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Auroville Consulting

IDEAS TO IMPROVE TANGEDCO'S FINANCIAL SITUATION

Subsidies, Profitability, Improvement Levers and New Tariff Design

14 December 2020, Monday | 4:00 PM – 5:30 PM

Image credit: Got Credit/CC

Agenda

Introduction	*Sandhya S, Lead – Energy Transitions, WRI India*
Welcome Remarks	*K Saraswathi, Secretary General, The Madras Chamber of Commerce & Industry (MCCI)*
Overview and context setting	*Harsha Meenawat, Senior Research Specialist, WRI India*
Analysis of TANGEDCO Financials	*S Venkatachalam, Chairman, Energy Committee, MCCI*
KUSUM - C and its benefits in improving financial situation of TANGEDCO	*S Sankara Narayanan, General Manager, TEDA*
Community Solar for Domestic Consumers as an Alternative to Electric Subsidies	*Martin Scherfler, Co-founder, Auroville Consulting*
Challenges and opportunities for TANGEDCO given emerging trends	*Ann Josey, Fellow, Prayas (Energy Group)*
Q&A /Open Forum	Moderated by *Sandhya S, WRI India*
Closing Remarks	WRI

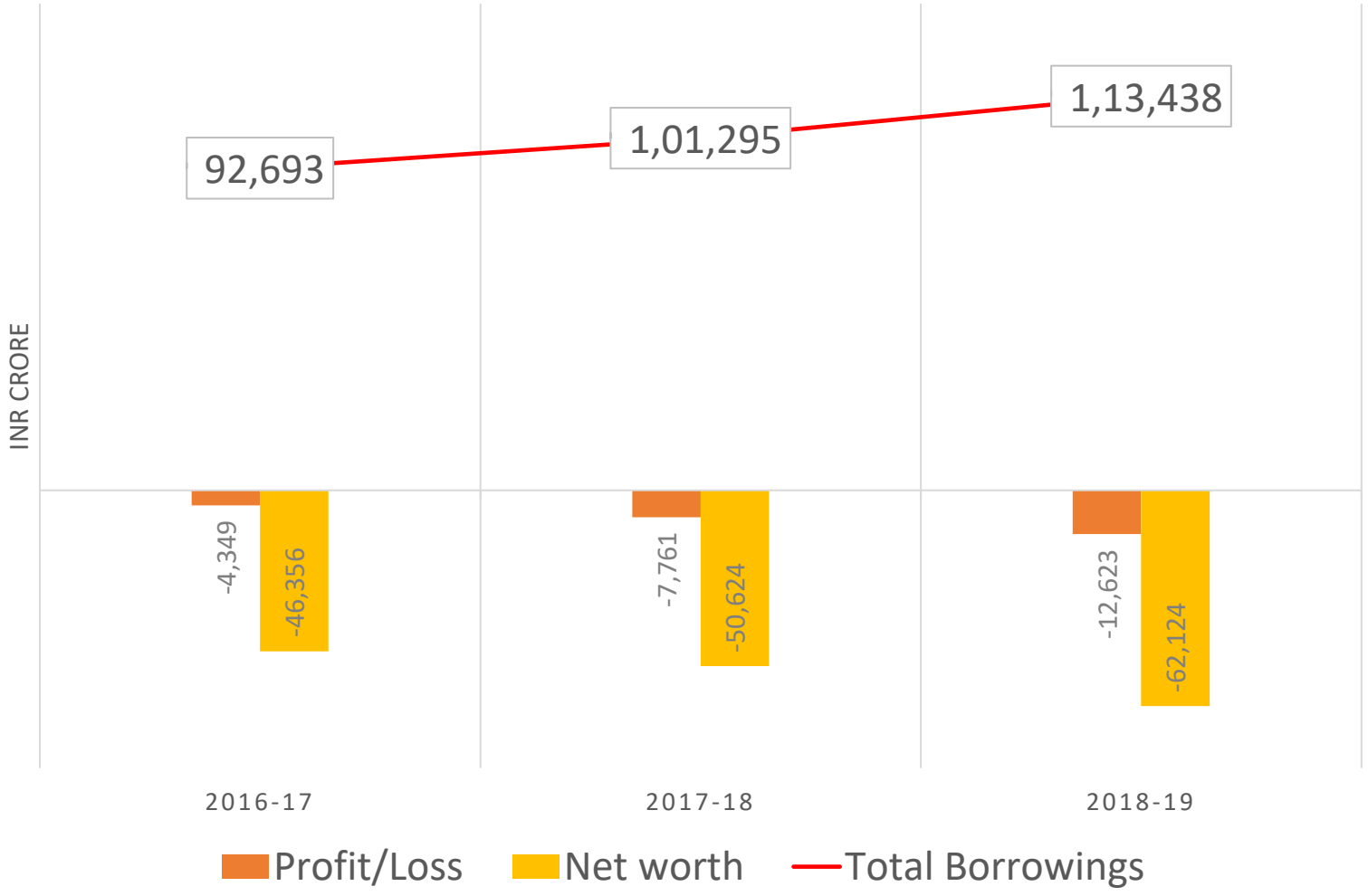
WORLD RESOURCES INSTITUTE

IDEAS TO IMPROVE TANGEDCO'S FINANCIAL SITUATION

Overview and Context Setting

ENERGY PROGRAM

TANGEDCO's financial situation : Pre COVID-19



TANGEDCO rated 'B' with GoTN as guarantor

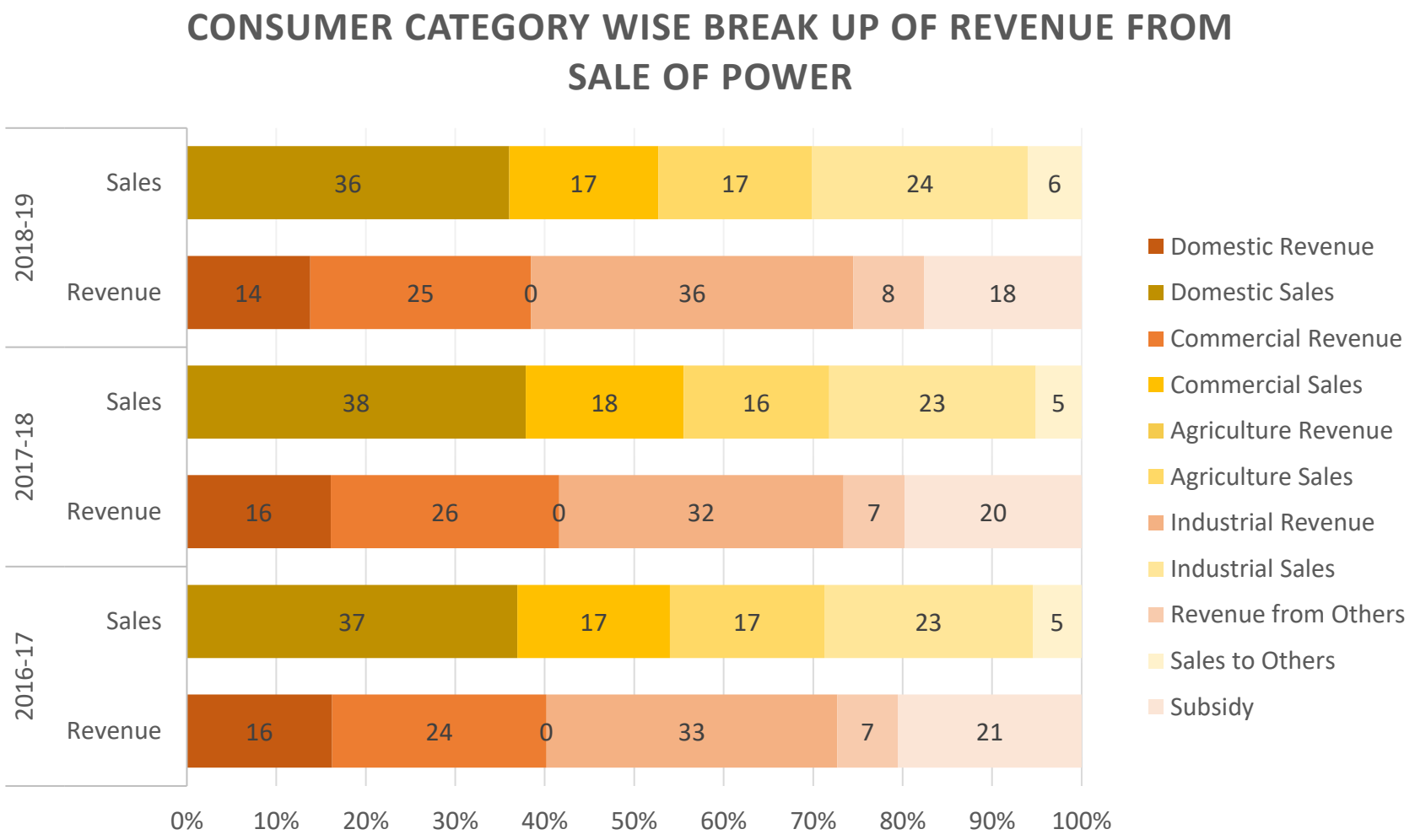
High financial risk on standalone basis

Low cost coverage standing of 0.87x (FY18)

Negative net worth and total debt of ₹1,13,438 crore (FY19)

7th Integrated Rating for State Power Distribution Utilities (MoP & PFC, 2019)
Report on Performance of State Power Utilities (PFC, 2020)

TANGEDCO's Revenue Streams

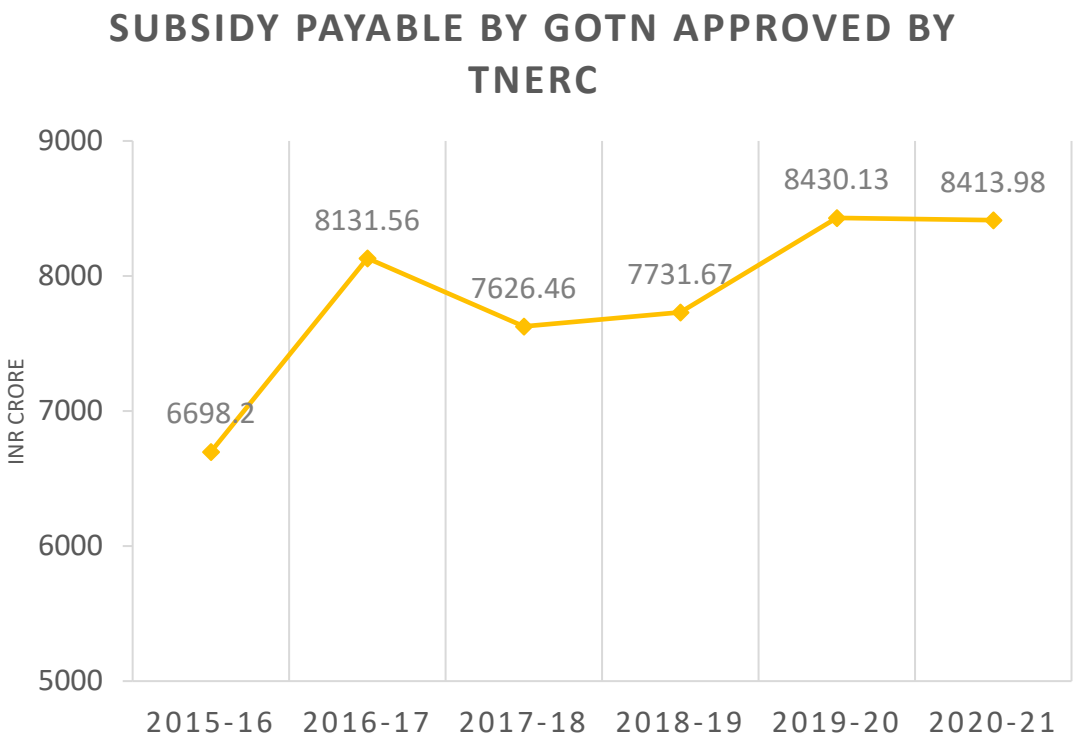


Industrial consumers contribute highest to revenue and domestic consumers highest to sales

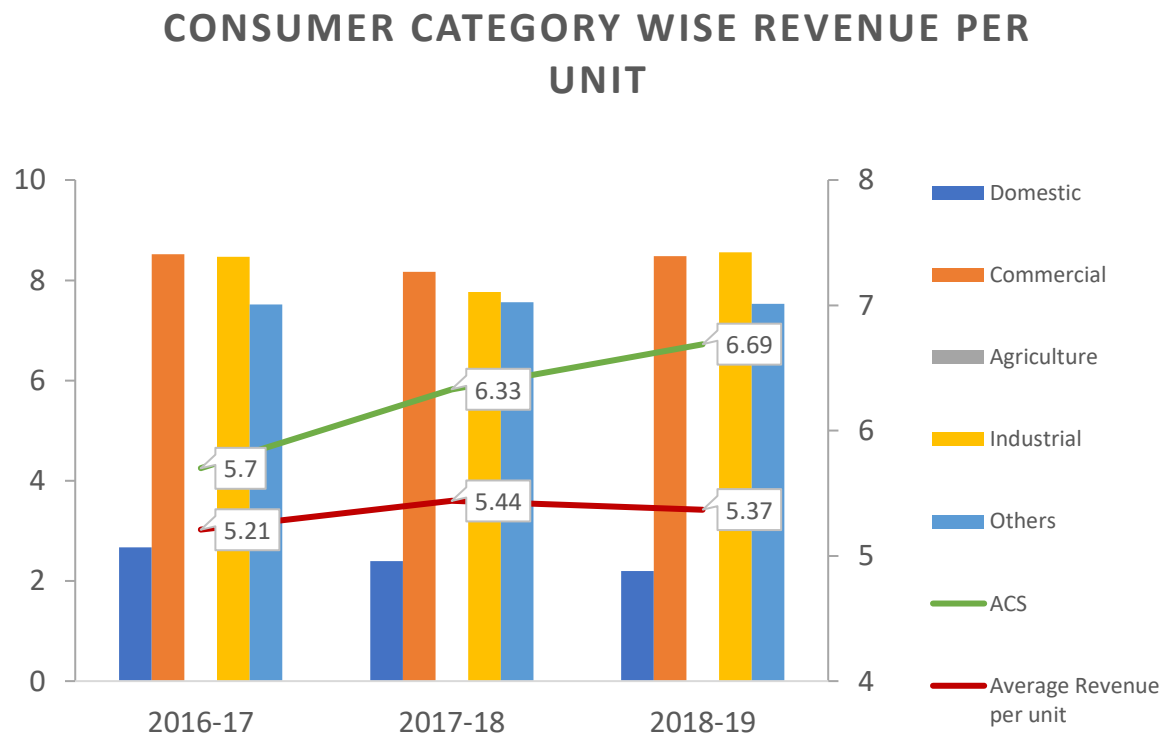
No revenue from Agriculture despite 17% of sales

Report on Performance of State Power Utilities (PFC, 2020)

Subsidy and Cross-Subsidy



Subsidy transfers from GoTN contribute 1/5th of revenues



C&I consumers provide cross subsidy by paying more than ACS

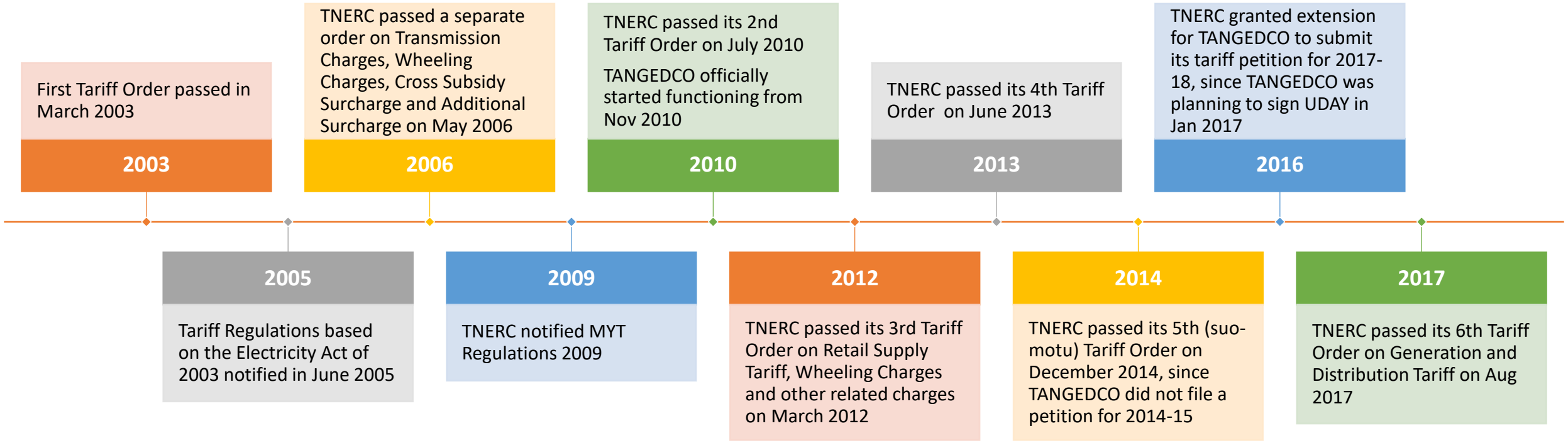
TNERC Subsidy orders 2015,2016,2017,2018,2019,2020
Report on Performance of State Power Utilities (PFC, 2020). Average based on Revenue and expense structure

Factors affecting TANGEDCO's financial situation

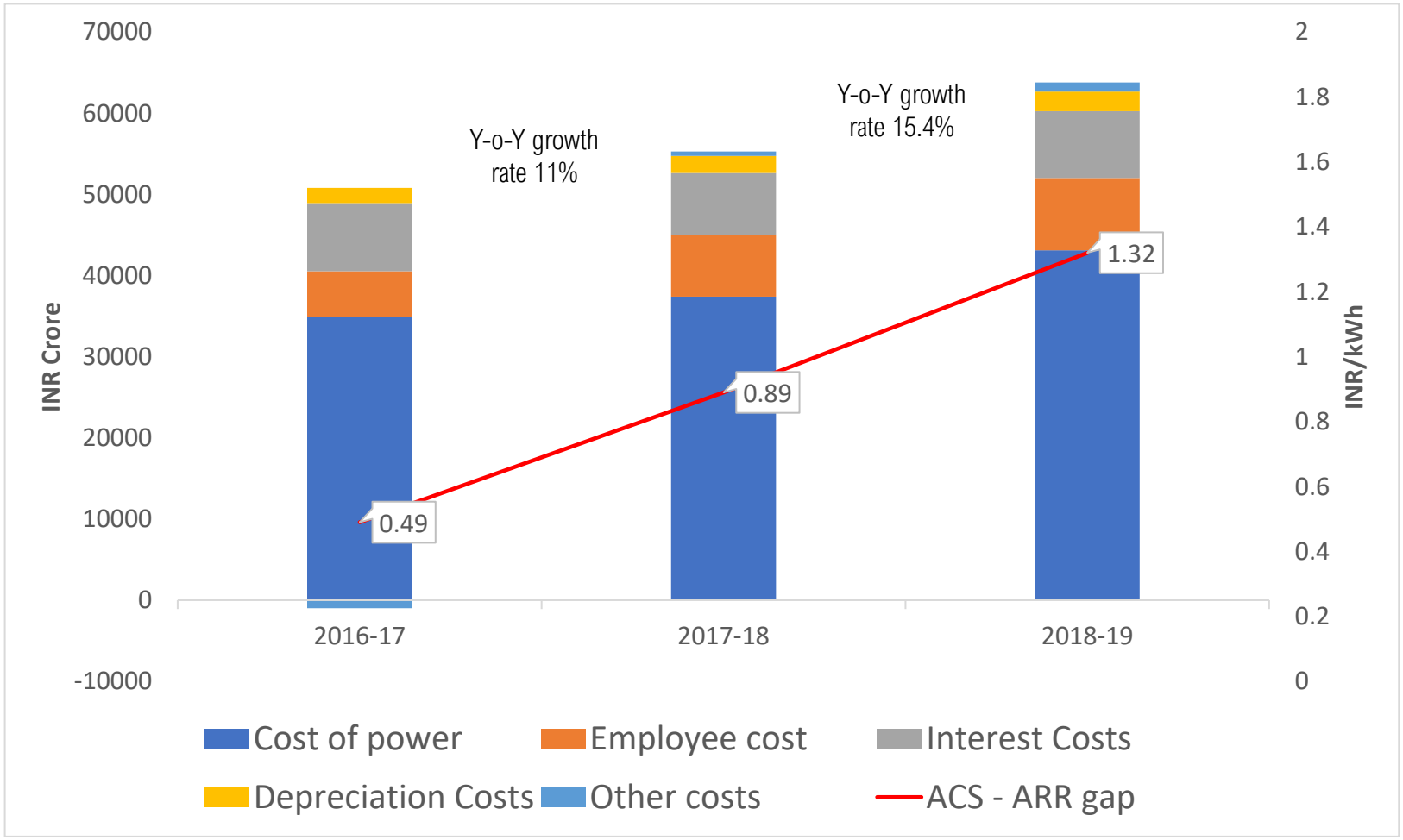
Delays in Tariff determination process

Last Tariff Order Issued for FY 19 on 11 August 2017

Tariff petition yet to be filed



TANGEDCO'S expenses



Power purchase costs have been rising over the years

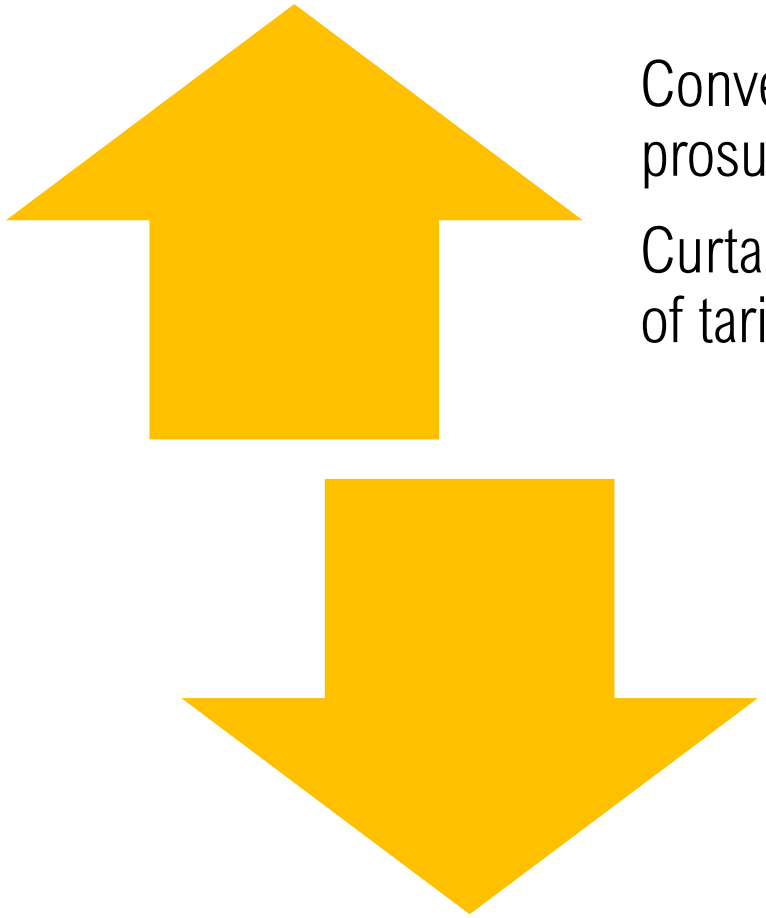
ACS-ARR Gap increased from 0.49 in FY17 to 1.32 in FY19

Report on Performance of State Power Utilities (PFC, 2020)

Post COVID-19 : Pressures on TN's fiscal position

- Uncertainty of demand due to slowdown of economic activity
- Contraction in GoTN's own tax revenue
- Reduction in central tax devolution
- GSDP of the state is expected to worsen in FY 21, which will strain the fiscal profile of GoTN

Potential levers for improving TANGEDCO's financial situation



Converting subsidized consumer categories to prosumer categories

Curtailing of AT&C losses and improving realization of tariff from domestic and agriculture consumers

Reducing power purchase costs

Reducing subsidy and cross subsidy burdens – learnings from other states

Webinar: Impact of Tamil Nadu's Tariff & Subsidy Policies on TANGEDO & Alternatives

Community Solar for Domestic Consumers as an Alternative to Electricity Subsidies

14th December 2020

Martin Scherfler
Auroville Consulting

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01 TANGEDCO’S FINANCES

• TANGEDCO FINANCES | SNAPSHOT

Approved Cumulative Revenue Gap FY 2011-12 to 2015-16

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)

The trued-up 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.

OUTSANDING DEBT

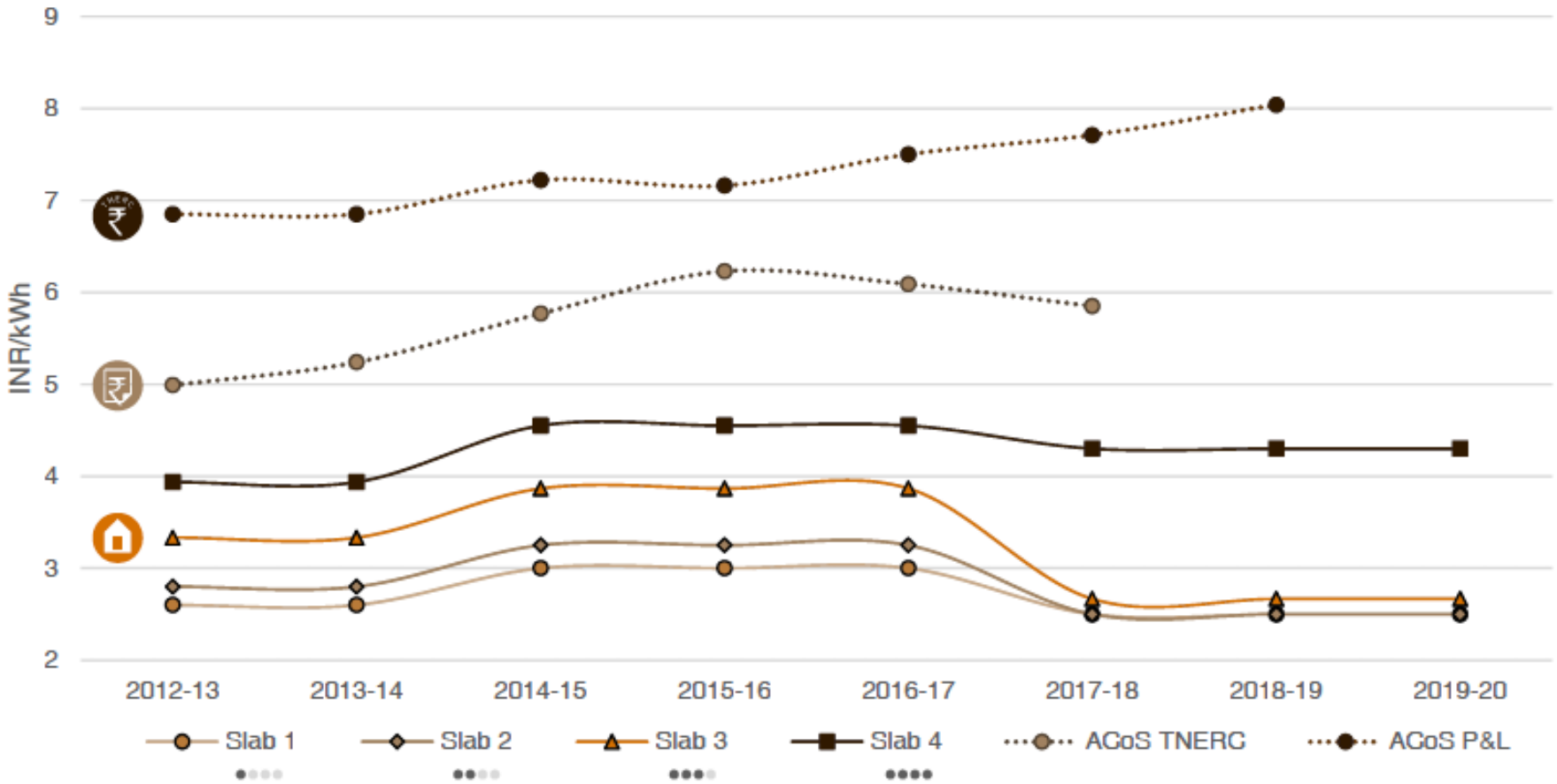
2017 INR 65,897 Crore
2019 INR 1,01,173 Crore
(increase of 54%)

OVERDUE PAYMENTS TO GENCOS

MAY 2020: INR 16,917 Crore
(= 15 months of power purchase)

• DOMESTIC TARIFF RATES & COST OF SUPPLY

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



02 SUBSIDIES AND CROSS SUBSIDIES

- # Direct subsidies and cross subsidies

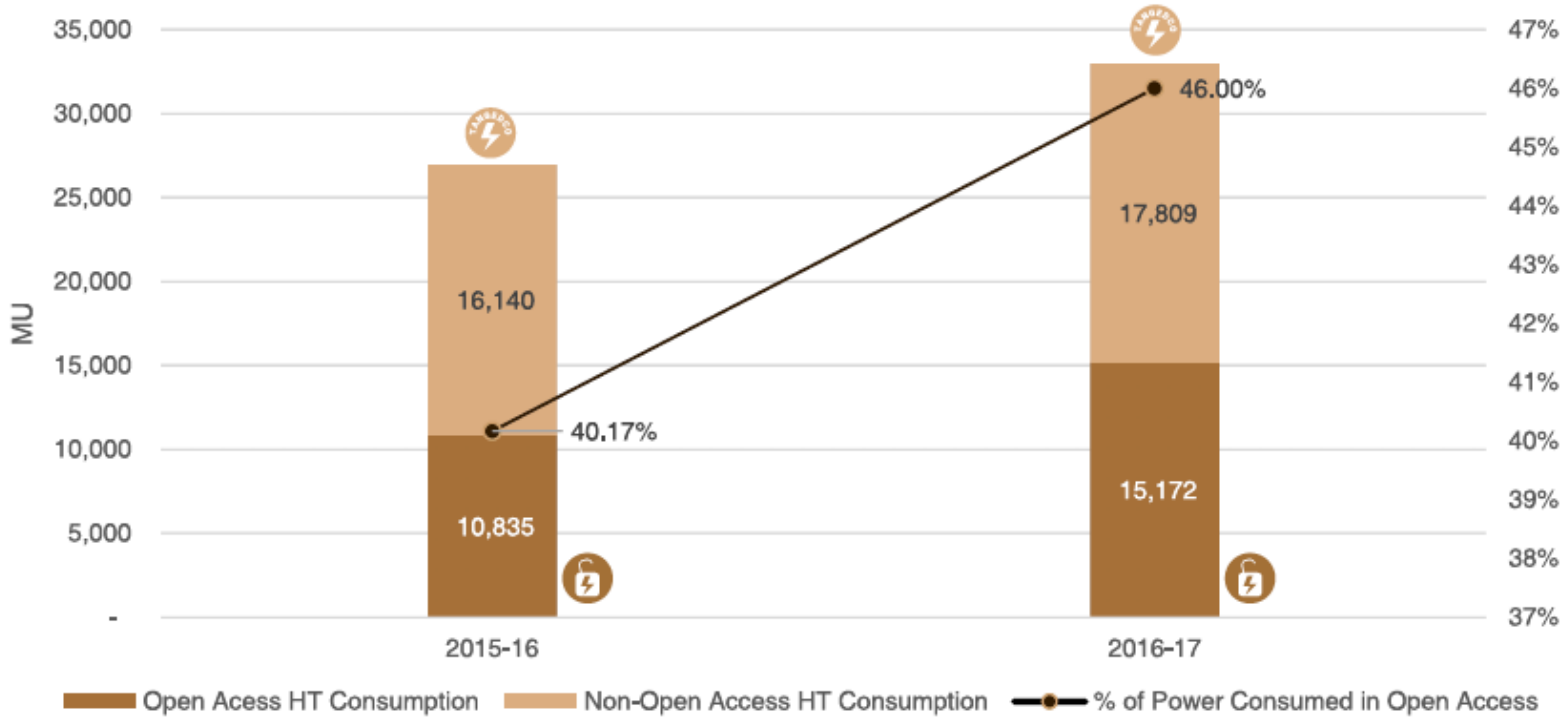
Direct subsidies by the State Government are mostly determined on a per kWh basis and are directly disbursed by the State Government to TANGEDCO.

Cross subsidies are 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.

Cross subsidies are determined by the Tamil Nadu Regulatory Commission (TNERC).

• HT CONSUMER MIGRATION

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

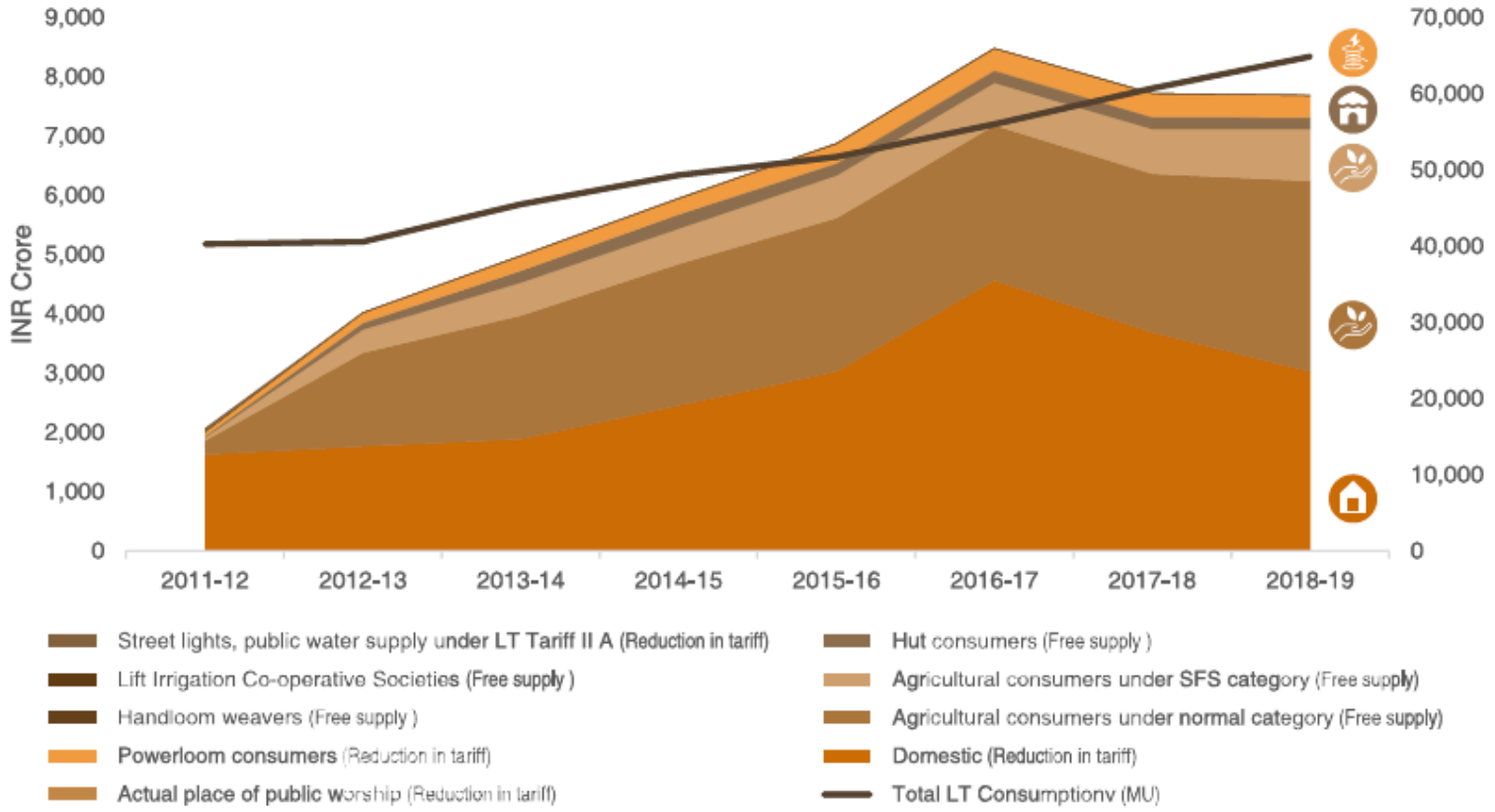


Source: TNERC (2017c)

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.

- # SUBSIDY ALLOCATION I TN GOVERNMENT

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

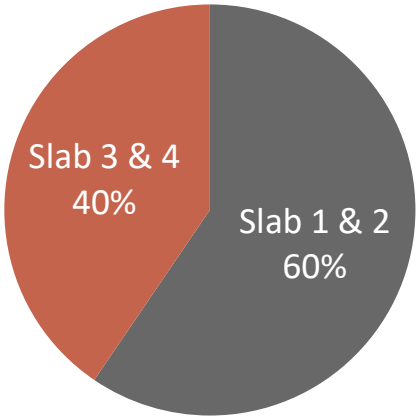


Source: TNERC (2012b), TNERC (2013b), TNERC (2015a), TNERC (2015b), TNERC (2016), TNERC (2017b), TNERC (2018) and TNERC (2019).

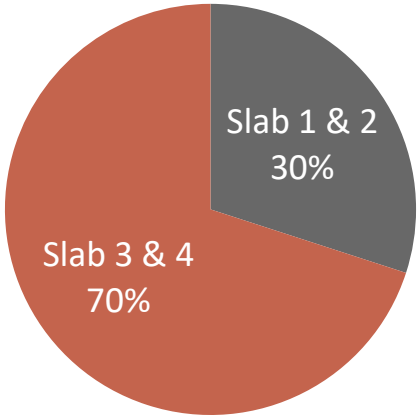
• SUBSIDY ALLOCATION I DOMESTIC CONSUMER CATEGORY

	Share on domestic service connections	Share on domestic electricity consumption	Share on total subsidy	Share on total cross- subsidy	Share on total subsidy and cross-subsidy
Slab 1 & 2	69%	26%	60%	30%	39%
Slab 3 & 4	41%	74%	40%	70%	61%

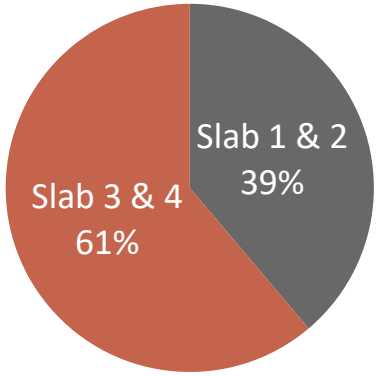
Share on total subsidy



Share on total cros-subsidy

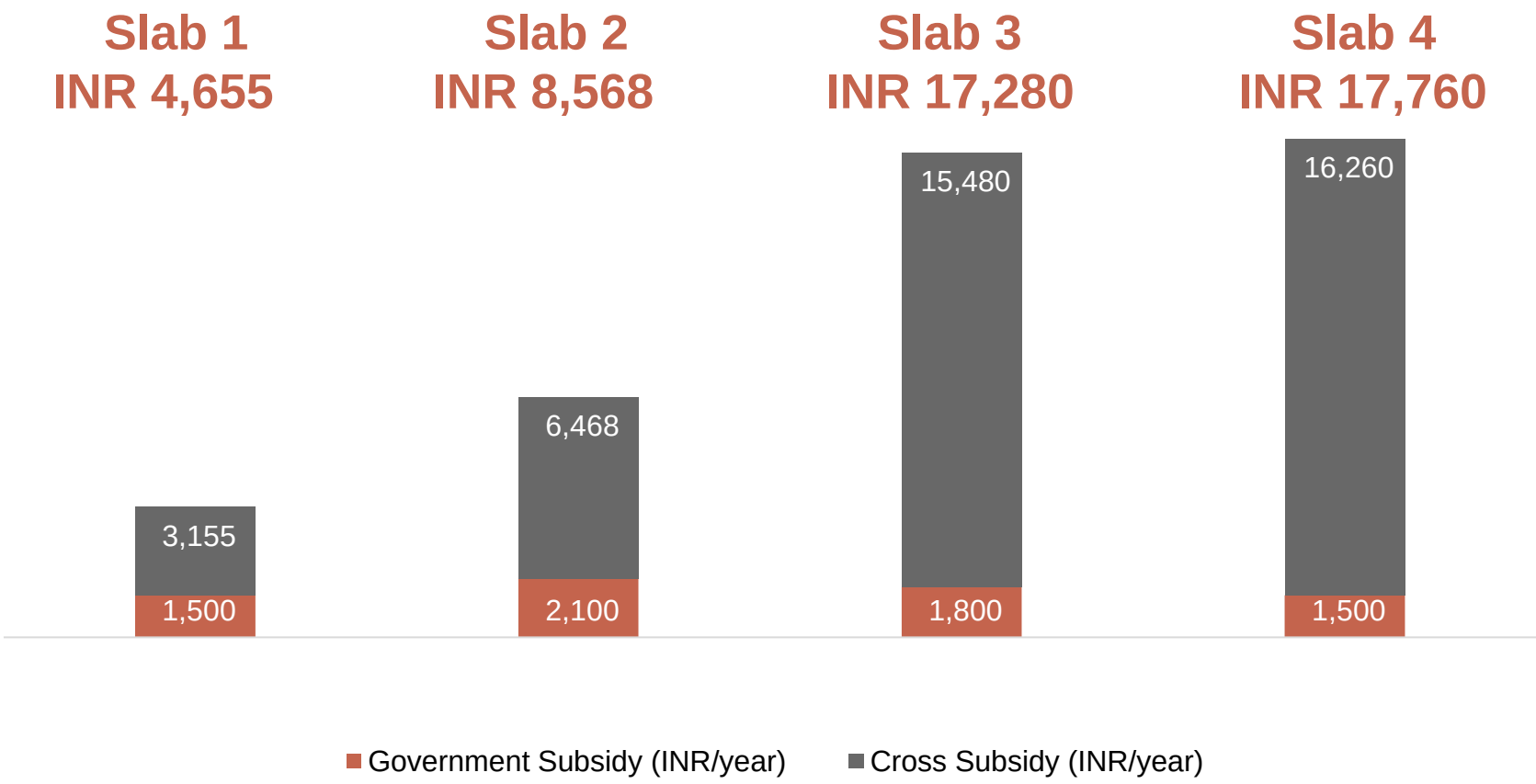


Share on total subsidy and cross-subsidy



http://www.tnerc.gov.in/orders/Tariff%20Order%202009/2018/SubsidyOrder-03-12-2018.pdf

- # AVERAGE ANNUAL SUBSIDY & CROSS SUBSIDY BY SLABS PER CONSUMER



03 ALTERNATIVES

I Direct Benefit Transfer
II Community Solar Program

- EXERCISE

STEP 1: Tariff rationalization

Increase in tariff for all domestic tariff slabs to INR 7.00 per kWh
Increase in demand charges (ABB ~ 8.28 INR/kWh)
Average billing rate slightly above TANGEDCO's cost of supply

STEP 3: Community Solar

Former domestic slab 1 & slab 2 consumers are transitioned to have a share in community solar energy systems under net feed-in mechanisms. Benefits for all stakeholders in comparison to Business as Usual are simulated.

- Increase in solar net feed-in tariff from INR 2.28 per kWh to INR 4.80 per kWh
- 1 kW Solar per slab 1 and slab 2 consumer
- 80% capital subsidy by TN Government
- 20% from consumers (30% equity/70% debt with on-bill financing)
- Solar self-consumption 39%

STEP 4: Direct Benefit Transfer (DBT)

Former domestic slab 1 & slab 2 consumers receive a DBT equal to the current subsidy and cross subsidy benefits.

- **IMPACT OF TARIFF RATIONALIZATION I COMPARED TO BAU**

Domestic Consumer Slabs	Consumer		TANGEDCO	
	25 year losses/gains (INR)	25 year losses/gains (%)	25 year losses/gains (INR)	25 year losses/gains (%
Slab 1	(58,093)	-2761%	30,790	111%
Slab 2	(1,40,905)	-344%	93,951	120%
Slab 3	(1,67,730)	-74%	1,38,532	83%
Slab 4	(1,47,121)	-17%	1,17,437	18%

Savings to Tamil Nadu Government on account of phasing out subsidy:

59,551 (INR Crore)/ 100%

- **ALTERNATIVES I COMPARISON 25-YEAR NET GAINS AS COMPARED TO BAU**

	Consumer		TANGEDCO		TN Government	
Impact assessment (%)	Solar	Direct Benefit Transfer	Solar	Direct Benefit Transfer	Solar	Direct Benefit Transfer
Slab 1	650%	0%	148%	106%	-5%	-115%
Slab 2	34%	0%	104%	64%	-16%	-182%

	Consumer		TANGEDCO		TN Government	
Impact assessment (INR)	Solar	Direct Benefit Transfer	Solar	Direct Benefit Transfer	Solar	Direct Benefit Transfer
Slab 1	13,680	0.00	71,896	30,790	(1,362)	31,097
Slab 2	14,050	0.00	1,19,636	56,907	(5,805)	67,033

* Losses to TN Government will be made up by phasing out subsidy to slab 3 & slab 4 consumers

- **OVERVIEW ALL SLAB 1 & SLAB 2 CONSUMERS**

Scenario Community Solar		
Total Solar Capacity Slab 1 & Slab 2	12,865	MW
Gross capital cost	43,098	INR Crore
Consumer share	8,620	INR Crore
Net capital cost to TN Gov.	34,470	INR Crore

- **Tamil Nadu Government**

Total Cost:* 36,483 (INR Crore)

Reduction in subsidy**: 59,551 (INR Crore)

Gains: 23,068 (INR Crore)

Gains: 39%

* Net present value (NPV)
** Includes savings from phasing out subsid for slab 3 & 4 domestic

- **TANGEDCO**

Gains: 2,29,970 (INR Crore)

Gains: 103%

Assuming 25% of the gains are invested into energy storage, a 32 GWh storage capacity can be added. This represents ~ 50% of the daily solar energy generation.

- IMPACT OF COMMUNITY SOLAR PROGRAM

Job Creation Potential	79,121	FTE
GHG Emission reduction 25 years	378	t/million
Solar Energy Generation as % on total Energy of FY 18-19	23%	%

03 Conclusions

I Direct Benefit Transfer or Community Solar Energy can mitigate the impact of tariff rationalization on domestic slab 1 & slab 2 consumers

II Community solar is a financially more attractive and is a winning proposition to all stakeholders

III Some savings to TANGEDCO and the Tamil Nadu Government maybe re-invested into energy storage do manage high RE penetration

IV Wind community systems maybe consider along with solar to diversify RE sources.

Webinar: Impact of Tamil Nadu's Tariff & Subsidy Policies on TANGEDO & Alternatives

Community Solar for Domestic Consumers as an Alternative to Electricity Subsidies

14th December 2020

Martin Scherfler

Auroville Consulting

martin@aurovilleconsulting.com

www.aurovilleconsulting.com

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Profitability Improvement Levers for TANGEDCO by benchmarking with top performing DISCOMS

- A study by Avalon Consulting

Presenter:
S.Venkatachalam
Chairman, Energy Committee
Madras Chamber of Commerce & Industry
(MD & CEO, Orient Green Power Company Limited)

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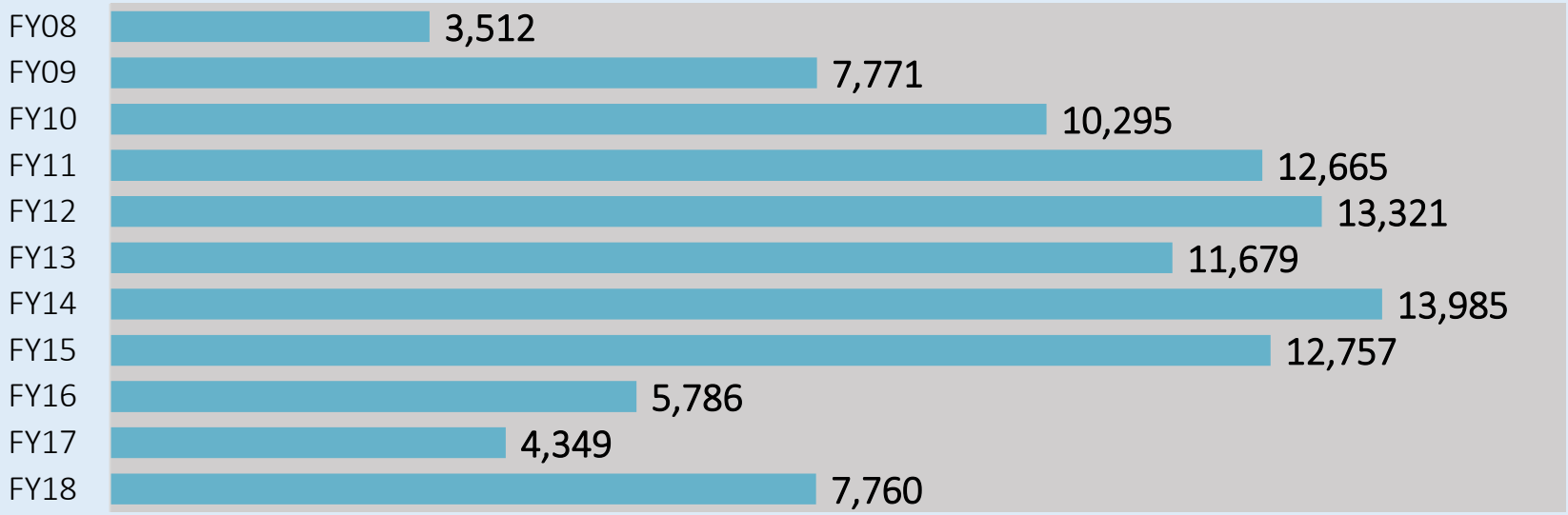
Introduction :

- The purpose of this white paper is to identify profitability improvement levers for TANGEDCO based on analysis of drivers of profitability and benchmarking with other States.
- Categories of profitability improvement levers studies
  - Realization improvement
  - Cost reduction

TANGEDCO was formed in 2010 after restructuring of TNEB

Figure - 1: TANGEDCO losses FY08-18 (Rs.Crore)



Source: Published data on TANGEDCO

A significant portion of accumulated losses were between 2009-2015 due to severe power deficits and procurement of power at high costs and highly subsidized domestic & agriculture customers.

Comparison with other DISCOMS

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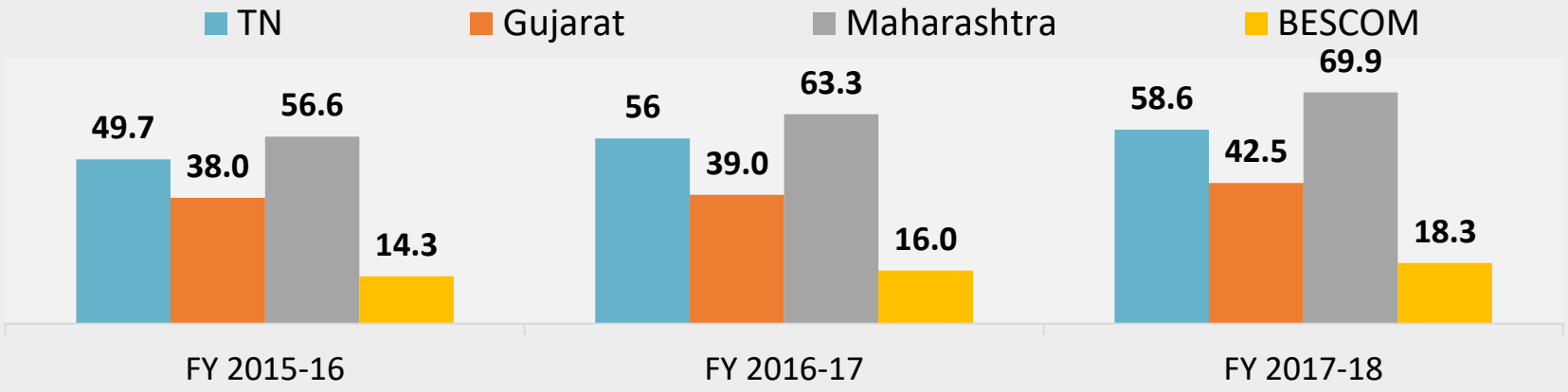
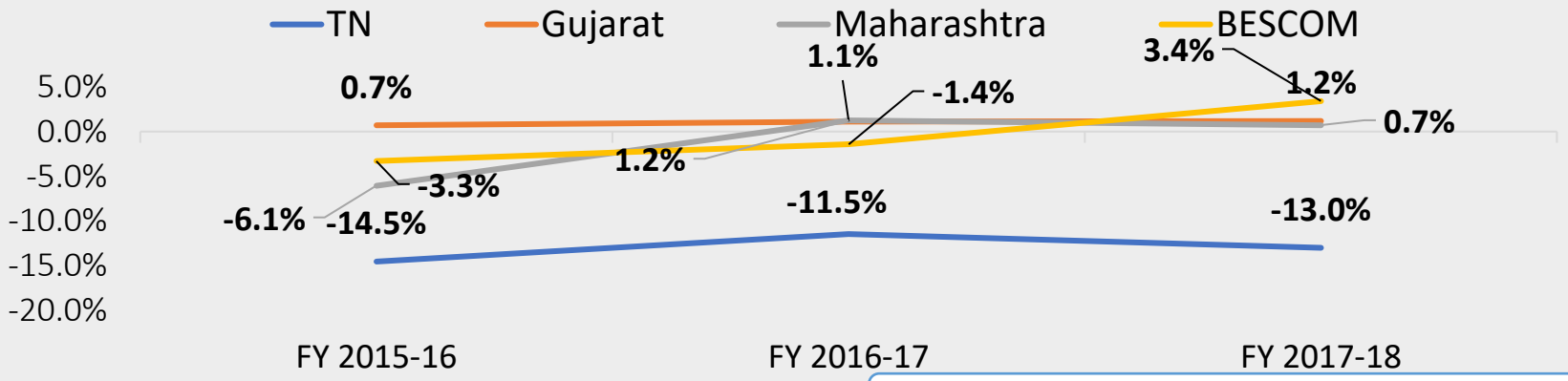
Figure-2: Revenue (Rs.'000 crore) of DISCOMS of TN, Gujarat, Maharashtra, BESCOM (FY16 - 18)



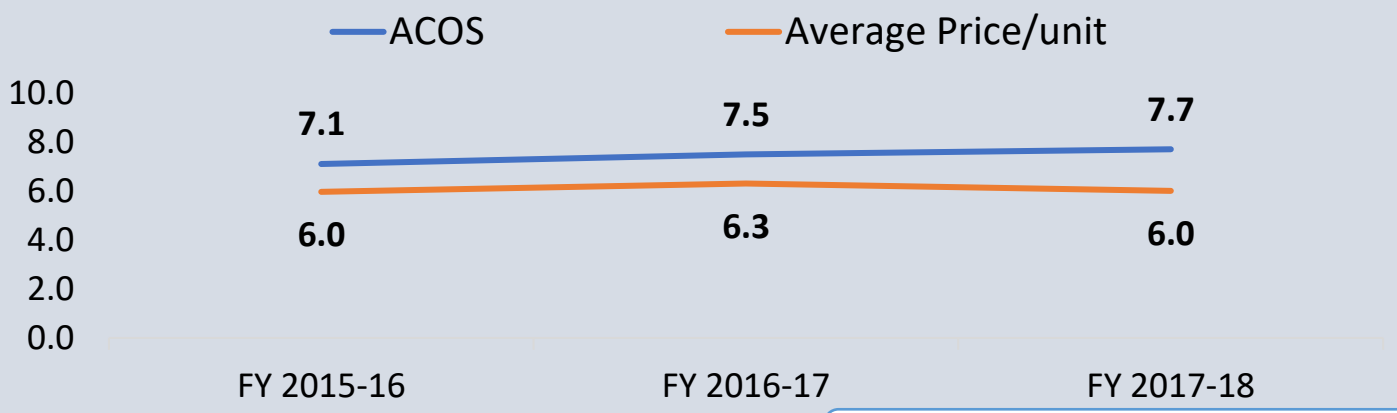
Source: Annual reports of DISCOMS

Figure-3: PBT (%) of DISCOMS of TN, Gujarat, Maharashtra, BESCOM (FY16 – 18)



Source: Annual reports of DISCOMS

Figure-4: ACOS and Average Price/unit for TANGEDCO, (Rs./unit), (FY16 - 18)



Source: Published data on TANGEDCO

Note for ACOS:

Total of all expenses as per P & L a/c divided by units sold

Note for ARR:

Sum of revenue from power sales plus subsidy received from TN Govt and charges recovered from customers as per P & L a/c divided by units sold

Realization improvement

In FY 18 avg price per unit redcued from Rs.6.30/unit to Rs.6.00 per unit:

Three broad categories:

- Domestic : 25,815 Mn Units
- Agriculture : 11,250 Mm Units
- HT Industrial : 31,705 Mn Units

Subsidized categories are 117% of high paying industrial and commercial customers. HT Tariff already comparable with other States. Any increase could lead to loss of industrial competitiveness.

Domestic Tariff of TN is less by ~30% compared to Karnataka

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Figure-5: Comparison of TN Domestic average realization/unit v/s Karnataka (Rs./unit)

Figure-5: Annual reports of DISCOMS (2017-18) realization/unit v/s Karnataka (₹/unit)

Note: *TANGEDCO avg. realization includes subsidy*

BESCOM, HESCOM, MESCOM, GESCOM, CESC are considered to calculate realization for Karnataka

LT Categories:

TANGEDCO has lower Demand / Energy charges and lower number of slabs . Other States have multiple slabs for Fixed Charges compared to TANGEDCO

Energy Charges : Maharashtra 1265 paise/kwh > 500 units / month

1137 paise/kwh > 250 units / month

Karnataka 780 paise/kwh > 200 units / month (Non Rural)

Hardly any tariff revisions over past 10 years. Potential to revise tariff structure

- introduction of new slabs
- increase in Fixed and Energy charges for each slabs

Agriculture category is comparable

Tamil Nadu : Rs.3/unit

BESCOM : Rs.3.34/unit

However metering has to be done 100%

Average Cost of Supply (ACOS)

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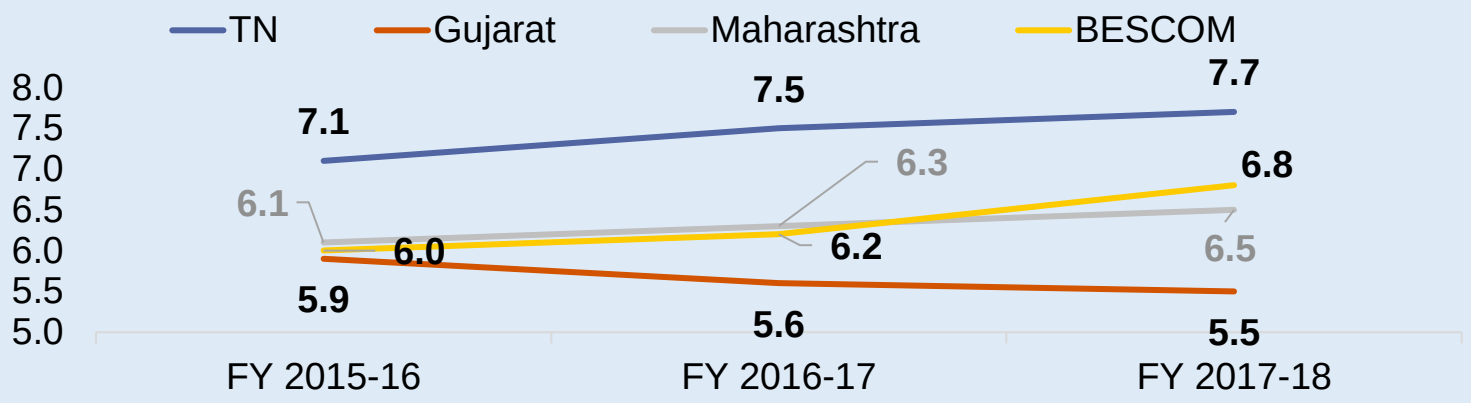
Figure 6: Average Cost of Supply (ACOS) comparison across states (Rs./unit)



Source: Annual Reports of DISCOMS

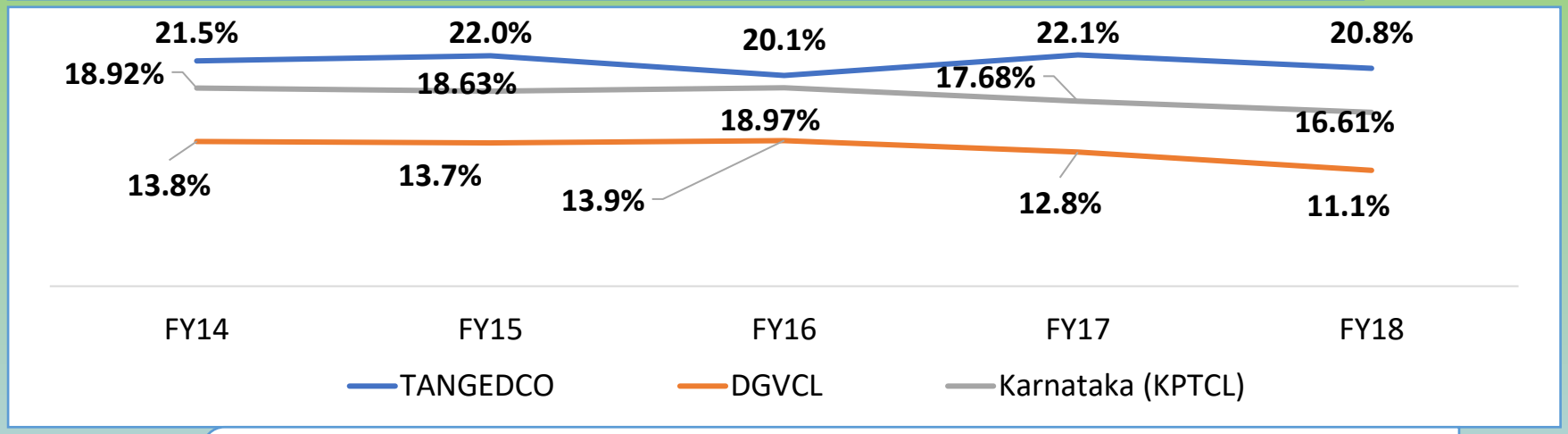
Note: ACOS is computed for non-TN states using the following formula:
ACOS = (Total expenses – extraordinary expenses)/Total number of units sold

Avg. Cost of Power: TANGEDCO : Rs.4.86/unit
Karnataka : Rs.4.03/unit
Maharashtra : Rs.3.92/unit

Adherence to Merit Order dispatch could help reduce costs must run plants should take priority and rest should be in increasing of their variable cost

T & D Losses

Figure-7-: T&D Losses of TANGEDCO vs. TNERC vs. DGVCL vs. KPTCL for FY14 -18, in %



Source: Published data on DISCOMS

Karnataka (KPTCL) includes BESCOM, MESCOM, CESC, HESCOM, GESCOM and Hukeri RECS

Recommendations

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1. Domestic Tariffs:

- Increase in Demand/Energy charges and increase in number of slabs
- Revising tariffs in line with Karnataka
- Impact → Rs.4600 Crore

2. Optimizing Cost of Power Purchased:

- Reducing variable cost of power/unit of own generation
- Monitoring power exchanges closely
- Impact → Rs 2,000 Crores

3. Controlling T & D losses:

- Metering of Distribution Transformers
- Feeder bifurcation
- Adoption of APDRP
- Compulsory metering
- Energy Audits
- IR Meters
- New Substations

Impact 4.3% reduction → Rs.2,200 Crore

Dealing with Disruption:
Ideas to improve TANGEDCO's Financial Situation - Subsidies, Profitability, Improvement Levers and New Tariff Design

Ann Josey and Maria Chirayil, Prayas (Energy Group)

Sustainable Energy Transformation in Tamil Nadu (SET-TN) initiative Webinar

14th December, 2020

16:00 – 17:30 IST

ann[at]prayaspune[dot]org

The inevitability of sales migration

- **Non-competitiveness of DISCOMs business model**
  - Cost of supplying for 1 unit of power → **Rs. 8.38/unit rising at 8% per annum (7 yr CAGR)**
  - Commercial and Industrial consumers pay → Rs. 9-10/unit
  - Rate of power from alternate sources (with charges) → Rs. 5-6/unit
  - Sales migration in FY17 (open access +captive) ~ 28% of TANGEDCO sales that year

- **Reducing role of cross-subsidy**

  - With increase in tariff or cross subsidy contribution, sales migration will increase

- **Contribution of RE to sales migration**
  - Modularity, scalability and economic viability
  - Significant wind and solar resources → incentive for intra-state/onsite captive

Data from PFC report (FY19)

DISCOMs are facing an ‘inevitable’ transition

Current Scenario	Future Scenario
Supply to all consumers	Supply only to small consumers
Dominant Grid User	Wires service Provider
Cross-subsidy based model	New Revenue Models

Crucial policy decisions needed to be taken soon to leverage on opportunities.
Else, changes will unfold chaotically → avoidable costs, disproportionate impact on small consumers
Future resource lock-in, bailouts can be avoided and investments for networks can be planned better

Significant burden on tax payers, bond rate payers and consumers can be avoided

TANGEDCO's capacity addition: Planning for Uncertain Demand?

- **Significant capacity addition planned for TANGEDCO**
  - Coal-based capacity addition: 5,700 MW (under construction) 11,300 MW (planned)
  - Most of this would be through cost plus route → increase cost of supply in the future
  - 25 year base-load capacity may not cater to TANGEDCOs growing but uncertain demand

- **Need for rigorous evaluation of capacity addition plans given changes in demand**
  - Maharashtra: Case 42 of 2017→ Only 30% of 6090 MW in the pipeline approved. Rest kept under abeyance.
  - Re-evaluate need for base load capacity addition with modelling tools
    - Mh Capacity expansion modelling by Prayas → 50% RE purchase by 2030, least cost option w/o thermal addition and with storage investments

- **TN can initiate process to evaluate requirement of capacity in pipeline.**
  - Can be part of the ongoing Capital Investment Plan process before the TNERC.
  - Should evaluate potential role of storage and sales migration

Encourage long term sales migration so TANGEDCO does not plan for large consumers and focusses on small consumers

Freedom for large consumers: The five ‘C’s

- **Clarity and Certainty**
  - Clarity in rules/ regulations – reduce scope for litigation
  - Charges and procedures (fixed for medium term)
  - Adequate adaptation time before major changes

- **Choice rather than Diktat**
  - Net metering and Gross metering
  - Changing Contracted Demand

- **Convergence**
  - Treatment of open access/ captive
  - Allowing sales migration for 500 kW and 100 kW consumers over time
  - Removal of policy concessions for future RE projects

Compensation for the DISCOMs..1

- **Banking→ block-wise valuation**

Monthly Banking Service Bill =
∑ Drawal Value – ∑ Injection Value

Drawal → Value @ highest variable cost of the dispatched power (incl. any power bought from bilateral contracts/exchanges)

Injection → Value @ marginal cost of backed down power (lowest VC among backed down plants)

DISCOM merit order stack with indicative variable prices in Rs/kWh

Must run	0.1
Must run	0.5
Must run	2
Dispatchable thermal 1	2.1
Dispatchable thermal 2	2.2
Dispatchable thermal 3	2.5
Dispatchable thermal 4	2.7
Dispatchable thermal 4	2.8
Day Ahead Market	3
Backed down unit 1	3.1
Backed down unit 2	3.3
Backed down unit 3	4

From lowest to highest VC

- **Revision of captive charges**
  - Electricity duty →Rs.0.10 /u to Rs. 1.5/u
  - PoC for captive → Rs.30/kVA to 25% of demand charges + charge for standby service
  - Additional fixed charge for BTM systems

Compensation for the DISCOMs..1

- **Net Metering**
  - Compensation for banking, wheeling and balancing services provided

- **Time of Day for 10 kW and above consumers**
  - Currently only for HT consumers

- **Seasonal variation in ToD charges**

Months	Proposed applicable ToD rates			
	22:00-6:00	**06:00-9:00**	**09:00-17:00**	**17:00 -22:00**
Normal	-1.5	**0.75**	0	**1.75**
Stress: Apr, May, Oct, Nov	-1.5	1.25 (+0.5)	0	2.25 (+0.5)
Monsoon: Jul , Aug	-1.75 (-0.25)	0.75	0	1.5 (-0.25)

To conclude…

- Sales migration is inevitable → need to change TANGEDCOs business model

- Policy makers should focus on:
  - Avoiding baseload capacity addition without rigorous assessments
  - Long-term migration of large consumers to reduce demand uncertainty
    - **C**ertainty, **C**larity, **C**ompensation, **C**onvergence and **C**hoice
  - Focus on supply and service quality of small consumers such that the burden of transition is not borne by them

- Without this, grave risk stranded assets and massive bailouts in the future