

Briefing Note

Community Solar for Domestic Consumers as Alternative to Electricity Subsidy

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

Purpose

To present alternatives to the current energy subsidy and cross-subsidy schemes along with the implementation of a tariff rationalization for the domestic consumer category and assess the impact on consumers, TANGEDCO, and the Tamil Nadu State Government.

Key messages

In the case of a swift tariff rationalization for domestic consumers, slab 1 and slab 2 domestic consumers will feel a higher financial impact compared to domestic slab 3 and slab 4 consumers.

Direct Benefit Transfer and Community Solar Energy will allow for a swift tariff rationalization while at the same time mitigate the impact on domestic slab 1 and slab 2 consumers.

No mitigation strategy for current slab 3 and slab 4 consumers may be required in the case of tariff rationalization.

Direct Benefit Transfer and Community Solar Energy are both attractive alternatives to the current electricity subsidy and cross-subsidy schemes for domestic consumers.

Community Solar is financially more attractive and is a winning proposition to all stakeholders.

25 year gains to TANGEDCO	104%
25 year gains to TN Government	42%
25 year benefits to domestic slab 1 consumers	1,457%
25 year benefits to domestic slab 2 consumers	45%

A Community Solar Energy program for all current slab 1 and slab 2 consumers has the potential to create 79,121 FTE of local employment.

Background

Electricity tariffs for domestic consumers and several other consumer categories such as agriculture, 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 revenue collected from higher tariff paying customers.

However, TANGEDCO is not able to recover its cost of supply. In 2015-16 TANGEDCO's cumulative revenue gap was INR 30,884 Crore (TNERC 2017a). The true-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.

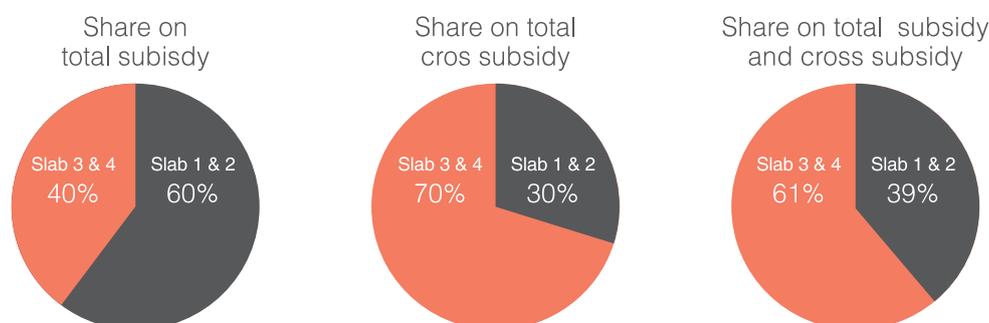
TANGEDCO's outstanding debt increased from INR 65,879 Crore in 2017 to INR 1,01,173 Crore in 2019, an increase in 54% (Crisil 2020). As of May 2019 overdue payments to generators stood at INR 16,917 Crore, which equals 15 months of power purchase (Ministry of Power 2019).

In the FY 2019-20 INR 3,023.62 Crore of electricity subsidy for the domestic consumers was allocated by the State Government (TNERC 2019)

The objective of State Government subsidies is to support low energy consuming residents. The current subsidy disbursement mechanisms however is favouring the higher consumption segment under domestic tariff slabs 3 and 4.

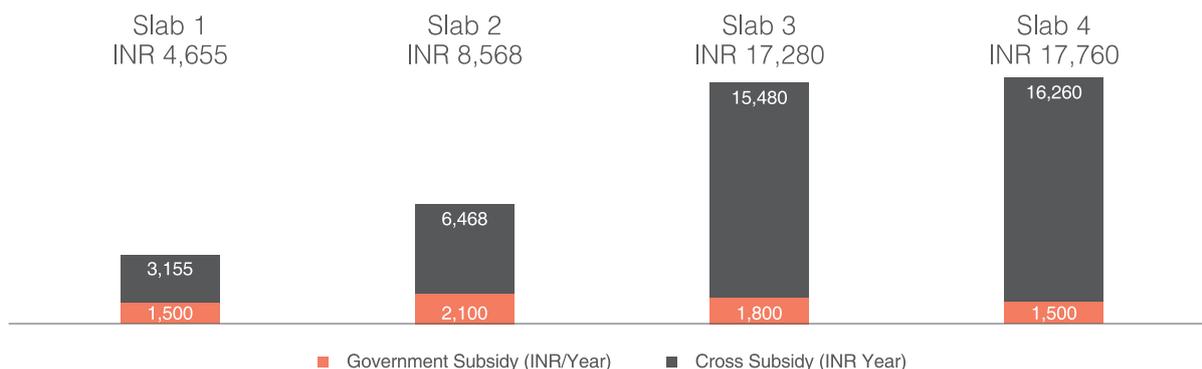
60% of the total of 21 million domestic service connections are falling under slab 1 and slab 2 - accounting for 26% of the total domestic electricity consumption in FY 2019 -20 (TNERC 2019). Slab 1 and slab 2 consumers benefit from 39% of the total subsidy and cross-subsidy allocation, whereas slab 3 and slab 4 consumers, which account for 41% of domestic service connection, benefit from 61% of the total subsidy and cross-subsidy allocation.

Figure 1 Share of consumer slabs on total domestic



The per-service connection allocation of subsidy and cross-subsidy clearly favours domestic consumers with higher electricity consumption. On average a slab 4 consumers received close to 4 times more subsidy and cross-subsidy compared to an average slab 1 consumer.

Figure 2 Break up of subsidy and cross subsidy by slab



If one were to equate higher per household electricity consumption with higher household income level, then it can be concluded that higher income households receive more electricity subsidies than low-income households. Clearly, that cannot be the aim of the subsidy scheme.

Ministry of Power has repeatedly requested State Governments to phase out cross-subsidies and introduce a direct benefit transfer scheme in lieu of the current electricity subsidy scheme.

Considerations

Direct Benefit Transfer or Community Solar Energy systems are alternatives to the current subsidy and cross-subsidy schemes. Both mechanisms can be deployed to mitigate the impact of a swift tariff rationalization for domestic tariff rates.

Assuming a swift tariff rationalization with a single tariff rate of INR 7.00 per kWh for all domestic consumers and an increase in demand charges in the tune that the average billing rate is at INR 8.28 per kWh¹, then the 25 year increase in electricity cost is primarily affecting slab 1 and slab 2 consumers. Therefore a mitigation strategy for these two consumer slabs will be required.

Savings to Tamil Nadu Government on account of phasing out subsidy is 100%. Gains to TANGEDCO will be highest for slab 1 and slab 2 consumers.

Table 1 Impact of tariff rationalization by slab and stakeholder

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	-57,835	-4015%	29,644	108%
Slab 2	-144,302	-308%	97,849	120%
Slab 3	-176,736	-57%	145,686	70%
Slab 4	-128,855	-6%	96,542	9%

Community Solar as a mitigation strategy

All domestic slab 1 and slab 2 consumers are transitioned to have a share in community solar energy systems under net feed-in mechanisms.

Assumptions:

- 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%

Direct Benefit Transfer as a mitigation strategy

Former domestic slab 1 and slab 2 consumers receive a Direct Benefit Transfer (cash transfer) equal to the current subsidy and cross-subsidy benefits.

Results

The community solar energy program presents a winning proposition to all stakeholders. With gains to TANGEDCO of 148% for slab 1 and 104% for slab 2., Substantial gains for slab 1 consumers (650%) and moderate gains to slab 2 consumers (34%) as compared to the current subsidy and cross-subsidy scheme are expected. The moderate losses to the Tamil Nadu Government will be made up from savings by phasing out subsidies to slab 3 and slab 4 consumers.

¹ A rate that is close to the actual cost of supply per kWh.

Table 2 25-year financial impact assessment

Impact assessment (%)	Consumer		TANGEDCO		TN Government	
	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%

Impact assessment (INR)	Consumer		TANGEDCO		TN Government	
	Solar	Direct Benefit Transfer	Solar	Direct Benefit Transfer	Solar	Direct Benefit Transfer
Slab 1	13,680	0%	71,896	30,790	-1,362	31,097
Slab 2	14,050	0%	1,19,636	56,907	-5,805	67,033

Scaling

To deploy a Community Solar Energy program for all slab 1 and slab 2 consumers the following is required:

Solar capacity:	12,865 MW
Gross capital cost:	INR 43,098 Crore
Tamil Nadu Government share:	INR 37,859 Crore ²
Consumer share:	INR 8,620 Crore

Community Solar Energy program will have the following impact:

25-year reduction in subsidy:	INR 65,704 Crore ³
25-year gains to TN Government:	INR 27,845 Crore (42%)
25-year gains to TANGEDCO:	INR 2,57,989 Crore (104%)
Job creation potential:	79,121 FTE
GHG emission reduction:	378 t/million
Solar energy generation as % of total energy in FY 2018-19:	23%

Conclusions & Recommendations:

Introducing Community Solar Energy program has the potential to allow for a swift tariff rationalization and a phasing out of subsidy and cross subsidies. Community Solar is financially more attractive and is a winning proposition to all stakeholders.

- Locate Community Solar Energy systems close to communities (e.g. one solar system per panchayat etc.) to create a point of identification.
- Interconnect Community Solar Energy systems close to load centres at the distribution network level to leverage on existing infrastructure and reduce transmission and distribution losses.
- Implement standard solar capacity plants for example 10 MW) for fast deployment.
- Turn solar systems into Community Solar Gardens by co-locating of solar energy systems and agriculture).
- Wind Community Energy systems maybe consider along with solar to diversify renewable energy sources.
- Some savings to TANGEDCO and the Tamil Nadu Government may be re-invested into energy storage to manage high solar energy penetration.⁴
- Extensive engagement with key stakeholders including Government, Civil Society Organizations, and media will be required.

² Discounted cost including cost of financing.

³ Includes savings from phasing out subsidy for slab 3 and 4 consumers.

⁴ 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.

References

1. Auroville Consulting (2020a). Assessing the impact of Tamil Nadu's tariff policy on TANGECO's financial performance. Sustainable Energy Transformation Series. Available at: (accessed on 20th December 2020).
2. Auroville Consulting (2020b). Assessing the Impact of Introducing Solar Energy in the Distribution Network. A case study for Tamil Nadu. Sustainable Energy Series. Available at: (accessed on 20th December 2020).
3. Auroville Consulting. (2020c). Making Tariff Rationalization for Domestic Consumers A Winning Proposition for all Stakeholders. Available at: <https://www.aurovilleconsulting.com/?p=3062> (accessed on 20th December 2020)
4. Crisil (2020). Rating Rationale - Tamil Nadu Generation and Distribution Corporation Limited. Available at: https://www.crisil.com/mnt/winshare/Ratings/RatingList/RatingDocs/Tamil_Nadu_Generation_and_Distribution_Corporation_Limited_January_08_2020_RR.html (Accessed on: 27 December 2020)
5. Energy Department of Tamil Nadu (2019a). Demand No.14. Policy Note 2019-20. Available at: https://cms.tn.gov.in/sites/default/files/documents/energy_e_pn_2018_19.pdf (Accessed on: 27 December 2020).
6. Ministry of Power (2019). PRAAPATI Portal. Available at: <https://praapti.in/state-dashboard/tamil-nadu> (Accessed on: 27 December 2020).
7. TNERC (2019). Order No. 6 of 2019, Provision of Tariff subsidy for the year 2019-20 by the Government of Tamil Nadu, Chennai. Available at: <http://www.tnecr.gov.in/orders/Tariff%20Order%202009/2019/SubsidyOrder-2019-20.pdf> (Accessed on: 27 December 2020).