Gujarat's Power Sector Transformation: Institutional Reforms, Ownership Models, and Equitable Tariff Design for Energy Transition

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Dedication

To my wife **Archana** and my daughter **Bhavya**,
whose love, patience, unwavering support, and constant inspiration were my greatest source of strength throughout this journey.

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I served as the Managing Director of Gujarat Urja Vikas Nigam Limited (GUVNL). My Executive PhD programme was approved by the Government of Gujarat, and the course fees were paid by GUVNL in accordance with the Government's directive.

The research presented in this thesis has been undertaken in my personal and academic capacity. The views, interpretations, conclusions, and recommendations expressed herein are solely those of the author and do not necessarily reflect the views, policies, or official positions of the Government of Gujarat, Gujarat Urja Vikas Nigam Limited (GUVNL), or any of its subsidiary or affiliated entities.

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Thesis Abstract

India's electricity sector reforms have strengthened generation and transmission; however, electricity distribution remains the binding constraint on sectoral sustainability, financially stressed, operationally heterogeneous, and increasingly disrupted by consumer-led renewable adoption. This thesis presents a three-essay, evidence-based analysis of Gujarat's distribution-sector transformation and derives policy and regulatory implications for advancing a sustainable and equitable energy transition in India.

Essay 1 explains how Gujarat emerged as a distribution-performance outlier despite facing structural constraints similar to those of other Indian states. The essay demonstrates that these improvements were not driven by a single intervention, but by a complementary reform package combining sustained network investment, digital and administrative reforms, and strong financial discipline.

Over FY2014-FY2024, Gujarat's DISCOMs invested approximately ₹87.3 billion in system strengthening and efficiency enhancement, reducing distribution losses from 15.62% (FY2014) to 8.46% (FY2024). On the financial front, the thesis identifies a distinctive liquidity strategy: payments to generators within seven days enabled ₹57.40 billion in prompt-payment rebates since FY2017-18 and a 96.16% reduction in short-term borrowings over five years. The utilities' strengthened financial position is reflected in a profit before tax of ₹74.5 billion in FY2023-24, a ₹0.90 per unit reduction in FPPPA during FY2024-25, and a ₹18.57 billion dividend payout to the Government of Gujarat, evidence that operational improvements translated into fiscal gains and consumer relief.

Essay 2 examines the widely held claim that private distribution utilities inherently outperform public utilities, leveraging a rare quasi-controlled setting in which public and private utilities operate under the same regulator and broadly comparable socio-economic conditions within Gujarat. Using regulator and utility-reported indicators for the period FY2014-15 to FY2023-24 (with AT&C loss and collection efficiency data extended to FY2024-25), the analysis finds that the private utility demonstrates superior reliability and profitability, albeit with persistently higher cost structures, raising concerns regarding cost efficiency and investment incentives under the prevailing rate-of-return (cost-plus) regulatory framework.

In parallel, Gujarat's public DISCOMs exhibit substantial performance convergence over time, driven by governance reforms and improved enforcement. Importantly, both ownership models demonstrate comparable renewable purchase obligation (RPO) compliance (average achievement of approximately 87% for the private utility and 90% for public DISCOMs), indicating that outcomes depend more on regulatory incentives and institutional capacity than on ownership alone. The essay's policy implication is therefore not a binary "privatize or not," but rather "design

incentives appropriately": strengthen performance-based regulation, tighten capital expenditure oversight, and align returns with service outcomes rather than asset expansion.

Essay 3 shifts the focus from performance to distributive justice in the energy transition by quantifying how renewable migration by high-paying consumers reallocates fixed-cost burdens onto "passive" consumers who remain dependent on DISCOM supply. Combining statutory and regulatory analysis with empirical modelling using Gujarat DISCOM data, the essay estimates that each 1% increase in the share of captive and open-access renewables raises the per-unit fixed-cost burden on passive consumers by approximately ₹0.05-₹0.09.

The analysis argues that the current framework, particularly the narrow statutory interpretation of the Additional Surcharge, does not adequately recover the full fixed-cost obligations being shifted. The thesis, therefore, proposes a cost-neutral, unified surcharge design alongside a phased reform pathway (including a review of existing exemptions) to restore tariff equity while preserving renewable investment incentives. Notably, even after applying the modelled cost-neutral surcharge, active consumers retain material savings under several configurations, implying that equity correction need not undermine the renewable business case.

Taken together, the thesis reframes distribution reform and the energy transition as a single institutional challenge: sustaining operational efficiency and financial viability while preventing regressive cost reallocation during decarbonization. Gujarat's experience is presented not as a template for mechanical replication, but as a policy logic, combining credible governance and financial discipline with regulatory designs that allocate grid costs transparently and equitably as the consumer base and technology mix evolve.

Gram Jyoti Yojna (2014) and Ujjwal DISCOM Assurance Yojana (UDAY). This early adoption not only gave Gujarat a first-mover advantage but also allowed it to shape the national discourse on power reforms. With strong political, social, and economic consensus, Gujarat institutionalized social trust that led to increased willingness to pay, improved collection efficiency, and created an environment of transparency and accountability. Many of these reforms later served as templates for national policies, especially during the tenure of the then Chief Minister of Gujarat in national leadership.

Moreover, Gujarat's reforms have not only yielded positive financial outcomes but have also positioned the state to better navigate emerging challenges in the power sector. As decarbonization accelerates, open access expands, and the demand for flexible grid operations increases, the Gujarat model offers a resilient approach that balances cost efficiency with sustainability.

This case study underscores the potential for other Indian states to adopt similar strategies to strengthen their power distribution utilities. The lessons from Gujarat's experience can serve as a roadmap for DISCOMs across India, enabling them to transition from financially distressed entities to sustainable, consumer-friendly power providers. By embracing this model, states can move towards a power sector that is both economically robust and future-ready.

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