



Auroville Consulting

## Briefing Note

# EMPOWERING HOMES THROUGH ROOFTOP SOLAR – A WELFARE PATHWAY FOR TAMIL NADU

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## Auroville Consulting

Using our expertise in ecological and socially responsible development, we work for a prosperous eco-system that supports all life on this planet. Our approach is multi-faceted: We collaborate with academic, private and public sector partners both in India and Internationally, helping to develop sustainable urban and industrial development policies, ecologically friendly technologies – and the minds of future leaders. Founded in 2010, Auroville Consulting is a unit of the non-profit organization Auroville Foundation.

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# BACKGROUND AND RATIONALE

*Tamil Nadu has achieved universal electricity access, with 24.02 million active domestic service connections as of FY2023-24 (TNPDC, 2024). However, this success has come with a growing fiscal burden driven by the state's welfare-oriented electricity subsidy model. In FY 2025-26, ₹8,223 crore has been provisionally allocated for domestic electricity subsidies, supporting an annual domestic consumption of 36,228 MU (TNERC, 2025a).*

Subsidies have brought electricity to every home, but the next challenge is keeping it affordable for the state. The PM Surya Ghar scheme offers a way to make welfare support sustainable.

While the subsidies have expanded access and protected vulnerable groups, they have also increasingly benefited higher-consuming households, reducing the state's ability to target support to those most in need. The PM Surya Ghar: Muft Bijli Yojana (PMSG), launched by the Ministry of New and Renewable Energy (MNRE) in 2024, offers Tamil Nadu an opportunity to align rooftop solar deployment with the state's broader policy agenda. By adapting the programme's design and delivery, the government can connect rooftop solar with welfare, economic, and environmental objectives – from modernising subsidy mechanisms to improving household energy security and advancing climate targets. When implemented with innovative business models, precise beneficiary targeting, and robust local engagement, PMSG can simultaneously lower recurring subsidy outlays, strengthen energy resilience, and enhance the income of vulnerable households.

# DOMESTIC CONSUMPTION AND SUBSIDY

Tamil Nadu's domestic electricity consumption has been steadily increasing and accounts for over one-third of the total electricity demand in the state.

Domestic consumption is projected to grow by 57% between FY 2023-24 and FY 2029-30, increasing pressure on subsidy allocations unless structural reforms are introduced.

Table 1 Domestic Consumption for Tamil Nadu:

Year	Domestic Consumption (MU)	Share of Total Consumption (%)
2021-22	30,647	37.37
2022-23	32,592	37.82
2023-24	34,042	37.87
2024-25	38,600	35.11
2025-26	41,190	35.32
2026-27	43,942	35.53
2027-28	46,887	35.77
2028-29	50,076	36.06
2029-30	53,587	36.27

Source: ICED, CEA 2022 (Note: Data from 2025-26 to 2029-30 is projected data by CEA)

Concomitantly, as observed in Table 2, subsidy is also rising year on year. In FY 2025–26, Tamil Nadu has allocated a total electricity subsidy of ₹17,052 crore, of which ₹8,223 crore (48.2%) is directed towards domestic consumers. The domestic category has seen a consistent increase in its share of the total subsidy, rising to nearly half of the total in 2025-26. In 2025-26, the electricity subsidy accounted for 3.88% of the total State Budget.

*Table 2 Comparison of TN State Budget with Electricity Subsidy*

Years	Total State Budget (₹ Crore)	Subsidy (₹ Crore)	Subsidy as a percentage of State Budget %	Domestic Subsidy	Domestic Subsidy %
2021-22	3,29,035	8,876	2.70%	3,469.02	39.08%
2022-23	3,33,251	12,008	3.60%	5,284.32	44.01%
2023-24	3,65,321	14,917	4.08%	7,055.51	47.30%
2024-25	4,12,504	15,852	3.84%	7,452.91	47.02%
2025-26	4,39,293	17,052	3.88%	8,223	48.22%

Source: TNERC 2021b, 2022, 2023, 2024a, 2024b, 2025a, 2025b; PRS Legislative Research, "Tamil Nadu Budget Analysis" (annual reports for each year: 2021-22, 2022-23, 2023-24, 2024-25, and 2025-26)

Note: This excludes the Bailout, Loss Funding and/or Equity Infusion

## INEFFICIENT TARGETING

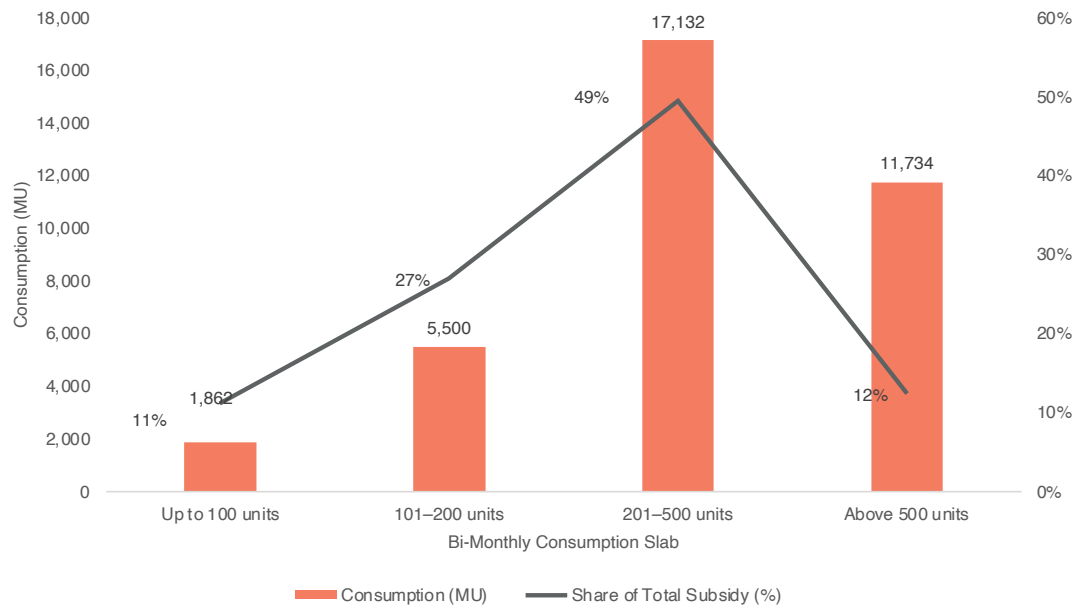
*Tamil Nadu's current subsidy framework exhibits significant inefficiency: high- and mid-consumption households absorb a disproportionately large share of electricity subsidies, even while welfare objectives favour lifeline support.*

According to Auroville Consulting (2023, 2025), subsidy allocations have risen sharply in recent years, yet the benefits remain skewed toward those consuming more electricity. Such leakage both reduces the state's ability to support lower-income households and imposes increasing fiscal pressure.

Figure 1 shows a breakdown of consumption and subsidy distribution by bi-monthly slabs revealing significant inequities. The lowest consumption group (up to 100 units) represents only 5.14% of consumption but receives 11.12% of the total subsidy. The 201–500 unit and above 500 unit slab absorbs 61.9% of subsidies. Subsidy outlays scale with consumption volume; as a result, mid- and high-use slabs receive the largest absolute shares. As household electricity demand grows, the volume of subsidised units will increase proportionally, compounding fiscal pressure without improving equity.

Most of Tamil Nadu's power subsidy goes to homes that use the most electricity. Targeting beneficiaries is needed to make subsidies fairer.

Figure 1 Slab-Wise consumption and share of total subsidy – FY 2025–26



Source: TNERC 2025a, 2025b

This inequitable distribution highlights the need for structural reform. Rooftop solar, through the PMGC scheme, offers an opportunity to redirect recurring consumption subsidies into one-time capital support, enabling households to generate their own electricity. This shift could reduce long-term fiscal burdens while improving energy equity.

## ROLE OF PM SURYA GHAR

The PMSG, launched in 2024, provides central financial assistance (CFA) to households for rooftop solar with 60% CFA for systems up to 2 kW and 40% CFA for systems between 2 and 3 kW. However, the installed capacity in Tamil Nadu under the PMSG is only 140.8 MW as of August 2025 (PM Surya Ghar National Portal, 2025). With 24.02 million domestic connections, less than 0.5% households in the state currently have rooftop solar systems installed, highlighting a large untapped potential. Adoption has been slow and limited. This underscores the need for targeted strategies to unlock adoption.

Eligibility does not ensure adoption. Financial constraints limit participation for vulnerable households in PM Surya Ghar scheme.

## CURRENT GAPS IN IMPLEMENTATION

Nationally, a majority of households fall into the low consumption slab, 0–100 kWh per month or 100–300 kWh per month (CEEW, 2023). These households benefit from either free or heavily subsidised electricity tariffs. Table 4 shows Tamil Nadu's domestic consumption profile closely mirrors this national pattern (TNERC, 2023).

Table 4 Subsidy outlay by slabs for domestic consumption for FY 2025-26

Slab	No. of Services (lakhs)	Slab Share of Total (%)	Estimated Tariff Subsidy (INR Crore)
Bi-monthly consumption up to 100 units	82.90	33%	962.25
Bi-monthly consumption 101-200 units	62.60	24.90%	2,308.94
Bi-monthly consumption 201-500 units	86.80	34.50%	3,722.17
Bi-monthly consumption above 500 units	19.40	7.70%	665.62
<b>Total</b>	<b>251.70</b>	<b>100%</b>	<b>7,659.00</b>

Source: Auroville Consulting, 2025; TNERC 2023

Note: The domestic subsidy outlay for FY 2025-26 presented in Table 4 differs slightly from the value shown in table 2. This variation is due to an increase in subsidy mandated by TNERC (2025a), for which slab-wise details were not available.

Identifying target beneficiaries is essential, but it does not guarantee participation. Several barriers limit the uptake of PMGC scheme. A few of them are:

- Free electricity units limit financial benefits from self-generation, as low-income households have little financial incentive to adopt rooftop solar, elongating payback periods and reducing participation.
- Even after a 60% MNRE subsidy, households must mobilise the remaining 40% of system costs, is often beyond the means of vulnerable households, thus limiting uptake without additional financial innovation.

These barriers require innovative business models that directly address affordability, financing intermediation, and incentive alignment.





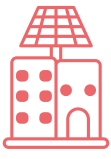
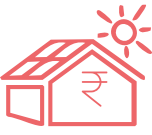
## BUSINESS MODELS FOR PM SURYA GHAR

Business models decide how the benefits of rooftop solar are shared. The right approach can create a win-win-win scenario for vulnerable households, state and utilities.

The PM Surya Ghar business models described below aim to deliver rooftop solar solutions for low-income Antyodaya Anna Yojana (AAY) households in Tamil Nadu, specifically those with average monthly electricity consumption of 50 kWh or less.

For the financial analysis, a 2 kW rooftop solar system is assumed. As of August 2025, Tamil Nadu has issued 1.15 crore (11.5 million) ration cards, with 96.68 lakh (9.66 million) categorized as Priority Household (PHH) and 18.64 lakh (1.86 million) as AAY (GoTN, 2025). The AAY scheme targets families below the poverty line who are among the most vulnerable, including landless laborers, marginal farmers, destitute individuals, the elderly, widows, people with disabilities, and others without a stable income or social support. Ideally, this business model provides a win-win-win outcome for all key stakeholders: the Tamil Nadu Government, the DISCOM, and the households.

Figure 2 Business Models for PM Surya Ghar

					
<b>Market-Driven</b> Consumers finance rooftop solar (with MNRE subsidy), use net metering/feed-in to offset bills and sell surplus.	<b>BOT (Build-Own-Transfer)</b> EPC/RESCO installs, owns, and operates the system for a time period (Eg 5 years), recovering costs through a dedicated feed-in tariff, before transferring ownership to the consumer.	<b>Full Subsidy</b> Government covers entire installation cost; consumer owns system from day one; savings and surplus accrue to consumer.	<b>P2G (Power-to-Government)</b> Consumers install and sell surplus solar directly to government entities via PPA at fixed tariff, offsetting govt electricity costs.	<b>Super RESCO</b> RESCO fully finances, installs, and operates; sells solar to the utility, while the government pays consumers generation-linked incentives.	<b>Zero Interest Finance</b> Consumer gets a interest free loan to finance rooftop solar (with MNRE subsidy), use net metering/net feed-in to offset bills and sell surplus
<b>Net Feed-in</b>	<b>Net metering</b>	<b>Net metering</b>	<b>Net metering</b>	<b>Gross Metering</b>	<b>Net Feed-in</b>

Note: A monthly settlement period for surplus solar energy under net metering at specified solar tariff has been assumed.

**Market-Driven:** In the market-driven model, the current business as usual (BAU) case, beneficiaries purchase and own the solar system directly, availing the subsidy under the PMSG scheme. The responsibility for financing the residual cost, securing a loan, rests with the household or farmer. In Tamil Nadu, consumers receive a 60% MNRE subsidy, with the balance repaid through bill savings and by exporting surplus solar to the grid at the net feed-in tariff. There are no special payment security mechanisms beyond conventional loan agreements, so consumers assume standard market credit risk.

**Full Subsidy Model:** The full subsidy model completely removes upfront cost exposure by covering 100% of system costs through a combination of central (MNRE) and state government subsidies targeting vulnerable households. The state government installs and owns the system initially, later transferring ownership to consumers post-commissioning. Operation and maintenance (O&M) can be managed directly by the government or contracted to qualified vendors. Households benefit from self-consumption and receive the standard feed-in tariff (₹3.61/kWh) for surplus exports. The state recovers costs gradually by reducing future recurring subsidy outlays as consumers shift from grid dependency to solar self-generation. This model can ensure rapid adoption among the most economically disadvantaged groups but requires careful fiscal planning to remain sustainable.

**Build-Operate-Transfer (BOT) Model:** The BOT model addresses upfront affordability. A public entity such as Tamil Nadu Green Energy Corporation Ltd. (TNGECL) or an EPC firm installs, owns, operates, and maintains RTS systems during the loan tenure, and consumers pay nothing upfront. Post-subsidy capital costs are financed through loans, with repayment ensured by revenues earned from selling surplus energy at a dedicated feed-in tariff on

the gross solar generation. After the loan is repaid (e.g., 5 years), ownership is transferred to the household which then benefits from self-consumption and standard net feed-in credits. The State Government covers the incremental subsidy increase in the first 5 years to pay the EPC at APPC.

**Peer-to-Government (P2G) Model:** The P2G model introduces direct energy trading between citizens and the government. Household self-consumes daytime solar generation. Surplus generation is sold to a designated government entity (e.g., schools, hospitals, or street-lighting accounts) at a premium tariff of ₹5.00/kWh. An escrow system channels all payments first toward repaying any government-backed loan, with excess credited to the household. Provides a stable, higher return than standard feed-in tariffs. Reduces payment risk through the escrow mechanism. Strengthens public infrastructure by supplying low-cost renewable power. A minimum five-year O&M contract is bundled into the initial installation cost, ensuring performance reliability. The P2G model aligns incentives by linking household adoption directly to the state's energy and infrastructure priorities.

**Super RESCO Model:** Under the Super RESCO model, a third-party developer fully owns and operates the solar assets, while households lease their rooftops or land. The gross generation is sold to the DISCOM. Existing electricity subsidies remain unchanged. Households receive a lease payment plus a solar incentive, calculated using a virtual net export mechanism that rewards reduced grid draw during solar hours. This model incentivises behavioural change without requiring households to assume financial or operational responsibility. And reduce cross-subsidy burdens on the state by lowering peak domestic and agricultural demand.

**Zero-Interest Finance Model:** Beneficiaries get the MNRE capital subsidy for purchasing a solar system and the remaining cost is covered by a zero-interest loan from the Tamil Nadu government, which is taken by the household. Interest is paid by the government, and there are no special payment security measures beyond normal loan terms. The principal repayment of the loan is made by the household from bill savings and from the sale of surplus solar energy to TNPDC.

*Table 5 Surya Ghar for low-income households, 25-year cost-benefit analysis*

Models	Metering Type	Consumer	Gov.	TNPDC
Model 1 - Market Driven	Net feed-in	14,491	14,281	22,187
Model 2- Full Subsidy	Net metering	53,010	8,604	7,137
Model 3- BOT	Net metering	48,492	(434)	35,555
Model 4- P2G	Net metering	29,943	1,75,167	35,969
Model 5- Super RESCO	Gross metering	65,209	-	81,272
Model 6- Zero-Interest Finance	Net feed-in	26,529	1,669	22,187

Source: Auroville Consulting, 2025

Note: These findings are based on a separate cost-benefit analysis conducted for Tamil Nadu's low-income rooftop solar households. Detailed assumptions and calculations are available in the source study.

## Key Insights:

The financial analysis of different business models highlights different trade-offs in value distribution.

- Under Market Driven model, model, households gain ₹14,491 over 25 years, while the state and TNPDCCL see savings (₹14,281 and ₹22,187, respectively).
- The Full Subsidy model maximises household benefit (₹53,010) but delivers limited savings to the government (₹8,604) and minimal utility gains (₹7,137).
- The BOT model provides strong benefits to both households (₹48,492) and TNPDCCL (₹36,555) but requires the state government to step up in its subsidy (increase of ₹435 over 25 years per household).
- The P2G model generates the largest fiscal savings for the state (₹1,75,167) and substantial utility benefits (₹35,969), but household gains are comparatively modest (₹29,943).
- The Super RESCO model delivers the highest household benefits (₹65,209) with no impact on TNPDCCL and no direct fiscal burden on the government.
- The Zero-interest finance model over the period of 25 years delivers benefits to the household (₹26,529) and TNPDCCL (₹22,187) and the government (₹1,669).

## CONCLUSIONS

Tamil Nadu's rising subsidy burden and inequitable benefit distribution demand a shift in how welfare is delivered. PMSG provides an opportunity to modernise subsidies by linking them to rooftop solar, converting recurring fiscal outflows into lasting household assets. With innovative business models, this transition can be achieved in ways that address the needs of households, the state, and the utility. The business models presented highlight the trade-offs across different approaches, showing how benefits and costs are distributed among stakeholders over the long term. This evidence is intended to inform decision-makers, enabling them to weigh policy priorities focused on household welfare, fiscal sustainability and utility performance and choose the pathway that best aligns with Tamil Nadu's welfare and energy transition goals.

## REFERENCES

1. Auroville Consulting. (2023). Electricity subsidy and a just energy transition in Tamil Nadu. Available at: <https://www.aurovilleconsulting.com/electricity-subsidy-and-a-just-energy-transition-in-tamil-nadu/> (Accessed: 10 September 2025).
2. Auroville Consulting. (2025). Advancing Distributed, Equitable Solar Energy in Tamil Nadu. Available at: <https://www.aurovilleconsulting.com/distributed-solar-energy-tamil-nadu/> (Accessed: 30 October, 2025)
3. Central Electricity Authority (CEA). (2022). Report on twentieth electric power survey of India (Volume I). Available at: [https://cea.nic.in/wp-content/uploads/ps\\_\\_\\_lf/2022/11/20th\\_EPS\\_\\_\\_Report\\_\\_\\_Final\\_\\_\\_16.11.2022.pdf](https://cea.nic.in/wp-content/uploads/ps___lf/2022/11/20th_EPS___Report___Final___16.11.2022.pdf) (Accessed: 10 September 2025).
4. Council on Energy, Environment and Water (CEEW). (2023). Residential rooftop solar market potential in Indian households. Available at: <https://www.ceew.in/publications/residential-rooftop-solar-market-potential-in-indian-households> (Accessed: 10 September 2025).



5. PM Surya Ghar National Portal (2025). Available at: <https://pmsuryaghar.gov.in/#/state-ut-wise-progress> (Accessed: 10 September 2025).
6. Government of India (GOI). (2024). PM Surya Ghar: Muft Bijli Yojana – Official launch and guidelines. Available at: <https://www.india.gov.in/spotlight/pm-surya-ghar-muft-bijli-yojana> (Accessed: 10 September 2025).
7. Government of Tamil Nadu (GoTN). 2025. NFSA Reports – Tamil Nadu. Available at: <https://tnpds.gov.in/pages/reports/pds-nfsa-report-state.xhtml>. Accessed on August 2, 2025.
8. Ministry of New and Renewable Energy (MNRE). (n.d.). State/UT-wise progress – PM Surya Ghar: Muft Bijli Yojana. National Portal for Rooftop Solar. Available at: <https://pmsuryaghar.gov.in/#/state-ut-wise-progress> (Accessed: 10 September 2025).
9. India Climate & Energy Dashboard (ICED): A one-stop data platform for India's climate, energy, economy and environment. Available at: <https://iced.niti.gov.in/> (Accessed: 10 September 2025).
10. PRS Legislative Research. (2020). Tamil Nadu budget analysis 2020–21. Available at: <https://prsindia.org/budgets/states/tamil-nadu-budget-analysis-2020-21> (Accessed: 10 September 2025).
11. PRS Legislative Research. (2021). Tamil Nadu budget analysis 2021–22. Available at: <https://prsindia.org/budgets/states/tamil-nadu-budget-analysis-2021-22> (Accessed: 10 September 2025).
12. PRS Legislative Research. (2022). Tamil Nadu budget analysis 2022–23. Available at: <https://prsindia.org/budgets/states/tamil-nadu-budget-analysis-2022-23> (Accessed: 10 September 2025).
13. PRS Legislative Research. (2023). Tamil Nadu budget analysis 2023–24. Available at: <https://prsindia.org/budgets/states/tamil-nadu-budget-analysis-2023-24> (Accessed: 10 September 2025).
14. PRS Legislative Research. (2024). Tamil Nadu budget analysis 2024–25. Available at: <https://prsindia.org/budgets/states/tamil-nadu-budget-analysis-2024-25> (Accessed: 10 September 2025).
15. PRS Legislative Research. (2025). Tamil Nadu budget analysis 2025–26. Available at: <https://prsindia.org/budgets/states/tamil-nadu-budget-analysis-2025-26> (Accessed: 10 September 2025).
16. Tamil Nadu Electricity Regulatory Commission (TNERC). (2020). Provision of tariff subsidy for the year 2020–21 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Order%20No%7240220211121.pdf> (Accessed: 10 September 2025).
17. Tamil Nadu Electricity Regulatory Commission (TNERC). (2021a). Generic tariff order for grid interactive PV solar energy generating system (GISS). Available at: <https://www.tnecr.tn.gov.in/Orders/files/TO-Order%20No%20251020211341.pdf> (Accessed: 10 September 2025).
18. Tamil Nadu Electricity Regulatory Commission (TNERC). (2021b). Provision of tariff subsidy for the year 2021–22 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Tariff%20Ord011020211659.pdf> (Accessed: 10 September 2025).
19. Tamil Nadu Electricity Regulatory Commission (TNERC). (2022). Provision of tariff subsidy for the year 2022–23 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-TO%2011%20of%202031020220639.pdf> (Accessed: 10 September 2025).
20. Tamil Nadu Electricity Regulatory Commission (TNERC). (2023). Provision of tariff subsidy for the year 2023–24 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Order%20No%205060420231033.pdf> (Accessed: 10 September 2025).
21. Tamil Nadu Electricity Regulatory Commission (TNERC). (2024a). Final tariff subsidy order for FY 2023–24 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Order%20No%20240620240232.pdf> (Accessed: 10 September 2025).
22. Tamil Nadu Electricity Regulatory Commission (TNERC). (2024b). Provision of tariff subsidy for the year 2024–25 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Order%20No%20150420241746.pdf> (Accessed: 10 September 2025).
23. Tamil Nadu Electricity Regulatory Commission (TNERC). (2025a). Additional tariff subsidy for FY 2025–26 due to the revision of tariff w.e.f. 01-07-2025 based on the Tariff Order No. 6 of 2025 dated 30-06-2025 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Order%20No%20030920251056.pdf> (Accessed: 10 September 2025).
24. Tamil Nadu Electricity Regulatory Commission (TNERC). (2025b). Provision of tariff subsidy for the year 2025–26 by the Government of Tamil Nadu. Available at: <https://tnerc.tn.gov.in/Orders/files/TO-Order%20No%20270320251635.pdf> (Accessed: 10 September 2025).
25. Tamil Nadu Power Distribution Corporation Limited (TNPDC). (2025). Data card – Tamil Nadu electricity distribution statistics. Available at: <https://www.tnpdcl.org/static/tnpdcl/assets/files/linkpdf/datacard/datacard.pdf> (Accessed: 10 September 2025).