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India's Electricity Future Depends on Politics — Not Just Technological Innovation

BLUF: Political economy considerations, not technological limitations, will determine whether electricity sector reform in India ultimately succeeds. This memo analyses the political and social constraints faced by four of India's most promising technological solutions and offers strategies to address them.

India faces massive electricity challenges, including frequent outages, the financial insolvency of utilities, and a lack of universal grid connectivity. While technological innovations promise substantial improvements, political realities and institutional inertia hinder their successful implementation. This memo assesses the political and social constraints holding back smart metering, electric vehicle charging, microgrids, and grid modernization programs, highlighting the opportunities these technologies offer and how to navigate lesser-understood political incentives to ensure meaningful and lasting progress.

1.) Smart Metering: Promise vs. Political Reality

Indian utilities face persistent problems with electricity theft and distribution leakages, suffering losses of over $8 billion in 2022-23, severely undermining their financial viability and causing chronic service disruptions. Smart meters offer a promising technological solution. Unlike traditional meters, which are prone to manipulation through selective access and illicit subsidies, smart meters wirelessly transmit accurate, real-time consumption data directly to utilities. This significantly reduces opportunities for theft and fraud, and consequently, distribution losses. However, local politicians actively hinder the deployment of smart meters, exploiting consumer fears by falsely suggesting that accurate billing will drastically increase electricity bills, especially for those benefiting from informal subsidies or free electricity through unchecked theft. This resistance is particularly pronounced in states such as Maharashtra, Bihar, Gujarat, and Tamil Nadu, where politicians leverage misinformation to protect existing systems of selective enforcement and patronage.

- **Recommendation:** Implement targeted public information campaigns explicitly highlighting how smart meters provide fair and transparent billing, linking accurate payments directly to improved electricity reliability and service quality. The idea that "you get what you pay for" can counteract political misinformation and align consumer interests with technological modernization efforts.

2.) EV Charging Infrastructure: Short-Term Optics vs. Long-Term Accountability

India faces the critical challenge of inadequate charging infrastructure, threatening the sustainability of its rapidly growing electric vehicle (EV) sector. As of March 2024, the country had only 16,347 public charging stations, insufficient to support the over 5.6 million EVs currently on the road. India's EV market is dominated by two-wheelers (58.49% of total EVs), and the charging infrastructure primarily consists of low-cost, AC slow chargers catering specifically to this segment.

Although strategically cost-effective and politically appealing as they are cheaper and faster to install, leading to immediate, visible results, exclusive reliance on AC slow chargers neglects the broader EV ecosystem, particularly cars and buses that require mixed-use (AC/DC) or faster DC charging infrastructure. This gap significantly discourages broader EV adoption, especially for residents living in multi-story dwellings without dedicated parking, who face practical constraints and resistance from housing societies in installing personal charging solutions.

Moreover, political attention disproportionately favors rapid installation over long-term operational sustainability. Government bodies, motivated by short-term electoral gains, prioritize the quantity of installations to signal quick achievements to voters, often neglecting maintenance funding and resulting in numerous non-operational chargers.

- **Recommendation:** Implement reforms that balance between incentivizing the installation of charging stations and ensuring their continuous maintenance. This will align political incentives with long-term infrastructure sustainability f and reliability.
- **Recommendation:** Promote private sector participation to speed up infrastructure growth, particularly by aligning private incentives with those of EV car and bus manufacturers to meet the broader market's needs.

3.) Microgrids and the Missing Market: When Marginalization Undermines Electrification

Despite India's significant strides in electrification, approximately 2.43% of households (roughly 32.85 million individuals) remain unelectrified, predominantly in rural areas of Uttar Pradesh, Madhya Pradesh, Rajasthan, Haryana, and Bihar. Large-scale microgrids offer a solution to electrifying disconnected regions while avoiding the considerable logistical and financial hurdles associated with central grid extension.

However, a paradoxical political-economic dynamic hinders their development. Governments typically underinvest in microgrids, opting instead for centralized grid projects that provide higher political visibility and electoral returns. Simultaneously, private sector investment in microgrids remains limited due to the anticipated expansion of the centralized grid undermining their long-term profitability. This mutually reinforcing reluctance creates a cycle where neither public nor private actors sufficiently support microgrids, severely hampering overall electrification efforts. In practice, a few independent actors and start-ups carry out the installation and maintenance of microgrids. They are unable to stay in business long enough to

provide long-term support for these systems, leading to abandoned mini-grids becoming "cemetery" like symbols of government failure.

- **Recommendation:** The government should establish explicit policy commitments that include guaranteed funding for microgrid development and maintenance, regulatory frameworks that protect private investments, and incentives for long-term private sector participation. For microgrids to be sustainable, it is crucial to increase resources, local knowledge, and training in repairing and maintaining these systems. In addition, explicit political accountability on this issue can create more stable conditions, ensuring sustainable and scalable decentralized electrification.

4.) Transmission Infrastructure Modernization: Backbone of Electrification vs. Political Gatekeeping

While microgrids are crucial for remote, disconnected regions, strengthening centralized transmission infrastructure remains equally important for regions where the central grid is economically sensible. In India, the central transmission infrastructure remains a critical bottleneck but receives much less attention than energy generation. Insufficient transmission capacity prevents generated power from efficiently reaching consumers, leading to stranded assets and underutilized renewable resources. For instance, renewable projects in states like Rajasthan and Gujarat often produce surplus power, but inadequate transmission lines limit effective distribution, undermining both financial returns and energy reliability.

High-voltage transmission lines represent a proven technological solution, effectively connecting power generation centers with distant consumption areas. Yet, political interests and governance failures significantly hinder transmission infrastructure development. Local political lobbying, patronage networks, and corruption frequently influence land acquisition processes and right-of-way (RoW) permissions, causing project delays or outright cancellations. Politicians, bureaucrats, and local authorities often exploit ambiguous land records or manipulate RoW permissions to serve private interests. For example, land mafia operations involving government officials regularly misappropriate or illegally occupy public lands, obstructing critical infrastructure development.

- **Recommendation:** The government should prioritize digitizing land records and making project timelines publicly accessible. Independent regulatory bodies with explicit oversight of land acquisition and RoW approvals should be established to reduce corruption and enhance accountability. Additionally, transparent community engagement processes can mitigate local resistance, facilitating smoother, more reliable transmission infrastructure expansion.

Conclusion

The path forward for India's electricity infrastructure modernization requires balancing technological potential with practical political strategies. While smart metering, EV infrastructure, microgrids, and upgraded transmission lines hold considerable promise, their effectiveness depends on addressing underlying political and institutional constraints. Future progress demands proactive engagement with stakeholders, clear and targeted initiatives to

inform the public of potential political exploitation of state-owned resources, and regulatory reforms designed to align political incentives with infrastructure goals. A tangible next step is for policymakers, utilities, and civil society groups to collaborate on pilot initiatives that explicitly tie infrastructure performance to political accountability, such as publishing real-time service quality data by constituency or linking central funding to verifiable improvements in service delivery. Without tackling the politics behind the power, even the best technology will ultimately remain unplugged.