based on the connected load in HP (horse power). For service connections with energy meters subsidy is paid on the basis of energy consumed. In reality, the energy consumption for metered agricultural service connections is not based on actual meter readings but is in most cases estimated<sup>10</sup>.

In 2018-19 the Government subsidy for non-metered agricultural consumers' works out as INR 3.59 /kWh<sup>11</sup>, while the subsidy for metered agricultural consumers is INR 3.23 /kWh for the same year. This seems to suggest that non-metered consumers are subsidized at a higher rate than the metered consumers. However there would be significant differences between the estimated energy consumption and the actual energy consumption of non-metered connections. The trend of agricultural energy charges (payable by the State Government) and the ACoS are shown in Figure 6, where TANGEDCO's revenue gap between energy charges and ACoS is clearly visible.

Figure 5: Approved Domestic energy charges by slab Vs. ACoS year of 2012 till 2019.



Source - India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

Disclaimer: As the four Domestic slabs have further sub-slabs. The average tariff (INR/kWh) of each of the 4 slabs were determined to plot (Refer Figure 5).

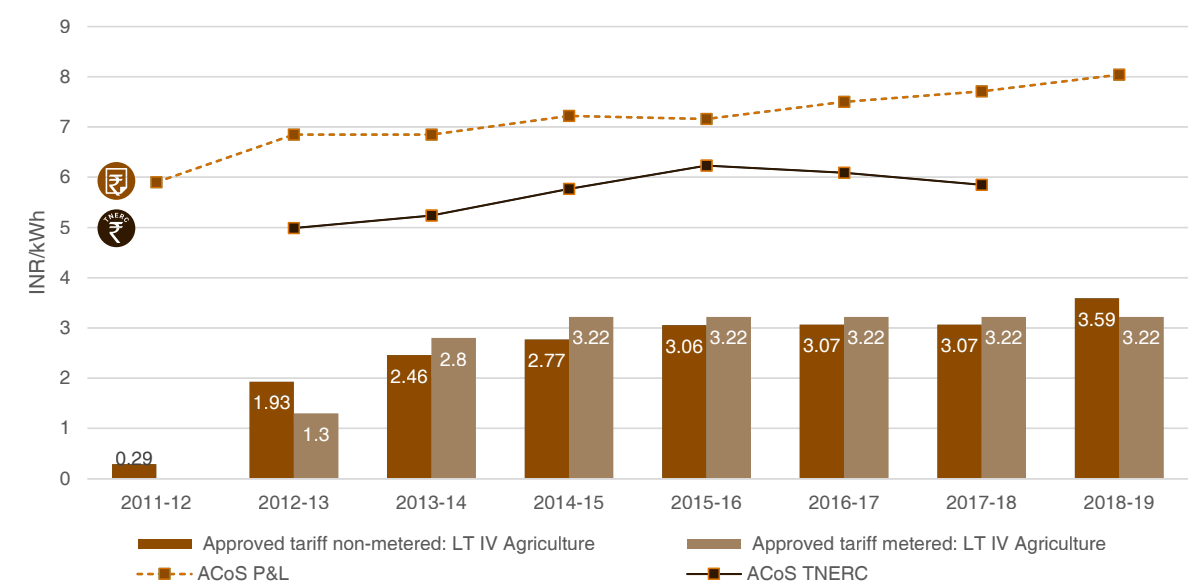
<sup>9</sup> To arrive at the CAGR of ACoS TNERC and P&L, the ACoS TNERC for the year 2018-19 is assumed to be the same of the previous year which is 5.85 INR/kWh. As for the P&L, ACoS P&L for the year 2018-19 is assumed to be at 8.04 INR/kWh.

<sup>10</sup> Metered Connections: The commission (TNERC 2017a) estimates agricultural consumption based on the average capacity of the pump-set in the middle of the year. The data on actual additional connections given as well as corresponding increase in load as submitted by TANGEDCO in its reply to data gaps has been considered.

Unmetered Connections: TANGEDCO submitted a scientific method of calculation of unmetered consumption in agriculture based on sample meter readings to TNERC (TNERC 2017a).

<sup>11</sup> Calculated as, total subsidy allocated for the un-metered agricultural connection/total estimated un-metered agricultural consumption

Figure 6: Approved Volumetric/energy charges of Agriculture under LT are plotted along with the cost of supply and subsidy from the financial year of 2012 till 2019



Source - India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014), TNERC (2017a), TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

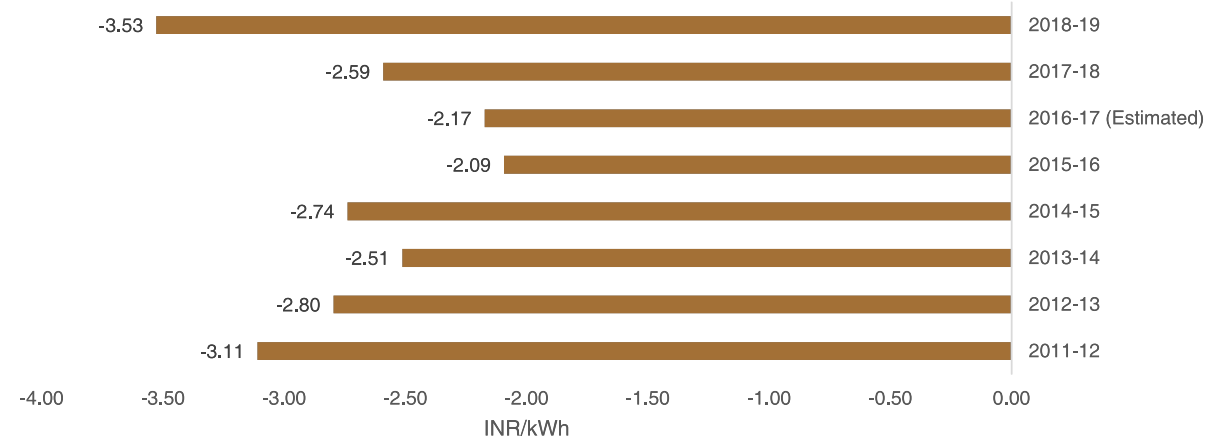
### 2.3 TANGEDCO Revenue and Loss

#### Clear impact of the tariff revisions is seen on the net revenue loss

Net revenue loss is calculated as a difference between the cost of supply and revenue from sales<sup>12</sup>. As TANGEDCO receives electricity subsidy from the Government of Tamil Nadu, this subsidy is counted, along with the income from sales, as revenue. Scrutinizing the revenue loss in INR per kWh of electricity supply to LT consumers a disconcerting trend of an increase in average

net revenue loss per kWh is visible from FY 2011-12 to FY 2018-19 (Refer to Figure 7). The tariff revision in 2014, slightly reduced this revenue gap for the FY 2015-16. The possible impact of the tariff revision 2017 will be discernible once the true-ups for revenue from sales are being published. An estimate for the average net loss per kWh supplied for the FY 2018-19 indicates a higher revenue gap, due to the fact that the tariffs for categories such as Domestic were reduced, as compared to the previous years, in the 2017 tariff order.

Figure 7: TANGEDCO's estimated average net loss per kWh supplied to LT consumers FY 2011-12 to FY 2018-19 (after subsidy)



Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014), TNERC (2017a), TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

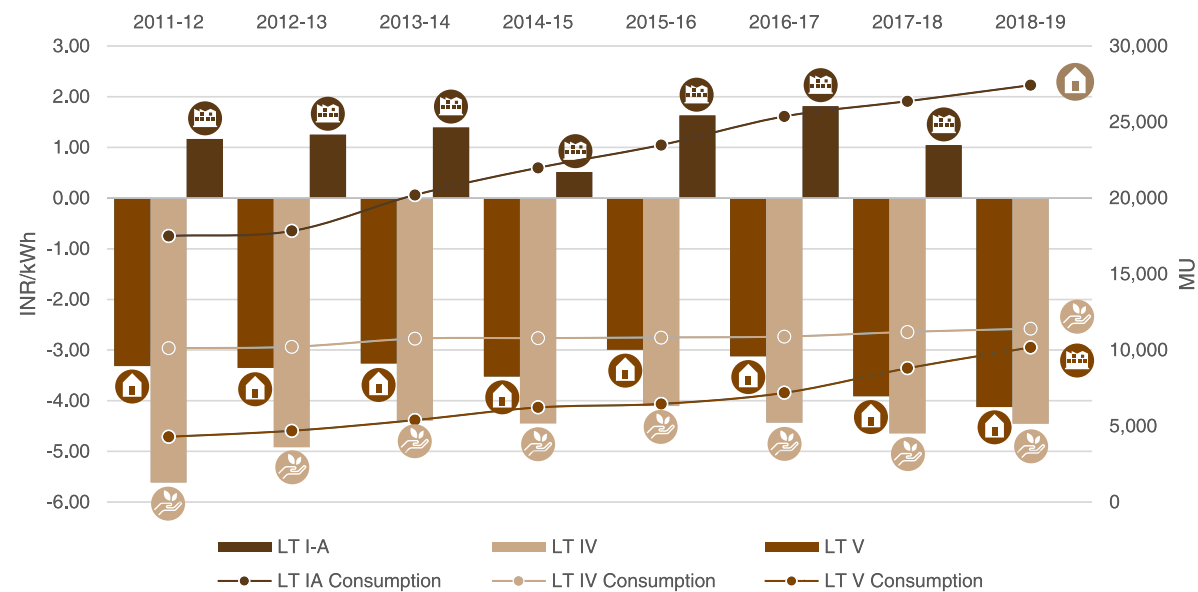
Domestic, agriculture, and commercial consumer categories, which account for more than 78% of the total LT electricity consumption, are key to the financial health of TANGEDCO. In spite of the subsidy provided by the Government of Tamil Nadu, LT I-A Domestic and LT IV Agriculture are steady loss categories to TANGEDCO. Revenue recovery from these two consumer categories is consistently and extensively below the ACoS. LT-V Commercial however, with a higher tariff, generates net revenue gains to TANGEDCO (Refer to Figure 8). It is, exempting LT Temporary Supply, the only LT category from which TANGEDCO is able to make moderate net revenue gains. As LT-V Commercial accounts for about 12.50% of the overall LT electricity

consumption, its net revenue provides a moderate excess that contributes to the cross-subsidy of other consumer categories.

After the top three consuming LT categories, the next three LT categories in terms of total consumption are LT II-A (public lighting, public water supply, and sewage), LT III-B (coffee grinding and ice factories, etc.), and LT III-A(2) (power looms), accounting for 21% of the total LT consumption. All these three categories show an increase in electricity consumption from FY 2011-12 till 2018-19. They also show an increase in revenue loss per kWh to TANGEDCO for the time period from FY 2015-16 till 2018-19 (Refer to Figure 9).

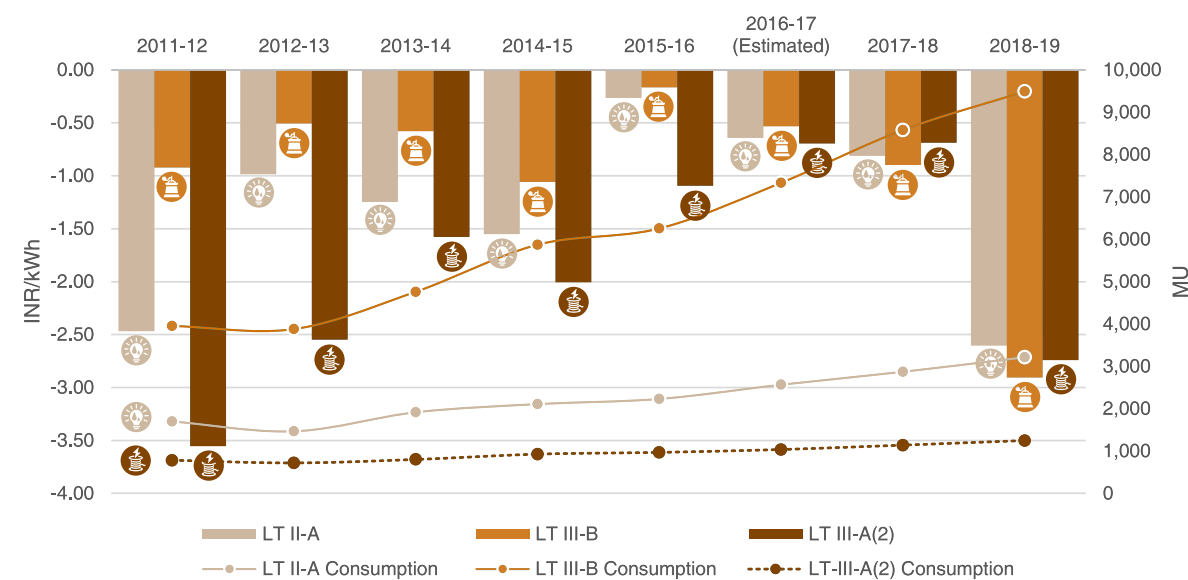
<sup>12</sup> Total Revenue from Sales also include the revenue from fixed/demand charges.

Figure 8: TANGEDCO's net revenue from sales & total electricity supply<sup>13</sup> from FY 2011-12 to FY 2018-19. LT I-A Domestic, LT IV Agriculture and LT V Commercial consumer categories.



Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014), TNERC (2017a)

Figure 9: LT II-A Public lighting, public water supply and sewage, LT III-B Coffee grinding and ice factories, etc., and LT III-A(2) Power loom



Source: TNERC (2012a), TNERC (2013a), TNERC (2014), TNERC (2017a), TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

To understand the impact of the subsidy, Table 4 below provides a comparison on the net revenue loss before and after subsidy for the FY 2017-18. Categories such as the Domestic, Huts, Power loom and Agriculture are major beneficiaries of the subsidy.

Table 4: TANGEDCO revenue loss from sales FY 2017-18 for LT Categories

LT Consumer Categories		Revenue loss from sales (before subsidy)	Revenue loss from sales (after subsidy)
		INR/kWh	INR/kWh
LT I-A	Domestic , Handloom, Old age homes, Consulting rooms, Nutritious Meals Centres etc.	-5.31	-3.91
LT I-B	Huts in Village Panchayats, TAHDCO etc.	-7.71	-4.73
LT I-C	Bulk Supply	-3.16	-3.16
LT II-A	Public Lighting and Public Water Supply & Sewerage	-0.81	-0.81
LT II-B(1)	Govt. Educational Institutions., Hospitals, Water supply etc.	-0.87	-0.87
LT II-B(2)	Private Educational Institutions, Cinema theatre & Studios	0.63	0.63
LT II-C	Actual place of public worship, Mutts and Religious Institutions	-1.5	-0.3
LT III-A(1)	Cottage and Tiny Industries	-2.65	-2.65
LT III-A(2)	Power loom	-4.04	-0.69
LT III-B	Coffee grinding and Ice factories etc. and Industries not covered under LT Tariff IIIA	-0.9	-0.9
LT IV	Agriculture and Govt. seed farm etc	-7.71	-4.64
LT V	Commercial and all categories not covered under IA, IB, IC, IIA, II B1, II B2, II C IIIA 1, III A2, IIIB and IV	1.04	1.04
LT VI	Temp. supply (a) Lighting and combined installations, (b) Lavish illuminations	13.02	13.02
Average		-3.86	-2.59

Source: India Research and Ratings (2014), TNERC (2017a) and TNERC (2017b)

<sup>13</sup> 2016-17 values are estimated by interpolation and 2018-19 values are estimated by extrapolation

2.4 Analysis of Subsidy

Domestic and Agriculture receive a major share of electricity subsidy:

The list of categories that receive electricity subsidy from the State Government and the total electricity consumption, for the FY 2011-12 to 2019-20 are plotted in Figure 10. There was a continuous increase of subsidy allocation from FY 2011-12 to FY 2016-17, followed by a moderate decrease in FY 2017-18 and FY 2018-19, only to increase again from FY 2019-20 onwards. The decrease in these two financial years is on account of the tariff determination that took place in 2017. The total electricity consumption for LT has been rising since FY 2011-12, a trend which is expected to continue in the future. With the expected future growth in electricity consumption for the subsidized LT categories, an increase in subsidy cost to the State Government can be expected.

The Disproportionate increase in Agricultural Subsidy:

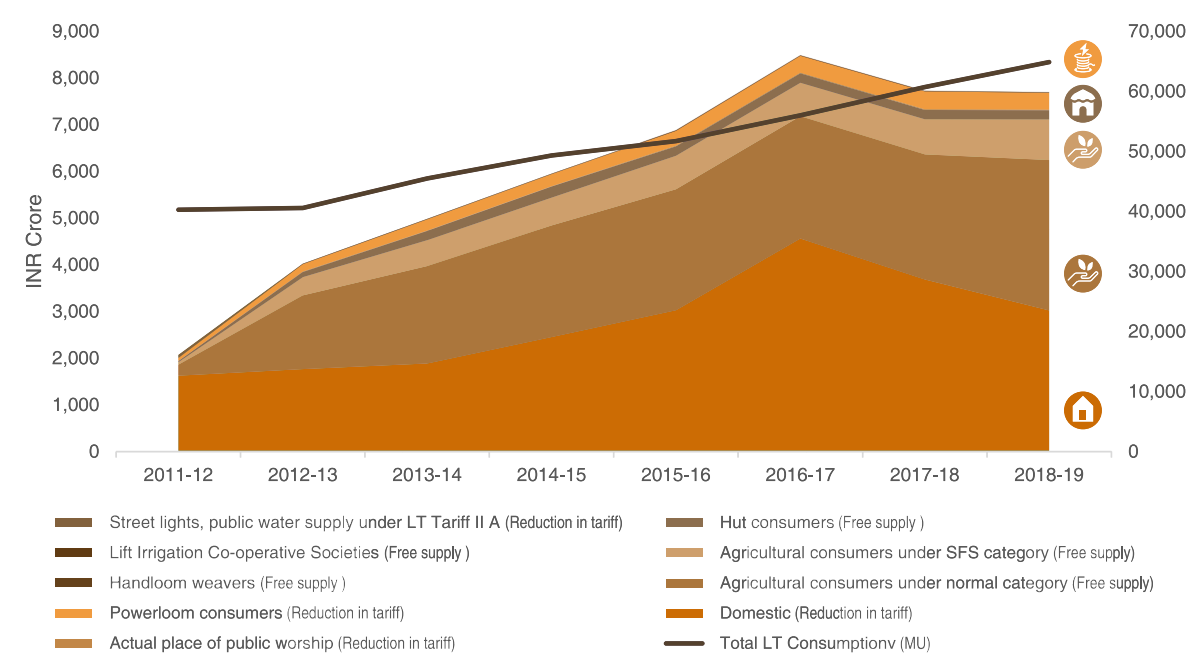
Breaking down the electricity subsidy allocation by the State, the agriculture and domestic

categories received 93% of the total state-provided electricity subsidy for FY 2019-20 (Refer to Figure 10). Both, the number of domestic and agricultural consumers and their electricity subsidy kept increasing from FY 2011-12 till 2019-20. In spite of the number of consumers being lower in agriculture, the subsidy received by the agriculture category is higher than the subsidy for domestic consumers (Refer to Figure 11).

The average annual subsidy per consumer (service connection) is INR 1,580 for domestic and INR 19,709 for agriculture (Refer to Table 5). The CAGR of agricultural subsidy is 39%, while the CAGR in the total number of agricultural service connections is less than 1% and CAGR in electricity consumption is 1.7%. If the trend of increase in Government subsidy continues, a gradual reduction in the gap between ACoS and revenue to TANGEDCO can be expected.

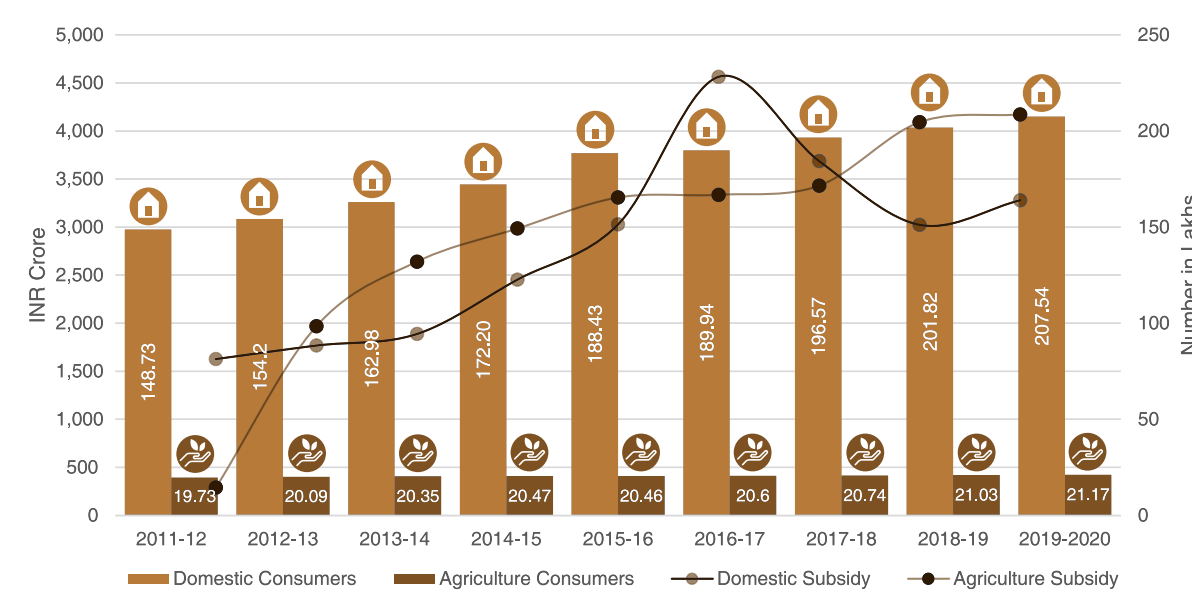
The question is whether State Government subsidies can keep pace with the expected growth in energy consumption in both the agriculture (lower ground water levels) and domestic segments (life style changes).

Figure 10: Government of Tamil Nadu subsidy allocation for various LT consumer categories from FY 2011-12 to FY 2019-20.



Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019).

Figure 11: Subsidy disbursed and the growth in the number of consumers of Agriculture and Domestic.



Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018), TNERC (2019), Energy Department of Tamil Nadu (2012), Energy Department of Tamil Nadu (2013), Energy Department of Tamil Nadu (2014), Energy Department of Tamil Nadu (2015), Energy Department of Tamil Nadu (2016), Energy Department of Tamil Nadu (2017), Energy Department of Tamil Nadu (2018) and Energy Department of Tamil Nadu (2019)

Table 5: Subsidy granted for Agriculture and Domestic in INR/per consumer/per annum

FY	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Domestic	1,094.02	1,146.38	1,158.50	1,425.06	1,606.99	2,402.81	1,875.65	1,498.18	1,580.08
Agriculture	1,469.59	9,803.93	12,977.40	14,584.20	16,168.28	16,195.78	16,545.13	19,454.35	19,709.16

Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018), TNERC (2019), Energy Department of Tamil Nadu (2012), Energy Department of Tamil Nadu (2013), Energy Department of Tamil Nadu (2014), Energy Department of Tamil Nadu (2015), Energy Department of Tamil Nadu (2016), Energy Department of Tamil Nadu (2017), Energy Department of Tamil Nadu (2018) and Energy Department of Tamil Nadu (2019)



### Incentivizing the Usage of electricity through Subsidy:

The electricity subsidy allocation for the domestic consumer category is intended to support the economically weak consumers. Assuming<sup>14</sup> that domestic electricity consumption serves as a proxy indicator for the average annual household income, the domestic consumers in Slab I are primarily economically weak consumers and are therefore most in need of the electricity subsidy. As of 2019-20, 33.58% of the domestic consumers come under slab I, accounting for 7.49% of total electricity supplied to the domestic consumer category (TNERC 2019). Unlike the other 3 domestic tariff slabs, there is a decline in the number of consumers, and in the electricity consumption for tariff slab I.

Tariff slab II accounts for 27.42% of the total domestic consumers with a consumption of

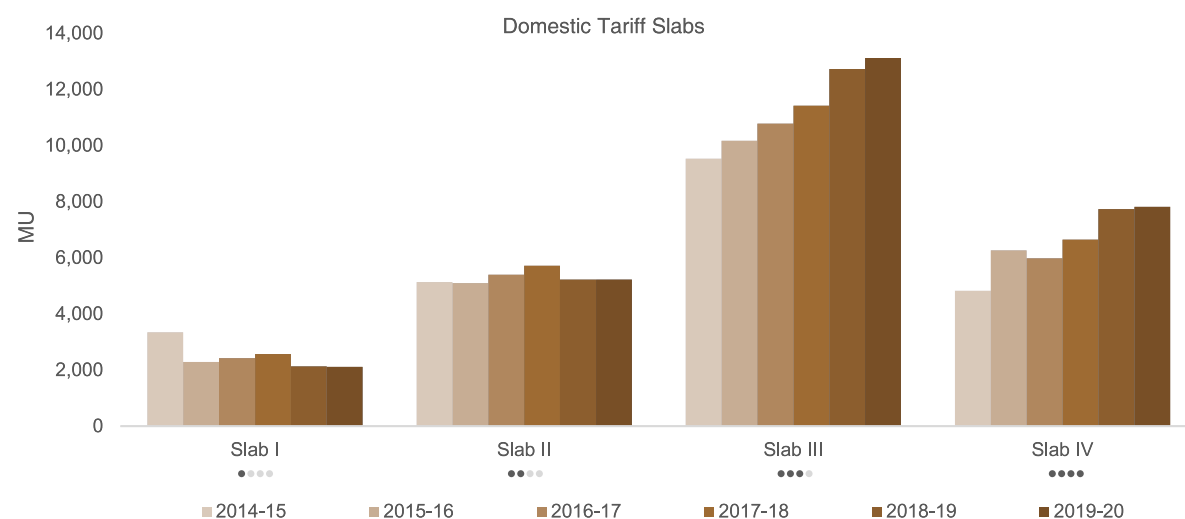
18.47% of total electricity supplied to domestic consumers. The units of electricity supplied to tariff slab II consumers remained flat over the years while the number of consumers shows a general increase from 2014-15 till 2019-20.

Tariff slab III accounts for 31.81% of total domestic consumers with 46.39% of the electricity supplied to the domestic category. Both the consumption and the number of consumers of tariff slab III are on a clear upward trend (Refer Figure 12 and Figure 13).

Tariff slab IV accounts for 7.19% of the total domestic consumers and 27.65% of total domestic electricity consumption.

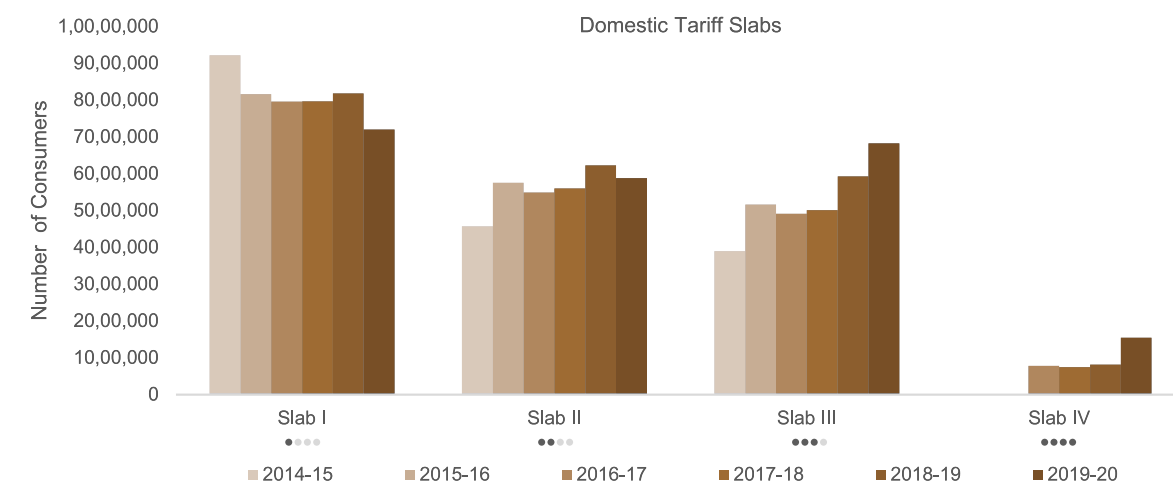
These data show an increasing trend in both the number of consumers and the total electricity consumption from 2014-15 to 2019-20 for slabs II, III and IV.

Figure 12: Total Consumption in MU of the Domestic slabs from 2014-15 to 2019-20.



Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

Figure 13: Number of consumers of the Domestic slabs from 2014-15 to 2019-20.



Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

Tariff slabs I, II, III and IV account respectively for 17.22%, 35.30%, 39.95% and 7.53% of the total subsidy allocation by the State Government for FY 2019-20. The highest subsidy allocation by the State Government goes to tariff slab III with INR 1227.84 Crore which is also the most electricity consuming slab in the domestic consumer category with an increasing number of consumers. After tariff slab III, the subsidy allocation is followed by tariff slabs II and I with respectively INR 1084.95 Crore and INR 529.39 Crore for FY 2019-20.

Tariff slab IV consumers receive the least cumulative subsidy of INR 231.31 Crore (Refer Figure 14). This is understandable, considering that a major part of energy consumption by these consumers is above the 250 kWh threshold, above which there is no State Government subsidy.

Consumers in tariff slab I receive 17.22% of the total State Government subsidy for domestic consumers. These consumers get the first 100 kWh per billing cycle of two months free of charge.

### Increase in subsidy with reduction in cross-subsidy:

In terms of average annual subsidy of energy charges allocation by slab per consumer for FY 2019-20, consumers in tariff slabs I, II, III, and IV receive respectively INR 735.16, INR 1,845.47, INR 1,800.09, and INR 1,500.06. These numbers show that domestic consumers in tariff slab II

receive the highest subsidy per annum followed by consumers in tariff slabs III, IV, and I. In the previous financial years, that is from FY 2014-15 up until FY 2018-19, slab III received the highest subsidy per annum (Refer to Figure 15).

Subsidy allocated to consumers in tariff slabs II and III is more than twice as that for consumers in tariff slab I. The objective of State Government subsidies is to support low energy consuming residents. This is achieved as far as tariff slab I is concerned. At the same time, the subsidy distribution is favouring the higher consumption segment under tariff slabs II and III. If the current trend of an increase in consumers in both the tariff slab II and III categories continues, the total subsidy for these consumer categories will keep increasing.

The first 100 kWh of consumption is free for all domestic consumers for each bi-monthly billing cycle. In the case of domestic tariff slabs II and III there is additionally a tariff subsidy on the energy that needs to be paid for. Consumers in these two tariff slabs therefore enjoy a higher benefit.

Government of India is trying to dissuade States from providing free power. The Ministry of Power communicated in 2016 that providing free electricity is not desirable as it encourages wasteful consumption of electricity (Ministry of Power 2016).

<sup>14</sup> As per a recent study only 5% of the population in India owns Air Conditioning units (Siva Kumar 2017) which correlates to 7% of service connections in Tamil Nadu consuming more than 500 units bi-monthly as in FY 2019 (TNERC 2019). Hence the consumers using below 100 units per month are assumed to be economically backward as they could not afford Air Conditioning units.



### 3. HIGH TENSION CATEGORY

Consumers falling in to the category of High Tension (HT) are those who are connected to voltage levels of 11 kV and above. There are 7 consumer categories under HT (Refer to Annex 2). HT electricity consumption accounted for 21% to 26% of the total consumption from 2011-12 till 2017-18. The relatively higher energy charges for HT consumers are partially cross-subsidizing the lower energy charges of some LT consumer categories. This chapter deals with the trend of HT energy charges, their trend in terms of TANGEDCO's net revenue from sales, and the question of migration of HT consumers to purchasing power from third parties through open access.

energy charges for HT-V (temporary supply) and HT-III (Commercial) consumer categories have been consistently above ACoS TNERC and ACoS P&L. While the remaining HT categories (HT I-A, I-B, II-A, and IV) are above the ACoS TNERC since FY 2014-15 but are consistently below the ACoS P&L (Refer to Figure 16). If fixed and energy charges were to be considered the billing rates per kWh for all 7 HT categories are higher than ACoS P&L.

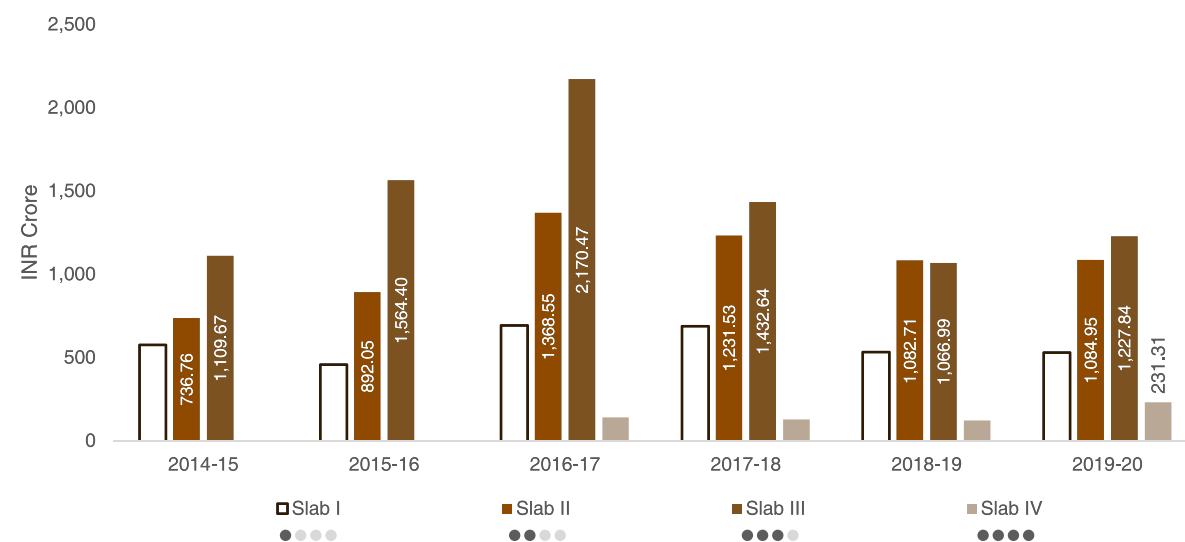
The CAGR for most HT energy charges is found to be between 2.25% and 2.50%. On the higher side, categories such as HT II-A (Govt. and Govt. aided Educational Institutions and hostels, etc.) increased at an average of 5.91% and HT IV (Lift Irrigation societies for Agriculture) at CAGR of 10.44%. ACoS TNERC grew at an average of 2.69% per year whereas ACoS P&L grew at a rate of 2.71% per year. This shows that the energy charges of categories under HT are on par or above the ACoS TNERC and ACoS P&L which ensures the recovery of the cost of supply (Refer to Figure 17).

#### 3.1 Trend of HT- energy charges

##### Energy charges levied on HT recover the cost of supply

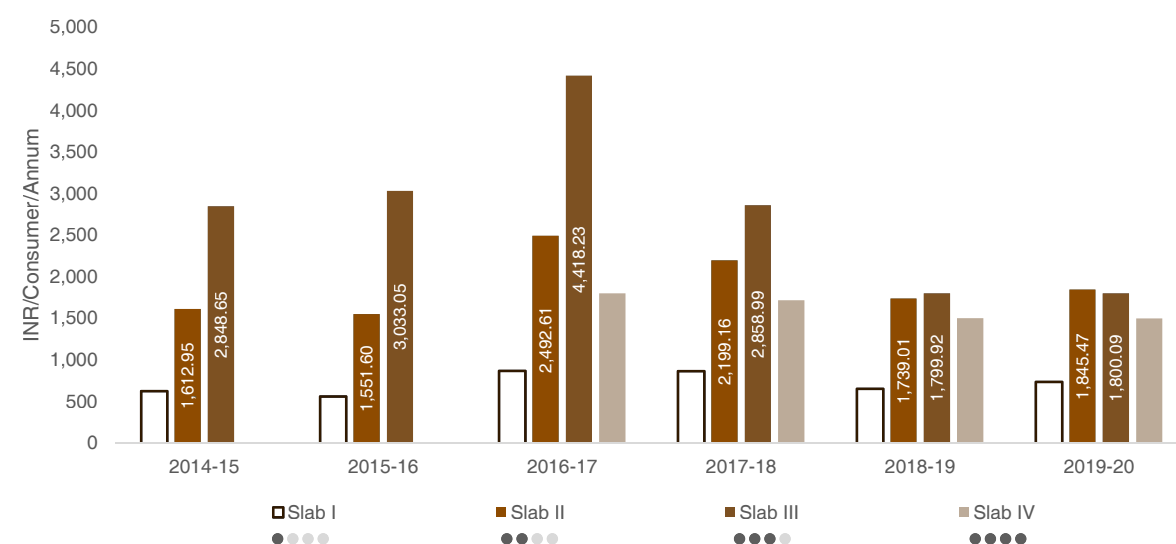
In the 2014 tariff revision process, tariffs for the HT categories were increased. This reduced the gap between the energy charges and the cost of supply. From FY 2012-13 to FY 2017-18 the

Figure 14: Subsidy on energy charges granted to the Domestic slabs from 2014-15 to 2019-20.



Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

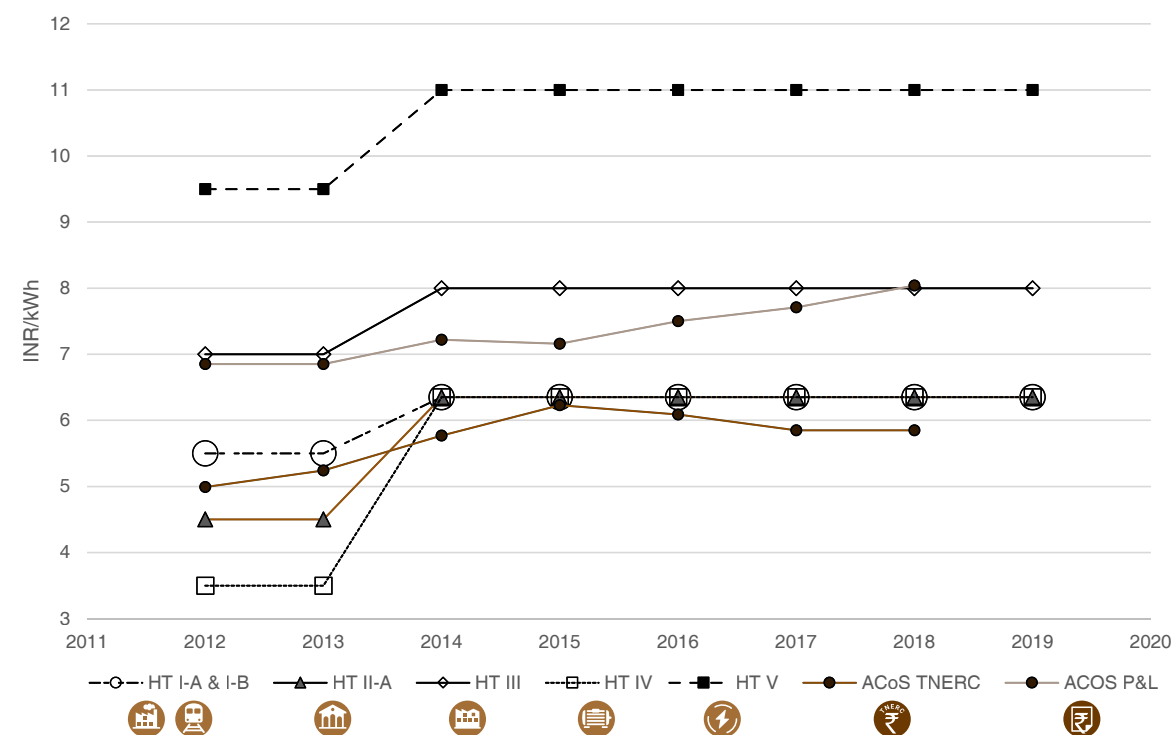
Figure 15: Subsidy on energy charges per Consumer in the slabs of Domestic from 2014-15 to 2019-20.



Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019)

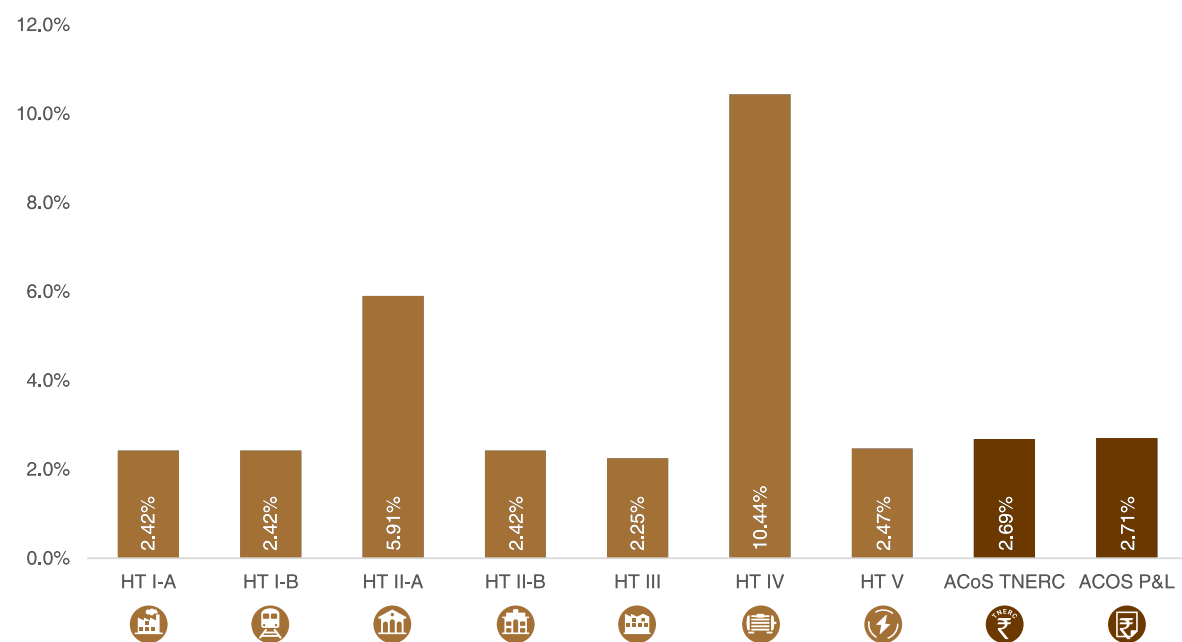


Figure 16: Trend of energy charges and ACoS for FY 2011-12 to FY 2018-19 in INR/kWh.



Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

Figure 17: CAGR of the energy charges in %



Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

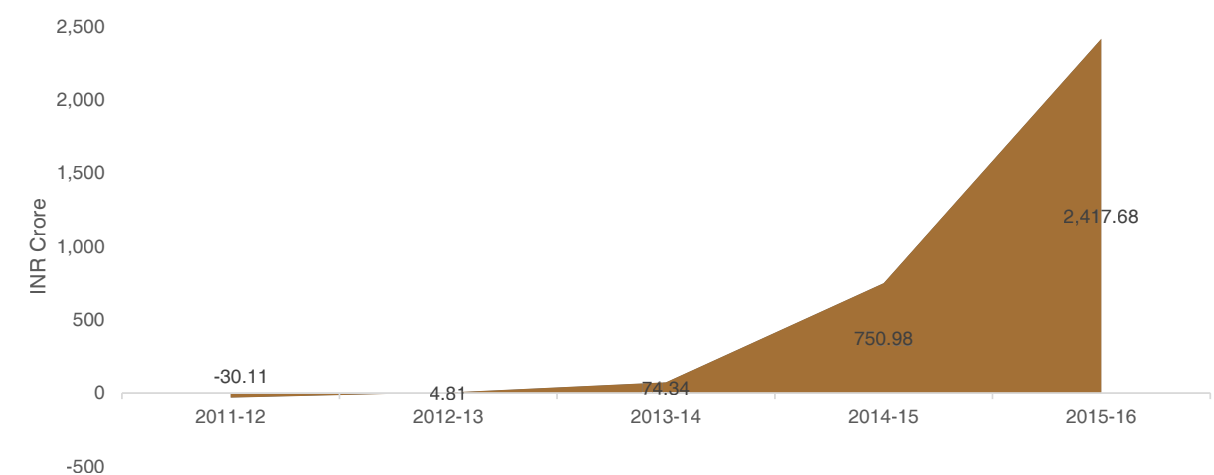
### 3.2 Revenue from Sales:

#### Tariff revision in 2014 set the course to net revenue from HT

The net revenue from sales, including demand charges, of HT consumers increased from INR 74.34 Crore in FY 2013-14 to INR 750.98 Crore in FY 2014-15 and then to INR 2417.68 Crore (Refer to Figure 18). On an HT consumer category level

it can be inferred that HT-III (Commercial and all other categories) and V (Temporary) resulted in a net revenue gain to TANGEDCO from FY 2011-12 to FY 2015-16 (Refer to Figure 19). Meanwhile, the HT IV (Lift irrigation) category is fully subsidized by the Government of Tamil Nadu. On account of the 2014 tariff revision, net revenue from sales for all HT categories, except HT IV, are positive from FY 2015-16 onwards.

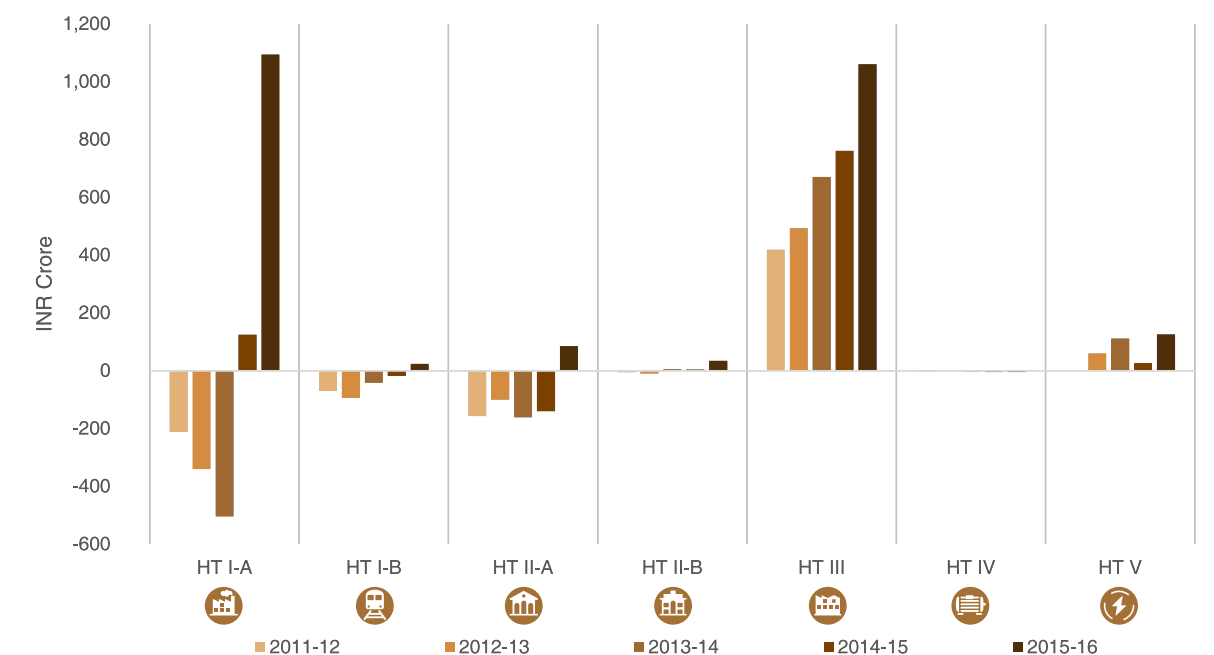
Figure 18: TANGEDCO net revenue from sales to HT.



Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a).

Comment: These figures were determined from the difference between ACoS P&L and the revenue from sales for all HT units supplied in the respective FYs. The total revenue from sales mentioned in the tariff orders include both the demand/fixed charges and the revenue from the energy charges.

Figure 19: Net Revenue from sales of Categories under HT from FY 2011 to 2016 (in INR Crore)



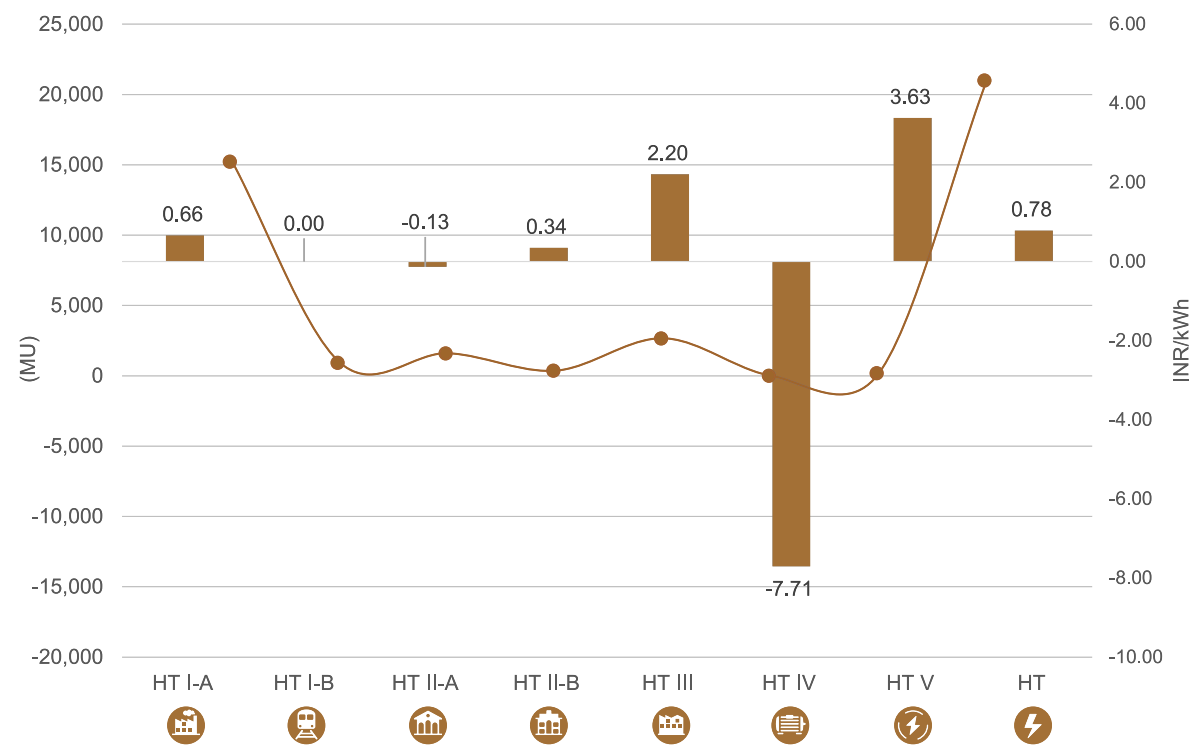
Source: India Research and Ratings (2014), TNERC (2012a), TNERC (2013a), TNERC (2014) and TNERC (2017a)

Comment: These figures were determined from the difference between ACoS P&L and the revenue from sales for all HT units supplied in the respective FYs. The total revenue from sales mentioned in the tariff orders include both the demand/fixed charges and the revenue from the energy charges.

Based on TNERC's (TNERC 2017a) estimate<sup>15</sup> in FY 2017-18. TANGEDCO's net revenue from electricity supply to HT may have resulted in gains to TANGEDCO at an average of INR 0.79 /kWh

in FY 2017-18. TANGEDCO's net revenue from sales to the respective HT consumer categories per kWh is shown in Figure 20.

Figure 20: TANGEDCO's revenue losses/gains from sales per kWh from HT consumer categories for FY 2017-18



Source: TNERC (2017a) and TNERC (2017b)

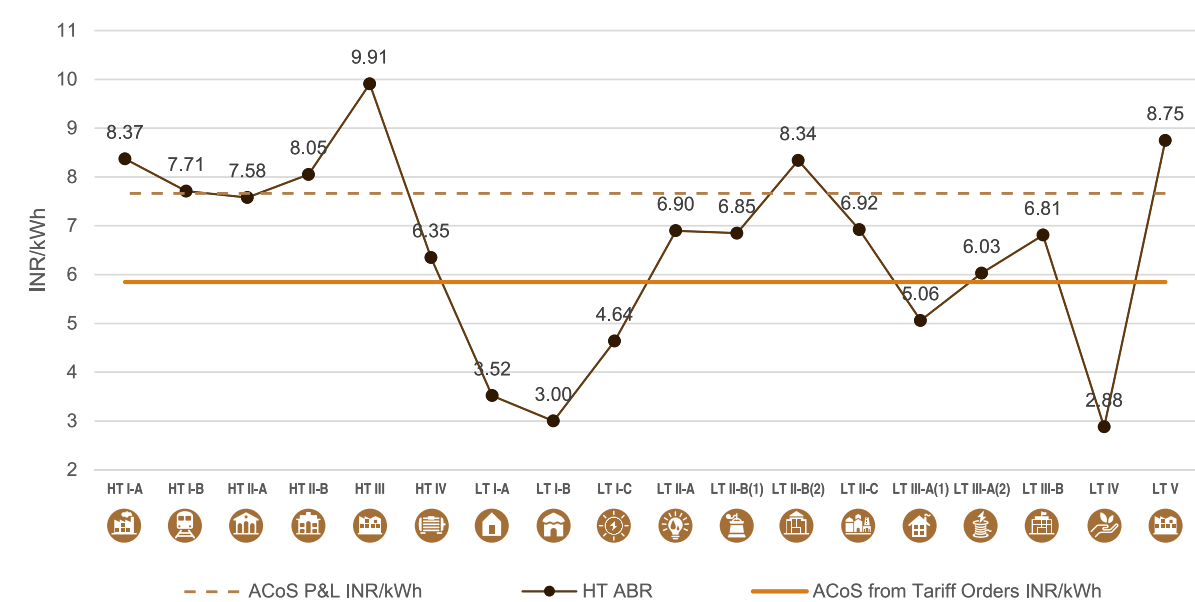
3.3. HT Consumers Cross-Subsidizing LT Consumers

In order to visualize the extent to which HT consumers cross-subsidize LT consumers, ABR (average billing rate) of LT and HT consumer categories are compared to ACoS TNERC and ACoS P&L. ABR includes demand/fixed charges and tariff collected by TANGEDCO (Refer to Figure 21). The ABR for all HT consumer categories, except for HT IV (lift irrigation societies for agriculture), is either near or above ACoS P&L and therefore creating a net revenue gain to TANGEDCO. While the ABRs of all LT categories, except for LT Commercial and LT temporary connections, fall below the ACoS P&L and below ACoS TNERC, resulting in a net loss for TANGEDCO.

As per the true-up data on revenue from total electricity sales in FY 2015-16, HT consumers contribute 42% of the total revenue while this category represents only 0.03% of the total TANGEDCO consumer base (electrical service connections). LT consumers contribute 58% of TANGEDCO's revenue and represent 99.7% of the consumer base. A single HT consumer generates INR 1.74 crores per annum while an LT consumer generates INR 7,157 (Refer to Figure 22).

HT consumers are less in numbers and accounted for 25.69% of total electricity consumption in FY 2017-18 (TNERC 2017a). Losing these high-value consumers is of serious concern to TANGEDCO. Relying on the HT consumers to cross-subsidize LT consumers is a risk to TANGEDCO. The trend in the number of HT consumers is given in Figure 23.

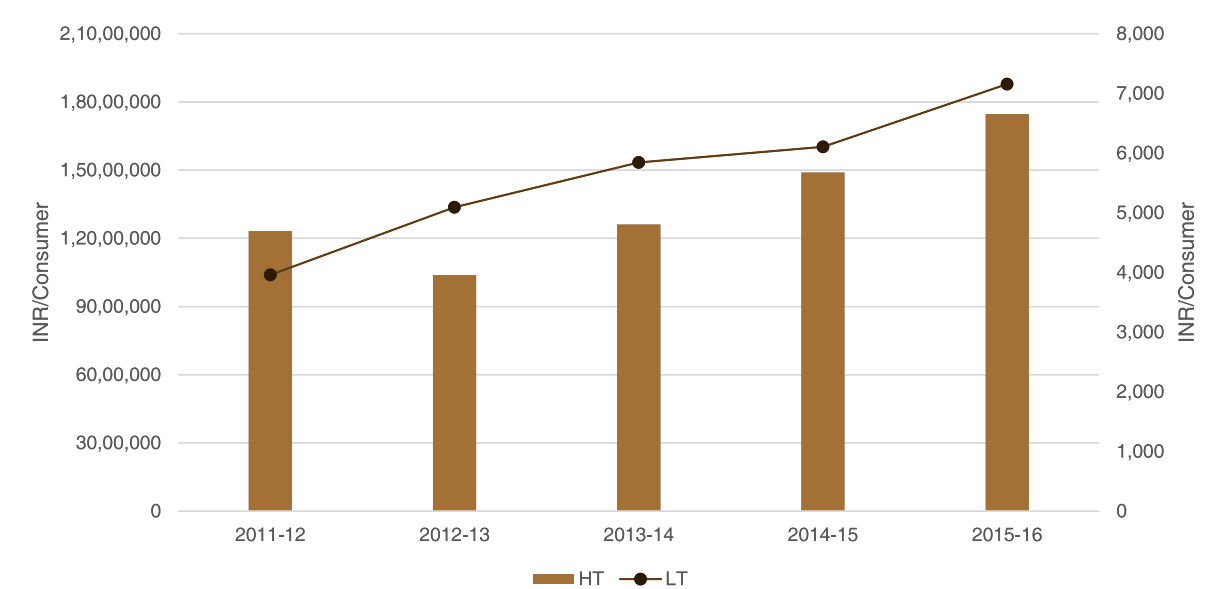
Figure 21: Average Billing Rates of categories falling under LT and HT.



Source: TNERC (2017a)

<sup>15</sup> This particular calculation is based on the commission's approved total revenue from sales, since the trued-up data on total revenue from sales for 2017-18 is not yet available.

Figure 22: Revenue from Total Sales per HT and LT Consumers



Source: TNERC (2012a), TNERC (2013a), TNERC (2014), TNERC (2017a), Energy Department of Tamil Nadu (2012), Energy Department of Tamil Nadu (2013), Energy Department of Tamil Nadu (2014), Energy Department of Tamil Nadu (2015), Energy Department of Tamil Nadu (2016) and Energy Department of Tamil Nadu (2017)

The CAGR of HT electricity consumption from TANGEDCO declined from FY 2013-14 till 2015-16 (Refer to Figure 24). In FY 2012-13, a clear dip in electricity consumption across all the consumer categories (HT and LT) can be observed (Refer to Figure 24). Both LT and HT consumption rates from TANGEDCO are decreasing, however, HT consumption decreases steeply.

In FY 2015-16 TANGEDCO's average revenue from HT sales is INR 8.66 /kWh which is 231% more than the average revenue from LT sales of INR 3.74 /kWh. This shows the importance of the revenue contribution from the HT category. From FY 2011-12 to FY 2015-16 the CAGR of energy consumption for LT is 6.45%, while that of HT is 4.32%. For the same time period, CAGR of total revenue from LT sales is 20.50%, while that of HT is 14.90%.

The lower CAGR in revenue and consumption of HT consumers from TANGEDCO compared to the CAGR of LT consumers is a contributing factor to TANGEDCO's poor financial performance. Multiple variables contributing to the slow growth of HT consumptions from TANGEDCO may include:

- (i) Comparatively high HT tariff resulting in a migration of some industries to other States with more competitive tariffs,
- (ii) HT consumers are becoming open access consumers and procure (renewable energy) at more competitive rates from third parties,
- (iii) HT consumers installing rooftop solar energy systems<sup>16</sup>.

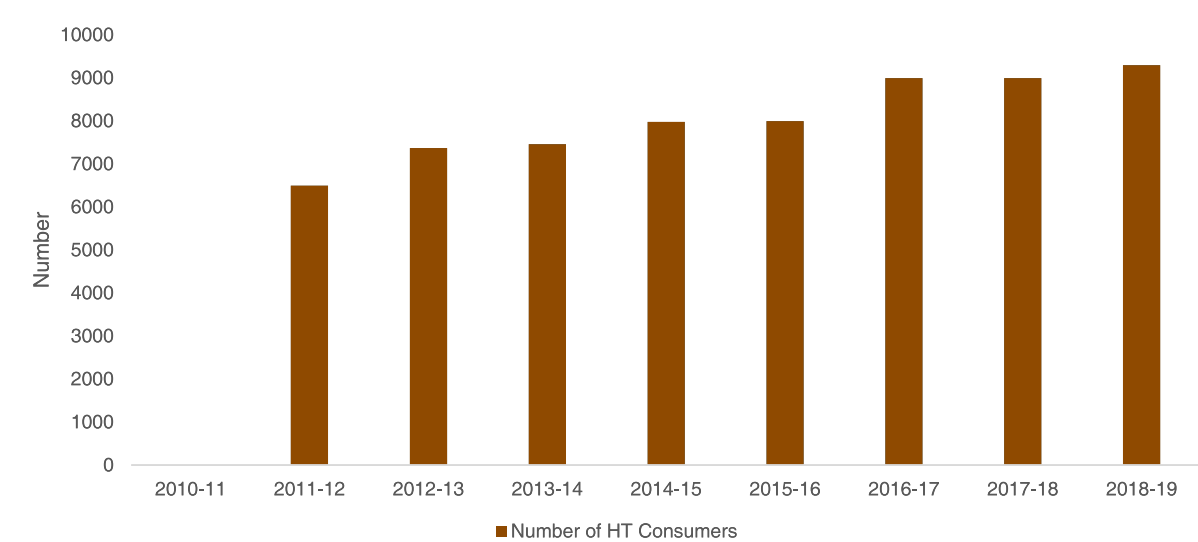
In order to ensure the mid- and long-term financial health of TANGEDCO tariff rationalization will have to be implemented. Rationalization of tariffs which can check the imbalances of cross-subsidization should be implemented immediately. As a delay of the same might result in a tariff shock.

Eventually, the State may have to move towards having only three tariffs, which are based on the voltage level of the service connection<sup>17</sup>. There could be a tariff for all LT consumers, a tariff for HT consumers with a connection voltage below 110KV and a tariff for HT consumers connected at 110KV or higher. The higher the connection voltage, the lower would be the tariff since distribution losses for TANGEDCO are lower

when the service connection voltage is higher. Each of these three tariffs would have to cover the actual cost of supply of TANGEDCO so that cross-subsidies are not required.

Consumer categories in need of subsidy can be supported by the State Government with a Direct Benefit Transfers (DBT) system or other suitable mechanism. Consumers who are eligible for free power or subsidised power under State Government policies, would still enjoy these benefits but without causing financial distress to TANGEDCO. A gradual approach to a three tariff system can be taken, in which all cross-subsidies are phased out within a clearly defined time frame.

Figure 23: Number of HT consumers FY 2010-11 to 2018-19.



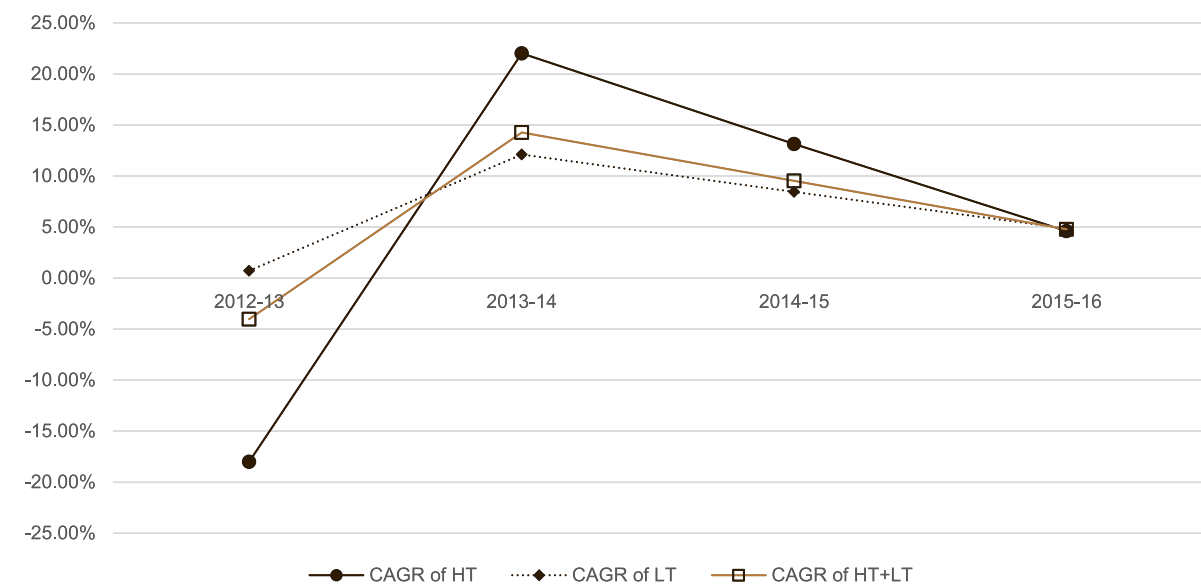
Source: TNERC (2012a), TNERC (2012b), TNERC (2013a), TNERC (2013b), TNERC (2014), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017a), TNERC (2017b), TNERC (2018), TNERC (2019), Energy Department of Tamil Nadu (2012), Energy Department of Tamil Nadu (2013), Energy Department of Tamil Nadu (2014), Energy Department of Tamil Nadu (2015), Energy Department of Tamil Nadu (2016), Energy Department of Tamil Nadu (2017), Energy Department of Tamil Nadu (2018) and Energy Department of Tamil Nadu (2019)

<sup>16</sup> No data is available in the public domain pertaining to the migration of industries to other States on account of higher electricity tariff or on the reduction in electricity supply on account of rooftop solar.

<sup>17</sup> Europe has made a progress in energy efficiency (European Environmental Agency 2019), and the European nations tend to have a simplified list of consumer and tariff categories such as Households, Industry, Commerce and Transport (BDEW 2019) (European Environmental Agency 2017).



Figure 24: CAGR of LT and HT electricity consumption in %



Source: TNERC (2012a), TNERC (2012b), TNERC (2013a), TNERC (2013b), TNERC (2014), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017a), TNERC (2017b), TNERC (2018), TNERC (2019), Energy Department of Tamil Nadu (2012), Energy Department of Tamil Nadu (2013), Energy Department of Tamil Nadu (2014), Energy Department of Tamil Nadu (2015), Energy Department of Tamil Nadu (2016), Energy Department of Tamil Nadu (2017), Energy Department of Tamil Nadu (2018) and Energy Department of Tamil Nadu (2019)

#### 4. CLASSIFICATION OF COSTS AND RECOVERY OF ARR

The Aggregate Revenue Requirement (ARR) is the annual revenue requirement of the Discom, for recovery of its expenses through electricity tariffs. The ARR consists of power purchase expenses and distribution costs (TNERC 2017a) (Feedback Infra 2013). The power purchase expenses on one hand have costs that are both variable and fixed in nature, while the distribution costs are only fixed in nature. Fixed cost of power purchase are the fixed cost of generation function

and transmission cost whereas the variable costs include cost of generation, power purchase from renewable and other sources.

All the costs of power purchase and distribution are consolidated into variable and fixed costs (Refer to Table 6). With respect to the recovery of these costs, the variable cost is to be recovered from the energy charges<sup>18</sup>, while the fixed costs are to be recovered from fixed/demand charges.<sup>19</sup>

Table 6: Classification of costs and recovery

S. No	Classification of Costs	Nature of Costs	Recovery through
1	Power Purchase Expenses		
1.1	Fixed Cost of Generation Function <sup>20</sup>	Fixed	Demand/Fixed Charges
1.2	Variable Cost of Generation <sup>21</sup>	Variable	Energy Charges
1.3	Power Purchase of Renewable and Other sources	Variable	Energy Charges
1.4	Transmission Cost (PGCIL, TANTRANS-CO & SLDC )	Fixed	Demand/Fixed Charges
2	Distribution Costs <sup>22</sup>	Fixed	Demand/Fixed Charges
3	Net ARR (Power Purchase Expenses + Distribution Cost)		

Source: (TNERC 2017a) (Feedback Infra 2013) (CERC 2018)

<sup>18</sup> This could also be substantiated by the statement from (CERC 2018): “The energy charges represent the equivalent cost of fuel paid by the end consumer coupled with operational efficiency. It comprises the ex-mine cost of coal, taxes & duties on coal, transportation cost, losses of transmission, and distribution network. Fixed charges involve the equivalent cost of infrastructure paid by the end consumer comprising of the cost of generating station infrastructure, transmission network, and distribution network.”

<sup>19</sup> It is clarified that the Demand Charges are levied to recover a part of the fixed costs of TANGEDCO. Only the variable cost of generation and power purchase is variable in nature, and the balance, which contributes around 50% of TANGEDCO’s ARR is fixed in nature.

<sup>20</sup> The fixed cost of the generation function is related to capital investment and the fixed costs for power generation.

<sup>21</sup> The variable cost of generation is the fuel cost.

<sup>22</sup> The fixed cost of the distribution function is the fixed cost incurred on the creation and maintenance of basic infrastructure facilities for distributing electricity to consumers.



### Recovery of Fixed Costs from Fixed/Demand charges

Fixed costs incurred by TANGEDCO from FY 2011-12 to FY 2018-19 are published in the respective TNERC tariff orders. TNERC calculates the fixed/demand charges that can be levied by TANGEDCO as 19% of the total revenue from sales<sup>23</sup>. In FY 2017-18, the total fixed cost of TANGEDCO was INR 1.93 /kWh whereas the fixed/demand charges collected were INR 0.96 / kWh (Refer to Figure 25). Therefore fixed/demand charges collected recover lesser than the fixed cost incurred. This applies for all FY, from FY 2011-12 till FY 2018-19. The current fixed/demand charges levied may require a rationalization to recover the actual fixed costs incurred.

### Recovery of Variable Costs from Energy Charges:

The variable costs are under-recovered from FY 2011-12 up until FY 2015-16 and also in FY2018-19<sup>24</sup>, but slightly over-recovered in FY 2016-17 and FY 2017-18. This is visible from the trend of the gap between the net-ARR and the total recovered charges for the corresponding years (Refer to Figure 25 and Figure 26).

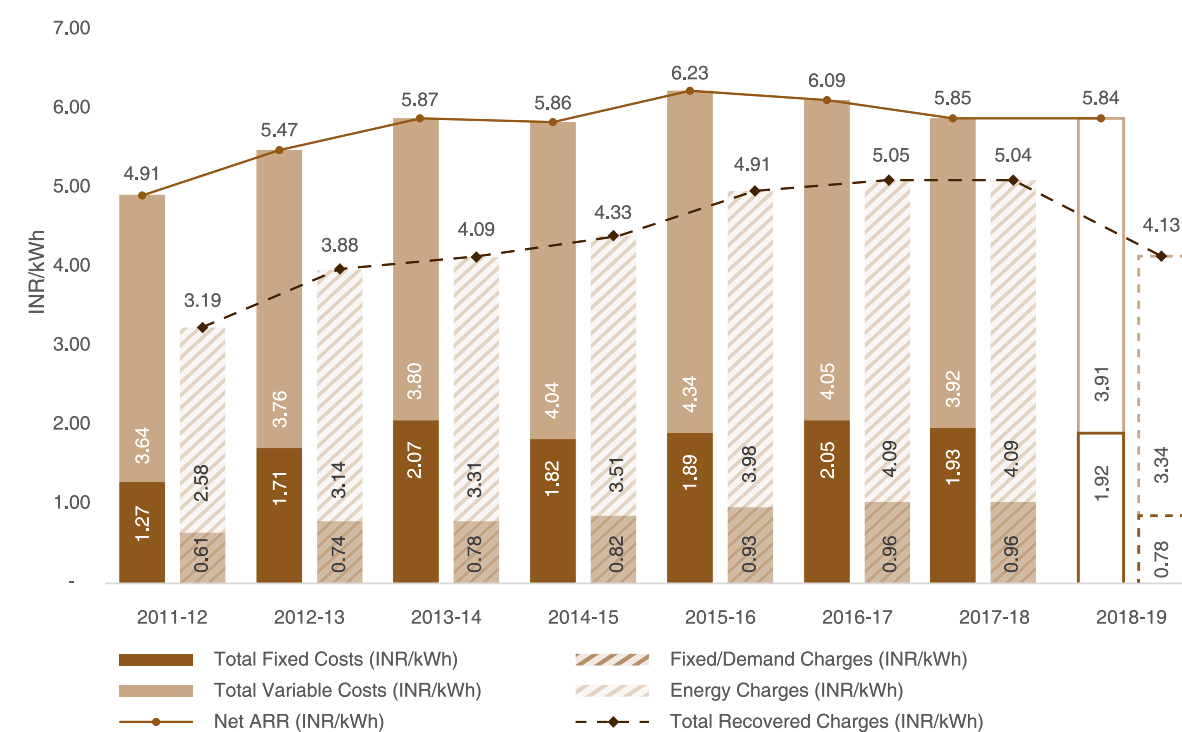
The reasons for the increasing trend in the recovery of variable costs in FY 2016-17 and FY 2017-18 are the following:

- The increase in the energy charges levied for most of the categories in the tariff order of 2014.
- The proportionally higher CAGR in the consumption of higher energy charges paying categories in comparison to the low

CAGR in consumption of the low energy charges paying categories, in particular, so agriculture. Between FY 2011-12 and FY 2017-18, the CAGR of consumption of higher energy charges paying categories such as HT IA Industries, HT IIB Private Educational Institutions, HT III Commercial, LT IIB Coffee grinding and other Industries and LT V Commercial are 8.03%, 8.24%, 6.23%, 13.79%, and 12.71% respectively. On the low consumption side, the LT IV Agriculture has a CAGR of consumption of 1.69%. All the higher energy charges paying categories mentioned above consume 44.33% of the total energy consumption for the FY 2017-18, while the LT IV agriculture accounted for 13.69% of the total energy consumption in the same year.

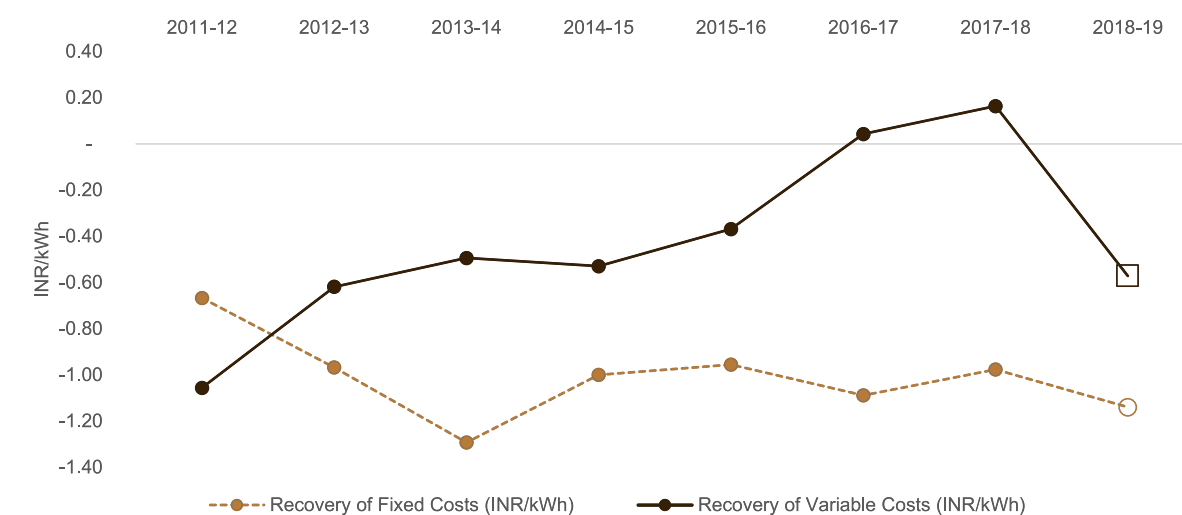
To summarize, in none of the years analysed was TANGEDCO able to recover its ARR<sup>25</sup>. There is a consistent under-recovery of the fixed costs for all the years from FY 2011-12 up until FY 2018-19. The variable cost was under-recovered for the years between FY 2011-12 and FY 2018-19, except for FY 2016-17 and FY 2017-18 where there was an increasing trend in the recovery of the variable cost leading to a slight over-recovery (Refer Figure 26).<sup>26,27</sup>. This clearly indicates the importance of annual tariff revisions and an increase in fixed/demand charges in order for TANGEDCO to be able to recover its ARR.

Figure 25: The total fixed and variable costs incurred against the recovery of fixed and energy charges



Source: TNERC (2017a)

Figure 26: Recovery of Fixed and variable costs



Source: TNERC (2017a)

<sup>23</sup> This is an estimated amount since the actual amount of fixed/demand charges collected by TANGEDCO is not available in the public domain for FY 2018-19.

<sup>24</sup> Since there is no data available on the total revenue from sales for the FY 2018-19, an extrapolated value is used to determine the recovered charges. Nevertheless, the recovery of energy charges is likely to reduce in FY 2018-19.

<sup>25</sup> TANGEDCO's total expenditure for delivering the electricity is higher than the ARR filed by TNERC. The total revenue from sales falls more in short of recovering TANGEDCO's expenditure.

<sup>26</sup> The trued-up values available for this study are only up until FY 2015-16. The commission approved values of ARR and total revenue are used for FY 2016-17 and FY 2017-18. Hence, the conclusion might vary after the trued-up values are published by TNERC.

<sup>27</sup> This statement is based on the estimated data on the total revenue from sales for the FY 2018-19 and not based on the commission approved data or a trued-up value.



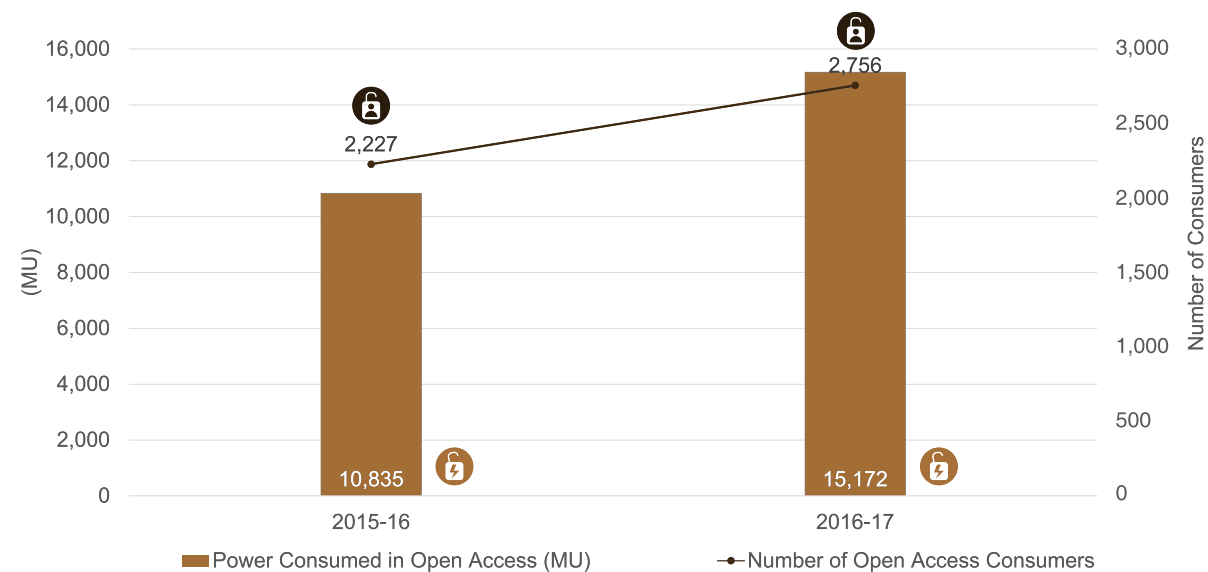
## 5. MIGRATION TO OPEN ACCESS

### High tariff for HT consumers result in migration to Open Access

High tariff levied on HT Commercial and industrial electricity consumers urged some of these consumers to move away from TANGEDCO and to procure their electricity demand via the Open Access market and captive generation. In the absence of a decisive tariff rationalization, a continuation of a trend of commercial and industrial consumers moving to alternative electricity procurement mechanisms can be expected. In this case TANGEDCO's losses are expected to further increase.

The total number of open access consumers in FY 2015-16 was 2,227, this number increased to 2,756 in the following financial year (TNERC 2017c). Also the number of units consumed increased from 10,835 MU in FY 2015-16 to 15,172 MU in 2016-17 (Refer Figure 27). The percentage wise consumption of HT open access consumers on total HT consumption in the State is 40.17% in FY 2015-16 and 46.00% in FY 2016-17 respectively. Though open access consumption data for other years are not available in the public domain, we could see an increase in consumption through open access.

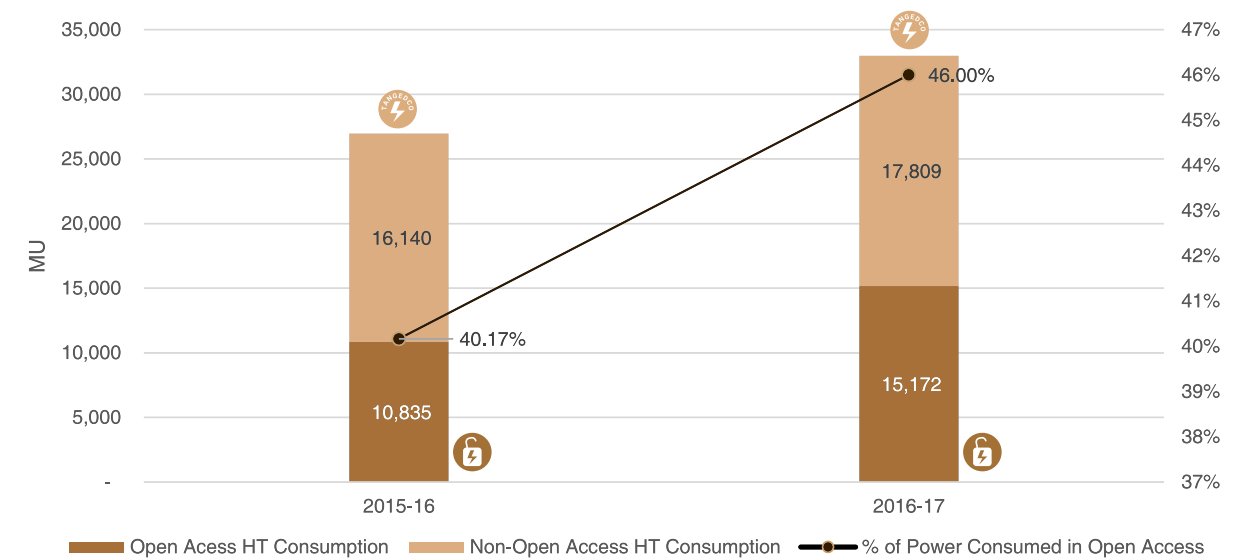
Figure 27: Number of consumers and Consumption of power through Open Access.



Source: TNERC (2017c)

Disclaimer: The data on open access consumption and consumers is available only for the FY 2015-16 and FY 2016-17 in public domain. The same data is not available for the previous and subsequent years.

Figure 28: % of power consumption in Open Access with respect to total HT consumption.



Source: TNERC (2017c)

Disclaimer: The data on open access consumption and consumers is available only for the FY 2015-16 and FY 2016-17 in public domain. The same data is not available for the previous and subsequent years.





## 6. KEY INSIGHTS

- For all the categories under LT, except for Commercial and Temporary supply, TANGEDCO incurs a net revenue loss on the supply of electricity. The expected future increase in LT electricity consumption would therefore further increase TANGEDCO's revenue gap.
- Agriculture and domestic consumers receive 93% of the total energy subsidy by the Government of Tamil Nadu.
- The domestic and agriculture segments combined account for 45.96% of the total electricity consumption in FY 2017-18. The respective ABRs in the FY 2017-18 for domestic and agriculture are INR 3.52 /kWh and INR 2.88 /kWh, which represent only 45.65% and 37.35% of TANGEDCO's ACoS P&L.
- In FY 2017-18, the domestic and agriculture categories combined contributed to a 98.58% of TANGEDCO's total LT revenue net loss.
- The energy charges of the first three domestic tariff slabs have reduced since 2017, while the total electricity supplied has increased thereby increasing TANGEDCO's net revenue losses.
- The subsidy provided for agriculture increased more (at a CAGR of 10.29%) than the cost of supply (CAGR of 2.71%), thereby slightly reducing TANGEDCO's net revenue losses for this consumer category.
- With the current tariff and subsidy policy for domestic consumers, higher electricity consumption is incentivized. Tariff slab II and III consumers receive a higher per service connection subsidy allocation per year as compared to tariff slab I consumers. If the purpose of electricity subsidy is to benefit consumers in need, a redesign of the energy subsidies may need to be considered.
- Since the 2014 tariff revision, the energy charges of all HT categories increased disproportionately to energy charge changes for LT categories. This resulted in a net revenue from all the HT categories. Of the total number of consumers 0.03% generates 42% of the revenue while 99.7% generates 58% of the revenue. The high revenue generating consumers are in the HT category.
- Since the fixed/demand charges collected do not recover the fixed costs incurred, there needs a rationalization on the fixed/demand charges levied. The energy charges could recover the variable costs only in the financial years such as FY 2016-17 and FY 2017-18. This is due to the increasing consumption of the high energy charges paying categories leading to higher revenues per average unit sold. But again, in FY 2018-19, the energy charges are unable to recover the variable costs. This indicates the importance of annual tariff revisions.
- Electricity consumption through open access as a percentage of total HT consumption in the State increased from 40.16% in FY 2016-16 to 46.00% in FY 2016-17.



## 7. CONCLUSION

The present system of tariff subsidies (cross subsidies and Government subsidies) results in TANGEDCO having to sell power below cost of supply. The omission of annual tariff revisions adds to the financial problems of TANGEDCO. Cross subsidies also result in high-end consumers (those who pay higher tariffs) to look for other options including captive renewable energy generation and purchase of power from third parties through the open access facility. Clearly the present system is not sustainable.

The Indian Electricity Act, 2003 (EA '03) 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 also, 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. (Ministry of Power 2006) states while fixing tariff for agricultural use, the imperatives of the need of using ground water resources would also need to be kept in mind in addition to the cost of supply. There is a need to install meters for all the agricultural consumers and also reduce their tariff subsidy in order to conserve ground water.

Similarly, the National Tariff Policy 2016 under section 8.3 recommends that 'subsidies should be targeted effectively and in a transparent manner'.

As a substitute for cross-subsidies, the State Government has the option of raising resources through the mechanism of electricity duty and giving direct subsidies to only needy consumers. The commission is responsible to prepare a road map in such a way that tariffs are brought within  $\pm 20\%$  of the average cost of supply. The road map would also have intermediate milestones, based on the approach of a gradual reduction in cross-subsidy. The recent draft amendments to the Tariff Policy suggested the introduction of a direct benefit transfer (DBT) and a voltage based tariffs (Ministry of Power 2016).

There has been some degree of tariff rationalisation in the HT category. There are still seven tariff categories but only three tariff rates of which one is for temporary supply. But there is still a long way to go in phasing out cross-subsidy and replacing tariff subsidy with an alternative system of (direct) subsidy delivery to the beneficiaries. These measures are also needed to retain high revenue yielding HT consumers. Rational tariff setting and direct subsidy delivery to beneficiaries are essential to improve the financial health of TANGEDCO.

There needs to be a revision in the tariffs in such a way that the ARR is collected back with the revenue. This could be ensured by recovering the fixed costs incurred through fixed/demand charges and variable costs through energy charges.



- Assessing The Impact of Tamil Nadu's Electricity Tariff Policies on TANGEDCO's Financial Performance



## 9. ANNEXURES

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### Annex 1: Abbreviations

<b>ARR</b>		Aggregate Revenue Required / Average Revenue Required
<b>ACoS</b>		Average Cost of Supply
<b>ABR</b>		Average Billing Rate
<b>CAGR</b>		Compound Annual Growth Rate
<b>CoS</b>		Cost of Supply
<b>DISCOM</b>		Distribution Company
<b>FY</b>		Financial Year
<b>HT</b>		High Tension
<b>INR</b>		Indian Rupee
<b>kWh</b>		Kilowatt Hours
<b>LT</b>		Low Tension
<b>OA</b>		Open Access
<b>PPA</b>		Power Purchase Agreement
<b>P&amp;L</b>		Profit and Loss
<b>MU</b>		Million Units of Electricity
<b>TANGEDCO</b>		Tamil Nadu Generation and Distribution Corporation Limited
<b>TNERC</b>		Tamil Nadu Electricity Regulatory Commission

### Annex 2: Table of tariff schedule

<b>HT I-A</b>		High Tension Tariff I A	Industries, Registered factories, Textiles, Tea estates, IT services, and start-up power provided to generators, etc.
<b>HT I-B</b>		High Tension Tariff I B	Railway Traction
<b>HT II-A</b>		High Tension Tariff II A	Govt. and Govt. aided Educational Institutions and hostels, Government Hospitals, Public Lighting and Water supply, Actual places of public worship etc.
<b>HT II-B</b>		High Tension Tariff II B	Private Educational Institutions & Hostels
<b>HT III</b>		High Tension Tariff III	Commercial and all other categories of consumers not covered under HT-I-A, I-B, II-A, II-B, IV and V



<b>HT IV</b>	 High Tension Tariff IV	Lift Irrigation societies for Agriculture registered under Co-op Societies or under any other Act. (Fully subsidised by the Govt.)
<b>HT V</b>	 High Tension Tariff V	HT Temporary Supply for construction and other temporary purposes
<b>LT I-A</b>	 Low Tension Tariff I A	Domestic , Handloom, Old age homes, Consulting rooms, Nutritious Meals Centres etc.
<b>LT I-B</b>	 Low Tension Tariff I-B	Huts in Village Panchayats, TAHDCO etc.
<b>LT I-C</b>	 Low Tension Tariff I-C	Bulk Supply
<b>LT II-A</b>	 Low Tension Tariff II-A	Public Lighting and Public Water Supply & Sewerage
<b>LT II-B(1)</b>	 Low Tension Tariff II-B (1)	Govt. Educational Institutions., Hospitals, Water supply etc.
<b>LT II-B(2)</b>	 Low Tension Tariff II-B (2)	Private Educational Institutions, Cinema theatre & Studios
<b>LT II-C</b>	 Low Tension Tariff II-C	Actual place of public worship, Mutts and Religious Institutions
<b>LT III-A(1)</b>	 Low Tension Tariff III-A(1)	Cottage and Tiny Industries
<b>LT III-A(2)</b>	 Low Tension Tariff III-A(2)	Power loom
<b>LT III-B</b>	 Low Tension Tariff III-B	Coffee grinding and Ice factories etc. and Industries not covered under LT Tariff IIIA
<b>LT IV</b>	 Low Tension Tariff IV	Agriculture and Govt. seed farm etc.
<b>LT V</b>	 Low Tension Tariff V	Commercial and all categories not covered under IA, IB, IC, IIA, II B1, II B2, II C IIIA 1, III A2, IIIB and IV
<b>LT VI</b>	 Low Tension Tariff VI	Temp. supply (a) Lighting and combined installations, (b) Lavish illuminations

Source: TNERC (2017a)

September 2020