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Politics, Procurement, Bail-Out and Buy-In: Woes and Ways of Rajasthan's Distribution Sector

Working Paper
Mapping Power Project

Siddharth Sareen
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Abstract

What are the recent consequential developments and current issues in Rajasthan's electricity distribution sector, bailed out of more than $10 billion debt by the state government in 2015? If political interference got it there despite sectoral reforms and unbundling in 2001, what measures have been instituted to safeguard against a repeat? As Rajasthan's distribution companies turn to technology adoption, efficiency enhancement, and loss reduction measures, this study offers an in-depth analysis of the sector's stakeholders and practices, capturing contrasting perspectives. Based on 30 expert interviews besides secondary research, it examines the political economy of distribution in Rajasthan, spanning concerns of various consumer categories and providing insights into the roles played by a number of institutions, from the regulatory commission to the renewable energy nodal agency. The article lays out key actors' expectations with regard to current developments on tariffs, renewable energy growth targets and compliance, the advent of competition and a franchisee model introducing private players in distribution, popular engagement, and demand-side management. Unpacking the current issues that characterise this sector, it argues that the prime state-level concerns are: the continuation of an organisational culture that led to heavy indebtedness despite recurrent attempts to bolster efficiency; continuing political influence rather than the autonomous functioning of discoms; the beginnings of a dual-track sector with private franchisees operating in urban areas; and an adverse configuration of incentives to ensure renewable energy growth.

Introduction

As with most Indian states, little social science research exists on electricity governance in Rajasthan. This demands rectification given the sector's size and socio-economic importance, but is unsurprising given the historically politicised nature of electricity distribution and the relative lack of attention it has received from researchers.[1] The latter is perhaps because social scientists shy away from the topic's technical nature and the challenges of accessing relevant sectoral information. This unfortunately means that despite publicly available statistics, contradictory figures and data gaps abound,[2] necessitating a multi-stakeholder perspective to approximate truth values from numerous "social facts" through triangulation. As this study shows, some very revelatory aspects can be unearthed by scratching just below the surface.

These indicate a sector that has been passing through turmoil: whether it is poised at a definitive moment or simply continuing to go through business-as-usual moments is something time will tell. Recent history shows that certain current developments, accompanied by tendencies entrenched within the sector, can combine to make for highly unpalatable socio-economic outcomes, with the state's populace bearing their brunt, such as a bailout of electricity distribution companies (discoms) worth more than $10 billion in 2015. An informed understanding is required to ensure that such combinations do not come to pass anymore. This is the key intent directing the focus of this piece.

The next section provides a sectoral overview, and situates it historically within the contemporary political economy of Rajasthan, focusing on the first two of three time periods: first, on the 1990s, when electricity sector reforms got off the ground in India; second, on initial developments since the

[1] Sovacool, Benjamin K. "What are we doing here? Analyzing fifteen years of energy scholarship and proposing a social science research agenda." *Energy Research & Social Science* 1 (2014): 1-29.
[2] Nagaraj, Rayaprolu. "How good are India's industrial statistics? An exploratory note." *Economic and Political Weekly* (1999): 350-355.

unbundling of the Rajasthan State Electricity Board (RSEB) in 2000, when the distribution sector was formally separated from generation and transmission. These periods broadly correspond with two significant shifts in state politics: from 1990, when the Bharatiya Janata Party (BJP) came into power for the first time in Rajasthan, to 1998, and then the Indian National Congress (henceforth Congress) and BJP terms during 1998-2008.

The subsequent section takes up the third period, focusing on recent changes during 2008-present, such as the advent of independently regulated competition and renewable energy, that currently require greater academic attention.[3] It presents and uses findings to diagnose the current problems facing the distribution sector and situate the key perspectives and roles of sectoral stakeholders within Rajasthan's political economy. This section is based on 30 expert interviews (some with two interviewees) conducted during August 2016 in Rajasthan's capital, Jaipur, with current or former top- and middle-management from various institutions. They included four experts from the regulatory commission, seven from the distribution companies, three from the state government energy department, one from a law firm, four from energy consultancies, four from civil society, two from academia, three from business associations, two from the renewable energy nodal agency, two from private renewable energy enterprises, and two from media houses. Interviews lasted between half and two-and-a-half hours, with the median length being an hour. A concluding section highlights the main current concerns and discusses what they reveal about sectoral development.

I. Sectoral Development and Rajasthan's Political Context During the 1990s and Early 2000s

This section provides an overview of the extent and institutional structure of Rajasthan's distribution sector as well as the political history of the state during the 1990s and early 2000s, bearing in mind that regional politics often influence sectoral dynamics due to the importance of electricity supply to domestic, agricultural, and industrial consumers' everyday lives.[4] Of Rajasthan's 43,264 villages, all but one had been electrified by the beginning of 2017.[5] Within the past decade, Rajasthan has moved to being an energy-surplus state, though it is still some way from having electrified every rural household due to distribution challenges.[6] While there is still some load shedding in rural and remote areas to balance supply and demand (e.g., during peak hours), power cuts are a thing of the past in urban areas, as the lack of once-ubiquitous diesel generators provides silent testimony for. With an area of 3,42,239 sq. km., Rajasthan has a total installed capacity of 17,924 MW, which is 5.9 percent of the national total of 303,118 MW.[7] This serves 6.9 crore people, or 5.7 percent of India's population of 121 crore, spread out over 10.4 percent of India's 32.87 lakh sq. km. area, making distribution across a relatively scattered population a more costly proposition than the national average.[8]

[3] Dubash, Navroz K., and D. Narasimha Rao. "Regulatory practice and politics: lessons from independent regulation in Indian electricity." *Utilities Policy* 16, no. 4 (2008): 321-331.
[4] Kale, Sunila S. "Current reforms: the politics of policy change in India's electricity sector." *Pacific Affairs* (2004): 467-491.
[5] Ministry of Power, Government of India (2017). Accessed 8th March 2017, http://garv.gov.in/assets/uploads/reports/statesnaps/Rajasthan.pdf.
[6] The MOP definition of "electrified" village for 2004-2005 onward refers to the provision of basic distribution infrastructure, supply to public facilities and to at least 10 percent of the total households in a village (vide MOP letter No. 42/1/2001-D(RE) dated 5th February 2004 and its corrigendum vide letter no. 42/1/2001-D(RE) dated 17th February 2004).
[7] Central Electricity Authority figures till 30 June 2016.
[8] Census of India 2011.

The sector looked rather different in 1990, when the BJP came into power for the first time in Rajasthan's Congress-dominated history, heading a coalition for two years followed by a year of President's Rule and a five-year BJP term under Chief Minister Bhairon Singh Shekhawat. The latter also served as chief minister during the late 1970s in Rajasthan's only other non-Congress government in the form of the Janata Party, a precursor to the BJP. With power sector reforms on the anvil nationally, the Rajasthan government decided to go in for power sector reforms in 1993, issued a Broad Reform Policy Statement in 1995, which was revised in 1997 and 1998 and adopted in 1999 (cf. Table 1). In the meantime, shares in total sale of power went down from 40.26 percent in 1995 to 28.44 percent in 2002 for industry, while going up from 30.40 percent in 1995 to 39.77 percent in 2002 for agriculture. Per capita consumption of electricity went up from 201 kWh in 1990 to 334.50 kWh in 2000, and Rajasthan's total installed capacity in 2000 was 1,872 MW.[9] Meanwhile, transmission and distribution (T&D) losses lingered just under the 30 percent mark, and aggregate technical and commercial (AT&C) losses, including theft, were even higher.

Table 1: Timeline of political and power sector events, 1949–2016

Political events	Year	Power sector events
Rajasthan formed	1949	Electrified towns/villages: 42, installed capacity: 13 MW
	1957	Rajasthan State Electricity Board (RSEB) formed
State's first BJP government	1990	Power sector reforms commence
Congress back in power	1998	Central Electricity Regulatory Commission Act
	1999	Rajasthan Power Sector Reforms Act passed
	2000	Rajasthan Electricity Regulatory Commission (RERC) established; RSEB unbundled into five state electric companies: • Generation company: Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RVUN) • Transmission company: Rajasthan Rajya Vidyut Prasaran Nigam Ltd. (RVPN) • Three regional distribution companies each serving 10-12 of 33 districts:

[9] Planning Commission (Power and Energy Division), Government of India. The Working of State Electricity Boards & Electricity Departments. Accessed 24 March 2017, http://planningcommission.nic.in/reports/genrep/seb/ar_seb02.pdf

		○ Jaipur Vidyut Vitran Nigam Ltd. (JVVNL) ○ Ajmer Vidyut Vitran Nigam Ltd. (AVVNL) ○ Jodhpur Vidyut Vitran Nigam Ltd. (JdVVNL)
BJP back in power with Raje	2003	Central Electricity Act passed, ERC Act effective 10th June 2003; RERC poised to play more effective role in sector development
	2007	RERC (Renewable Energy Obligation) Regulations
Congress back in power with Gehlot	2008	
	2010	RERC (Renewable Energy Certificate and Renewable Purchase Obligation Compliance Framework) Regulation
	2011	Rajasthan Solar Energy Policy
BJP back in power with Raje	2013	Approval of PPAs signed for 1,975 MW with power companies
Raje government raises tariff by 16 percent; loses 3 of 4 by-elections	2013-14	
Raje government does not raise power rates in 2014-15, wins both municipal and panchayat elections	2014-15	
Raje government raises tariff rates by 16% in 2015-16 after elections	Aug 2016	RERC approves cancellation of 7 out of 9 PPAs, worth 1,475 MW
Raje government joins Ujwal Discom Assurance Yojana (UDAY); Rajasthan first state to adopt it	Dec 2015	State discoms struggle to stay afloat

	2016	Rajasthan State Electricity Distribution Management Responsibility Act passed to hold discoms accountable for their performance
	Mar 2016	Rajasthan issues Rs. 28,455 crore in bonds to 26 banks at 8.39 percent under UDAY to clear part of power sector debt

State reforms took the form of the Rajasthan Power Sector Reforms Act, 1999, which came into force on 1 June 2000 and was aimed at attracting investment, improving efficiency, and enabling growth. The World Bank supported these developments through a $180 million Rajasthan Power Sector Restructuring Project, at a time when government subsidy requirements were $370 million during 2000 alone.[10] Besides unbundling the RSEB into generation, transmission, and three distribution companies, reforms sought to phase in private participation in distribution in the form of converting the public distribution companies or discoms into joint venture companies. This was even recognised as a promising move by researchers, but failed to take off over the years.[11] What has happened, however, is greater investment in the distribution sector, which has been recognised as lagging behind, now that generation and transmission have relatively come of age with private participation and adequate infrastructural development (compared to 223 substations and 17,325 km of electrical high voltage lines in 2001, Rajasthan had 482 substations and 32,515 km of transmission lines in 2015).[12] These latter accomplishments are laudable, especially given Rajasthan's low hydropower profile and its distance from coal pitheads; these factors add heavy transport costs to thermal generation and render transmission planning-intensive and costly across the sprawling state.[13]

In the decade and a half since unbundling, the installed capacity has grown almost ten-fold, but AT&C losses (as T&D plus commercial losses have in the meantime come to be commonly referred to) have remained well above 20 percent. In the meantime, Rajasthan has alternated between stable Congress and BJP governments serving five-year terms, with the electorate swapping out the incumbent party in every state election. Each term has seen shifts in political vision, meaning that one coherent policy for the electricity distribution sector to persist with has been lacking. While the historical nuancing of these political shifts is beyond the scope of this piece, some examples below suggest that the BJP has tended to follow market logic by commodifying power (the "nursery scheme"), whereas Congress' model can be characterised as an electricity-as-public-good model (then-Chief Minister Ashok Gehlot's high-rate, short-term power purchase agreements, or PPAs).[14] In any case, as Table 2 shows, the lack of a

[10] The World Bank, Report No. 20768-IN, Project Appraisal Document, Energy Sector Unit, South Asia Region, 2000, accessed 5 January 2017, http://documents.worldbank.org/curated/en/290151468752402493/text/multi-page.txt

[11] John P. Banks, C. Douglas Bowman, Thomas P. Gross, and Jim Guy, "The private sector: cautiously interested in distribution in India." *The Electricity Journal* 11;5 (1998): 21=–28.

[12] Rajasthan Rajya Vidyut Prasaran Limited, "Plan Wise Progress," 2016, accessed 5 January 2017, http://energy.rajasthan.gov.in/content/raj/energy-department/rajasthan-rajya-vidyut-prasaran-limited/en/about-us/plan-wise-progress.html

[13] Interview with Rajasthan Urja Vikas Nigam Limited representative on 23 August 2016.

[14] The point here is that the BJP and Congress claimed differences in their economic policies; regardless of whether there actually were distinctive differences in their governance approaches, this rhetoric made envisioning a consistent distribution

consistent planning approach has spelt financial disaster for the sector, with the average cost of supply (ACS) far exceeding the average revenue realised (ARR) per unit. Notably, this has happened despite post-election stability: during Congress' last two terms in power in the state, 1998-2003 and 2008-13, Gehlot held two five-year tenures as chief minister. Vasundhara Raje, the incumbent BJP chief minister since December 2013 and the first woman to hold that post in Rajasthan, comes from a political family and also served as chief minister during 2003–2008, the party's previous five-year period in power. This suggests a lack of political will on the part of each ruling party to implement tough measures to rectify sectoral finances—a phenomenon that has long characterised power sector reforms in Indian states.[15]

Table 2: ACS, ARR, direct subsidy received, and percentage AT&C losses, 2011–14

AVVNL	ACS (Rs/kW)	ARR (Rs/kW)	Subsidy (Rs/kW)	AT&C loss (%)	**JVVNL**	ACS (Rs/kW)	ARR (Rs/kW)	Subsidy (Rs/kW)	AT&C loss (%)
2011-12	8.35	2.74	0.37	28.12	2011-12	6.04	2.76	0.36	23.18
2012-13	6.19	3.25	0.47	19.90	2012-13	5.51	3.18	0.43	20.91
2013-14	7.14	3.90	0.30	22.04	2013-14	6.16	3.51	0.28	31.08
JDVVNL	ACS (Rs/kW)	ARR (Rs/kW)	Subsidy (Rs/kW)	AT&C loss (%)	**State total**	ACS (Rs/kW)	ARR (Rs/kW)	Subsidy (Rs/kW)	AT&C loss (%)
2011-12	6.66	2.41	0.32	23.83	2011-12	6.90	2.64	0.35	24.81
2012-13	5.81	3.02	0.36	18.97	2012-13	5.80	3.15	0.42	20.00
2013-14	6.49	3.61	0.19	25.69	2013-14	6.54	3.65	0.25	26.76

Source: Power Finance Corporation Limited, Report on the performance of state power utilities 2011-12 – 2013-14 (July 2015)

To its detriment, the power sector has been critically linked to electoral success in political perception, especially given the importance of agricultural connections to the vote bank of farmers in this desert state,[16] with the added complexity of balancing pumping with sustainable groundwater extraction, as reflected in the high per-unit negative impact of the agricultural subsidy provided by the government.

sector trajectory unlikely. On politics during this period, see: Baldev Raj Nayar, "The limits of economic nationalism in India: Economic reforms under the BJP-led government, 1998-1999." *Asian Survey* 40;5 (2000): 792–815.

[15] Rahul Tongia, "The political economy of Indian power sector reforms," Program on Energy and Sustainable Development Working Paper 4, 2003.

[16] The farmer vote bank has enormous political significance in Rajasthan with its 75.13 percent rural population (Census of India 2011), of which 78.4 percent are agricultural households and 52.8 percent report farming as their principal income source (National Sample Survey Organisation, 2012-13).

An example is the pro-large-farmer "nursery scheme" which ran during the late 1990s during a BJP government that allowed better-off farmers stuck in agricultural connection pendency queues numbering into the lakhs to pay installation costs in full (50,000 rupees per connection instead of the subsidised 5,000 rupees) and purchase power at premium rates, helping fund grid expansion into off-grid areas (including 10,000 new transformers and some cushion for 33 kV stations)[17] without financially burdening the sector. Approximately 85,000 connections were taken out through this scheme, and P.N. Bhandari, then chairman of the RSEB, was named one of Power Line magazine's two "heroes of 1997", having grown RSEB revenue from 130 to 300 crore rupees per month. The magazine minced no words in explaining his transfer after three terms as chairman thus: "Bhandari was transferred for the usual reason – those nefarious vote banks. Although he had managed to persuade even a large number of even opposition politicians about the good sense of a higher tariff and the success of his well-known nursery scheme … it seems the chief minister, Bhairon Singh Shekhawat (when it became clear elections would be held) came under strong pressure from other BJP ministers and Members of Legislative Assembly (MLAs) unhappy at not being able to promise connections in return for votes, to remove Bhandari from the post."[18]

The scheme was discontinued when the Congress came into power in 1998, then revived in the form of approximately a lakh free agricultural connections a year targeted at appeasing smallholder farmers, which required investment disproportionately exceeding the sector's finances at that time. As an experienced energy consultant explained: "This was counterproductive for many reasons. It depleted the already low water table very quickly. Plus it unduly increased the number of subsidised connections. The major income source was industry. But the major consumers became subsidised agricultural users."[19] To date, agricultural tariffs remain heavily subsidised by whichever political party is in power, with metered farmers paying Rs. 0.90 per unit after subsidy under either party's rule.[20]

In general, the state follows a progressive tariff structure, with energy charges per unit rising with higher consumption levels, which during 2014-15 ranged from Rs. 3.50 to Rs. 6.40 for domestic consumers, from Rs. 6.75 to Rs. 7.85 for non-domestic consumers, from Rs. 4.50 to 5.70 for agricultural consumers (though most of this is paid through agricultural subsidy,[21] as elsewhere),[22] and from Rs. 5.35 to Rs. 6.50 for industrial consumers.[23] These tariffs are set by the Rajasthan Electricity Regulatory Commission (RERC), a formal body established in 2000 that adjudicates on petitions raised by various stakeholders following centrally-mandated guidelines. In 2013–2014, Rajasthan's consumer type break-up was 77.27 percent domestic, 10.25 percent agricultural and 2.07 percent industrial, with other categories accounting for 10.39 percent of the total consumers.

Since unbundling in 2000, the state's power is distributed by three regional discoms—Jaipur, Ajmer and Jodhpur—which cover 72,474, 87,256, and 1,82,509 sq. km. across 2.56, 2.29, and 2.03 crore people, respectively. This means average population density in these three discoms' service areas is 354, 263 and 112 persons per sq. km. respectively, compared with a national average of 382 persons per sq. km.[24]

[17] "Power game: Win some, lose some," *Power Line*, 7 December 1997.
[18] "The heroes of 1997," *Power Line*, February 1998.
[19] Interview with energy consultant on 9th August 2016.
[20] Rajasthan Electricity Regulatory Commission Annual Report Financial Years 2011-12 and 2014-15.
[21] In 2013-14, metered farmers supplied in block hours paid 0.90 rupees per unit and those also receiving supply outside blocks paid 2.10 rupees per unit after subsidy, while flat metered farmers paid 15 rupees per HP for block supply after subsidy.
[22] Narendranath, G., Uma Shankari, and K. Rajendra Reddy. "To free or not to free power: Understanding the context of free power to agriculture." *Economic and Political Weekly* (2005): 5561-5570.
[23] Rajasthan Electricity Regulatory Commission Annual Report Financial Year 2014-15.
[24] Ibid.

Figure 1 shows the discom areas. As Table 3 shows, sales break-ups by consumer categories vary widely across discoms, with Jodhpur having the highest share of agricultural sales and lowest share of industrial sales, Jaipur the lowest share of agricultural sales, and Ajmer the highest share of industrial sales.

Figure 1: Areas of Ajmer, Jodhpur and Jaipur discoms in Rajasthan

Source: Government of Rajasthan Energy Portal

Table 3: Numbers, percentage sales, ARR, and total revenue recovered by consumer category, 2007–2008 and 2014–2015

Consumer category	Sales (%)			ARR (Rs/kWh)			Total RR (Rs crore)		
	A	JD	J	A	JD	J	A	JD	J
2007–2008									
Domestic	16.83	18.31	20.94	2.61	2.58	2.84	321	341	542
Agricultural	36.18	42.96	26.28	1.43	1.30	1.36	377	402	326
Industrial	35.68	20.48	34.88	3.94	5.22	3.89	1027	772	1237
Others	11.31	18.25	17.90	4.12	2.39	4.31	341	315	705

2014–2015									
Domestic	22.68	17.47	23.01	4.13	4.11	4.23	1210	1149	1722
Agricultural	36.92	55.08	29.67	4.18	4.21	4.11	1993	3705	2153
Industrial	28.65	13.18	30.54	5.48	5.49	5.39	2024	1157	2911
Others	11.75	14.27	16.78	6.14	5.37	5.55	930	1226	1646

Source: Ministry of Power figures. Key: A = Ajmer, JD = Jodhpur, J = Jaipur (discoms).

Having been among the first states to institute power reforms and unbundle its electricity board, Rajasthan was regarded as a success story of sorts till as late as 2007. However, the fact that AT&C losses ranged between 37-45 percent from the beginning of unbundling till 2007 (cf. Table 4) suggests that the sector was characterised by mismanagement rather than efficiency gains. A study on employee productivity shows JVVNL's performance well below that of national or private sector utilities, with 5.06 employees per 1,000 customers served and an employee cost of 0.51 rupees per unit during 2009–2010 (p. 28), and a damning statement on operations and maintenance (O&M) costs: "the majority of JVVNL's O&M costs are directed towards employees and administration" (p. 31).[25] Thus, these problems have recently come home to roost, as the next section picking up this narrative shows.

Table 4. T&D loss percentages for Rajasthan, 2002–2011 (after unbundling of sector)

Year	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
T&D loss (%)	43	44	43	45	37	35.5	31.9	29.9	27.6

Source: State Electricity Boards & Annual Report 2011-12 on Working Report of State Power Utilities

II. The Political Economy of Distribution in Recent Years

During Congress' 2008–2013 term, it became hard to deny that things had gone downhill: in 2009, Gehlot put a five-year moratorium on tariffs for farmers (arguably with an eye on 2009 national elections, which the INC won), compounding the detrimental financial impact of static tariffs since 2004 during the BJP's term; he then approved power purchase for up to Rs. 9.03 per unit from private

[25] CRISIL, "Study of various power distributions in India," (2011), accessed 24 March 2017, http://planningcommission.nic.in/reports/genrep/hlpf/ann6.pdf.

producers, compared to a highest rate of Rs. 4.50 per unit in 2011.[26] During difficult years of low frequency, low voltage and insufficient power on the national grid, it was not unheard of for the discoms to execute short-term power purchases at astronomical rates close to Rs. 20 per unit.[27] Losses piled up, with banks for instance declining a Rs. 8,300 crore loan to the state's discoms in 2012-13.[28] As things transpired, tariffs were increased at an average of 10 percent across consumer categories during 2011–2016 (both by Gehlot's Congress and Raje's BJP government after the latter had come back to power in 2013, though maintaining subsidised agricultural tariffs), which is marginally above the national average of 8 percent.

Despite these measures, the state wound up with a share of more than one-sixth in the national discom debt of Rs. 4,37,000 crore, or approximately Rs. 11,600 per capita for its population. Debt increased rapidly, more than tripling between 2010 and 2015, by which point the revenue gap was 2.71 rupees per unit despite an ARR of 5.77 rupees, reflecting the impossibility of making ends meet with an ACS as high as 8.83 rupees.[29] At the end of 2015, Rajasthan joined the Ujwal Discom Assurance Yojana (UDAY), a scheme to restructure debt and reform the sector towards profitability, which implied a Rajasthan government takeover of 75 percent of its discoms' debt from September 2015 levels, i.e., Rs. 60,500 crore out of Rs. 80,500 crore over a two-year time frame, with the balance Rs. 20,000 crore to be re-priced or issued as state-backed discom bonds at coupon rates 3 percent lower than existing interest rate. This followed a recent major financial restructuring of the sector during the Financial Restructuring Plan of 2012, in which 38,000 crore rupees of the erstwhile RSEB's short-term liabilities were recast.

The net benefit through UDAY was estimated at Rs. 21,000 crore by way of savings in interest cost, reduction in AT&C losses, interventions in energy efficiency, coal reforms etc.[30] In March 2016, the state government issued Rs. 28,455 crore in bonds to 26 banks at 8.39 percent. The annual debt servicing burden of the discoms, which was over Rs. 9,000 crore, has been reduced by more than Rs. 6,000 crore, with the 3 percent lower interest rate sparing a further Rs. 1,000 crore annually.[31] UDAY requires a planned trajectory of reducing AT&C losses to 15 percent by 2020 through ongoing reforms targeted at enhancing efficiency from levels as high as 50.84 percent in 2003–2004,[32] of which 44 percent were T&D losses, as Table 4 shows.

While in 2012–2013 they seemed on course to approach 20 percent by 2015–2016, AT&C loss levels remain volatile and have shot back up to over 27 percent at present, leading more than one interviewed stakeholder to raise an eyebrow and wonder about the accuracy of previous figures showing reductions in losses, since their basis in terms of gains on the ground seems impenetrable. Critics mused that losses shot up during unbundling as well, wryly pointing out that the RSEB must have been cooking its books

[26] Dipti Sharma, "Changing scenario of Indian electricity supply industry: Study of short-term power market in India." In *Energy security and development: The global context and Indian perspective,* edited by B. Sudhakara Reddy and Sergio Ulgiati. Springer, 2015: p. 356.
[27] Interview with project management consultant, 7 August 2016. See also: Central Electricity Regulatory Commission, "Monthly report on short-term transactions of electricity (November 2010)," accessed 9 March 2017, http://cercind.gov.in/2010/MMC/MMC_Report_Nov_2010.pdf. This reports a highest short-term purchase price of 17.46 rupees per unit and several over 12 rupees per unit during November 2010 across several Indian states, including Rajasthan.
[28] Rohit Parihar, "Rajasthan CM Ashok Gehlot bankrupts his power companies, banks deny loan," *India Today*, 6 August 2012.
[29] JVVNL, "A presentation on present financial position of distribution sector in Rajasthan," 22 July 2015.
[30] PTI, "Rajasthan issues Rs 28,400 crore bonds to 26 banks under UDAY scheme," *The Economic Times*, 16 March 2016.
[31] Interview with JVVNL representative, 26 August 2016.
[32] Power Finance Corporation, "State Wise Aggregate Technical and Commercial (AT&C) Losses From 2002-03 to 2009-10," http://www.powersector.in/content/state-wise-aggregate-technical-and-commercial-atc-losses-2002-03-2009-10.

for many years to see such high increases overnight.[33] While this is difficult to ascertain, lack of transparency in sectoral finances despite audits is considered partly inevitable, given that accounting follows an annual period, making tracking discrepancies over shorter periods rather hard for anyone but the RERC, which lacks incentive to expose discoms' accounting practices.[34] A Department of Energy representative confirmed that showing debts as asset build-ups on balance sheets rather than as losses in annual reports over the years is a problem.[35] What is clear is that total costs have outstripped revenue generation too much for financial sustainability.[36] Rajasthan is already failing to meet its targets under UDAY, and it has meanwhile taken on other loans, including the World Bank's Electricity Distribution Reform Development Policy Loan for Rajasthan, $250 million provided as the first of a two-part programme under the 24x7 Power for All objective.[37]

Discoms have been dug into a financial hole at least partly due to state government interference and repeatedly bailed out, with a Department of Energy official stating frankly that "It is an issue of votes *isliye uljha hua maamla hai*" ("which is why things are all knotted up"), meaning the government sees electricity distribution as a tough issue, fraught with politics.[38] Discoms are trying to up efficiency through various measures, and the RERC is keen to ensure they pull through. An RERC official said that they have alerted discoms that inefficiency is unacceptable and signalled that no prolongation will be possible in some matters, explaining that "When things have deteriorated, they need some time to improve, but discoms are interested."[39]

But both discoms and the RERC seem to lack teeth, given that the top management of discoms is bogged down with enormous volumes of work and that both bodies witness frequent changes in key personnel who are appointed by a committee largely determined by the state government. For instance, a former RERC employee said that the Board of Directors of the discoms is full of government representatives and that ARR and tariff petitions already get politically modulated in going through them, indicating that the process of fixing tariffs is not independent of politics despite the introduction of the RERC.[40] A former discom employee admitted to having stepped down shortly into his term due to entrenched politics: "Why is there loss? Because while the electricity sector has been described as autonomous, it has never been so … Even decisions like whether or not to even *make* a substation are up to political party people. So losses are the cost of politics in the sector."[41]

Other factors contributing to inefficiency include that discom field staff fail to act in an empowered manner due to a combination of lacking skills upgrades and individual incentives, manpower shortages and transfers, and insufficient support from ground administration to curb theft, as research also

[33] Interviews with Rajasthan Chamber of Commerce and Industry representatives, 11 August 2016, and with an energy consultant, 19 August 2016.
[34] Interview with consultant and auditor, 17 August 2016.
[35] Interview with Department of Energy representative, 5 August 2016.
[36] International Institute for Sustainable Development, "An assessment of the financial sustainability of the electricity sector in Rajasthan: GSI report" (2016), accessed January 5, 2017, https://www.iisd.org/sites/default/files/publications/assessment-financial-sustainability-electricity-sector-rajasthan.pdf.
[37] For details of this loan, see the World Bank's program document: http://documents.worldbank.org/curated/en/641031467994710244/pdf/103586-PGD-P157224-R2016-0038-1-Box394865B-OUO-9.pdf, accessed on 9 March 2017.
[38] Interview with Department of Energy official, 17 August 2016.
[39] Interview with RERC official, 3 August 2016.
[40] Interview with former RERC employee, 5 August 2016.
[41] Interview with two former RERC and discom employees, 17 August 2016.

shows.[42] An experienced consultant explained that there are only "a few technically informed officers who are planning for retirement" by gaining a sound technical understanding of the sector so they can continue as consultants afterwards, noting that "If you hire two CAs [chartered accountants] in the regulatory cell, they should stay there. But they are moved into other departments, so knowledge continuity suffers. The private sector keeps experts along verticals. Here knowledge-driven departments don't maintain human resource expertise. Most departments are only full of engineers, no CAs, and engineers cannot understand all the finances and calculations. The possibility of equipping functional departments with technically informed people is undermined by transfer practices."[43] A senior journalist concurred, saying he was shocked that chief engineers (CEs) had not been promoted for 20 years, but kept getting two-year extensions. Noting that the current superintending engineers (SEs) are the ones responsible for financial disaster and are still running things while no CEs are being promoted, he pronounced that "restructuring is not possible with the same workforce."[44]

An official from one discom pointed out that they are finally starting to use individual-level incentives in the current feeder renovation programme, with an employee from another discom explaining: "The biggest challenge from the earlier feeder renovation programmes is fixing responsibility at the assistant engineer at the subdivision level and ultimately at the feeder level" through linemen-in-charge.[45] During the period immediately preceding fieldwork in August 2016, a flurry of activity in line with such attempts was visible, through standing orders issued by the chairman of the discoms to, for example, institute feeder in-charges on 11kV rural feeders for regular monitoring of multiple parameters; specify measures for acting on losses above 15 per cent; ensure adequate field staff training through sample installations of transformers and connections; and put in place an anti-theft vigilance squad besides regular multi-level monitoring.[46] Moreover, it is key that the chairman of the discoms is able to gain support from the district administration by signaling ruling politicians regarding the importance of being able to actually implement functional efficiency measures (such as feeder renovation and separation and meter repair and installation) without any political meddling with discoms' field staff. This seems as crucial as unlikely, given a former RSEB employee's wry observation that "there is still so much political patronage. Even a senior engineer will have greater loyalty to his local MLA than to his MD [managing director], who can do nothing. Even if he wants to have the engineer transferred, he will have to go via the Chairman who will end up going to the MLA."[47] Indeed, a meeting with a senior discom official was interrupted by a phone call from a politician to all appearances demanding the transfer of a field employee, which the official frustratedly indicated compliance with. These pressures were apparent in various interviewees' asides about cost recovery measures being politically infeasible in some neighbourhoods dominated by Muslims, Scheduled Tribes, Scheduled Castes, or powerful Hindu castes, as well as from politically well-connected rural and agricultural consumers. Given that this encompasses a vast potential body of consumers, it goes some way towards explaining the large commercial losses discoms face.

Current attempts by discoms to improve their organisational culture—such as harnessing the contributions of consultants for uptake by staff for more efficient systems and applying individual incentives and disincentives to feeder-level staff for enhanced billing and collection—are important

[42] Sudhir Kumar Katiyar. "Political economy of electricity theft in rural areas: A Case Study from Rajasthan." *Economic and Political Weekly* (2005): 644-648.
[43] Interview with a project management consultant, 7 August 2016.
[44] Interview with senior journalist, 18 August 2016.
[45] Interviews with discom employees on 26 August 2016 and 23 August 2016, respectively.
[46] For full texts of circular orders, see www.jaipurdiscom.com/chairman_circulars.shtml, accessed 24th March 2017.
[47] Interview with former RSEB employee, 9 August 2016.

moves toward ensuring quality service and satisfying consumers who are paying higher tariffs and have increased expectations. A Department of Energy official explained: "The consumer is not concerned with finance. He wants a service" which should be 24x7, affordable, and good quality, with a new connection available quickly without too much paperwork, hassle-free billing, a convenient payment facility, and options for grievance redressal.[48] But management remains top-heavy, and positive results of efficiency measures, which have been tried in similar form with a lot of lip service, are yet to be seen, with only Jodhpur discom showing signs of having begun reaping some benefits in bringing down losses in 2015-16 based on implementing feeder separation in earnest. This study could not pin down the exact reasons for this, although preliminary probing suggested a combination of proactive management and technological upgradation, low political interference (being away from Jaipur) and a reasonable balance of high-tariff industrial and low-tariff agricultural consumers. Meanwhile, state-wide pendency in agricultural connections remains in excess of 3 lakhs, which a senior discom representative attributed to infrastructure expansion being expensive and involving a subsidy for which the state government specifies an annual cap.[49]

Procurement remains an area that requires greater attention, with true competition being limited by few prospective suppliers in some cases. A simple example of stationery procurement is illustrative, where one discom had secured a low-cost bid for its tender because the bidder had not factored in an updated requirement of 80 grams per square meter (gsm) rather than 70 gsm paper. Another discom, unable to get the same rate from the single bidder, was at a loss for how to accept a higher bid for the same service, as this would cause problems during audit. In the absence of sufficient guidelines, staff discussed ad hoc solutions such as using existing stock of 80 gsm paper and contracting a government press to print the ledgers. This lack of adequate guidelines is also reflected in a tendency to go with lower bids without adequate control procedures to check for knock-on effects of resultant low quality or time lags in delivery. As a consultant explained, state tenders do not have transparent technical assessment, which leaves scope to prefer so-called L1 over L2 bidders in order to lower costs, even if the L2 bidder is offering better quality and good value for the service to be provided. Since state discoms "just pull in known members who don't understand the technical aspects", scoring committees lack expertise and independent members, and the lack of objective criteria leaves room for political maneuvering.[50] A business association representative complained about bureaucratic procedures: "Between JVVNL and RSEB the only change is in name and in accounting principles … When you bring private vendors into distribution, have a very clear-cut exit policy", emphasising the need for a better administrator than a technical engineer in charge.[51]

Thus, a notable emphasis on efficiency measures on the part of discoms is accompanied by a tendency to attribute massive earlier losses to political interference and justify their entitlement to financial rescue courtesy the state government. This is coupled with a worrying tendency to put off responsibility, with a senior representative summing up UDAY in this manner: "If our carrying cost reduces, the tariff need will reduce. Losses will not come on the government in any case, because the central government is not counting this debt on the state's balance sheet. We can only think of servicing debt after the moratorium. Anyway, there is no pressure, maybe after UDAY 1, UDAY 2 will come."[52] This runs the risk of continued inadequate attention to unaddressed systemic inefficiencies that continue to be apparent in procurement processes, in some cost recovery attempts, in top-heavy management, and in the lack of

[48] Interview with Department of Energy employee, 5 August 2016.
[49] Interview with JVVNL representative, 8 August 2016.
[50] Interview with a project management consultant, 7 August 2016.
[51] Interview with PHD Chamber of Commerce and Industry representative, 11 August 2016.
[52] Interview with a discom employee, 8 August 2016.

individual checks and balances at the ground level amongst staff long conditioned to a bureaucratic and underperforming organisation. A former senior discom employee summed this up saying that total lack of incentive leads to "a workforce without any motivation to perform, just keep getting salary", noting that "I wasn't promoted for 20 years! What capacity building? They only know how to write this."[53]

On a related note, the sector is characterised by a great deal of subcontracting. A former RERC employee pointed out its drawbacks in billing, saying that the involvement of private players leads to disputes because they don't raise bills on time and ensure timely payment hence recovery suffers, which impacts the discoms' cash flow and eventually their planning.[54] The implications of private participation in distribution have gained added significance with the introduction of a franchisee model as one major measure towards cutting losses. The choice of Kota and Bharatpur as the first offerings has in effect allowed the winning franchisee (Calcutta Electric Supply Corporation or CESC) to cherry-pick urban areas with high AT&C loss levels but also high-tariff consumers. These afford possibilities to turn over quick profits by checking rampant theft through strong-arm tactics unavailable to the public sector to harvest low-hanging fruits. The discoms and Department of Energy nonetheless see this as a net gain, since the terms have allowed them to reduce their management burden; institute a demand for private investment in infrastructure development by the franchisee; and ensure a fixed revenue flow for a 20-year period from areas where they have not been able to reduce losses despite attempts and from where they can move staff around to other areas (after some negotiation with employee unions) due to a long-standing state-wide manpower shortage.[55]

Within discoms' top management, there is thus a sense of progressive privatisation being a win-win, even though the expansion of this solution across more urban areas risks burdening discoms with a higher proportion of loss-making categories in their consumer mix. This could well lead to a dual-track sector, with the discoms signing away chunks of potential gains (by stemming current theft) by way of heavy loss-making urban areas to distribution franchisees like CESC rather than putting up a rural and urban mix of consumers. Alternatively, this may turn out to be a good measure for utilities looking to ease their management burden: a Torrent Power Limited employee with expertise on regulation explained that they had not entered bidding as they found the tender conditions too hybrid with various obligations to invest for the franchisee rather than being purely market-based.[56] Yet Rajasthan failed to generate sufficient interest amongst potential bidders for a similar franchise in Ajmer, an urban area where losses are at 15 percent levels,[57] suggesting that low-hanging fruits in terms of high theft levels are the attraction for franchisees.

Despite this generally favourable disposition towards privatisation, the eventual separation of carriage and content, or multiple distribution licensees within the same area based on an amendment proposed to the Electricity Act, is not big on the radar of either discoms or the RERC yet, but is rather seen as a distant future scenario to be dealt with when it looms larger on the horizon. The impact of open access has been cushioned by discoms levying a relatively high additional surcharge of 1 rupee per unit besides the wheeling and cross-subsidy charges envisaged on industrial customers with consumption above 1 MW, thus limiting benefits for industry and keeping open access from bringing in true competition in the

[53] Interview with former discom and RERC employees, 17 August 2016.
[54] Interview with former RERC employee, 5 August 2016.
[55] Interview with Department of Energy official, 17 August 2016, and discom official, 8 August 2016.
[56] Interview with Torrent Power Limited employee, 6 October 2016.
[57] Interview with Rajasthan Urja Vikas Nigam Limited representative, 23 August 2016.

sector while stemming potentially big losses for the discoms.[58] Striking the right balance for both open access consumers and discoms has proved extremely contentious, with open access still being economically preferable for industrial consumers, but by what they argue are much lower margins than is fair: the RERC has had the last word for the moment.[59] This disagreement is partly a function of discoms being tied into long-term PPAs with relatively expensive state thermal plants while the power exchange offers significantly lower rates, meaning that lack of long-term planning prior to becoming an energy-surplus state has now come home to roost. These challenges should serve to underscore the importance of taking current pains in favour of more rational long-term PPAs, but discoms seem to lack the wriggle-room or political will to make such decisions. While the RERC does serve as a forum to enable some negotiations along objective lines amongst stakeholders, so far it has not proven to be sufficiently strong to initiate, prompt, or champion radical changes towards resolving sectoral irrationalities, instead constituting a modest platform for stakeholders to resolve disputes within an overall business-as-usual trajectory.

A former RERC employee explained that open access is causing problems because energy charges for industry have been set too high at over 6 rupees per unit after tariff hikes, given that power is available from the grid at 3 rupees per unit. So, the discoms are getting stuck with extra capacity and having to continue paying fixed costs on power plants that are being shut down. He opined that to accommodate tariff hikes, fixed charges should have been raised while keeping energy charges low for industry, but RERC deemed this infeasible as domestic consumers would also have demanded lower energy charges. An advocate exclaimed: "The discoms are facing such a huge financial crunch they are willing to pounce upon anyone who can give them revenue … But the more discoms push industry, the more industries run away. The discoms are losing them … You cannot just put all the blame and burden on open access *wallahs*. RERC is also hand-in-glove with the discoms. Simply because of losses you cannot loot people."[60] Business association representatives quipped, "We are helping the RERC but they are raising charges on us … Right now, industry is being alienated", but conceded that industry is benefitting from open access.[61] So while RERC has achieved a sort of homeostasis for now, this disguises true competition being held back in the sector.

Financial changes in the sector have raised different concerns from various consumer groups. Since layperson awareness on overall indebtedness remains low, their concern is primarily with tariffs. Consumer groups' attempts to raise this issue encounter different rates of success depending on their ability to grasp and argue along specific technical lines, with forums available only to a limited extent by way of occasional tariff hearings in Jaipur and through petitioning the RERC, which tries to satisfy competing needs in a balanced way. While annual tariff hearings have been generating written objections in the hundreds including some bulk copies, a few dozen tend to be entertained in person, with the RERC finding only a few to be actionable, typically by industrial consumers, with others taking the form of individual grievances.[62] Consumer categories seek out different ways to have their demands met: industrial consumers by way of hiring experienced advocates and petitioning the RERC, and agricultural consumers through political representatives such as MLAs who continue to ensure that agricultural subsidies stay in place. This study could not identify any Rajasthani farmer groups that engaged actively in distribution sector governance through the RERC or otherwise.

[58] Sidharth Sinha. "Introducing competition in the power sector: open access and cross subsidies." *Economic and Political Weekly* (2005): 631-637.
[59] See http://rerc.rajasthan.gov.in/TariffOrders/Order237.pdf, accessed 24th March 2017.
[60] Interview with advocate, 9 August 2016.
[61] Interview with Rajasthan Chamber of Commerce and Industry representatives on 11th August 2016.
[62] Interviews with RERC representatives, 3 August 2016, and with a former NGO worker, 17 August 2016.

In the absence of strong civil society presence in the sector, domestic consumers lack a real organised lobby, with the partial exception of Rajasthan's Consumer Unity & Trust Society (CUTS). As with most NGOs, however, CUTS' push is subject to the availability of funds for projects for which the discoms and a foreign donor base are the main sources. "NGOs always look for projects, but this doesn't do much for policy, for which you really need to consistently push the government," stated a regional researcher with expertise on governance.[63] CUTS' experience reinforces this point to some extent; despite having been the first NGO included on the RERC's State Advisory Committee, they had recently been removed from this position, with a staff member noting that "the current committee has no non-state members for the first time after 15 years."[64] While the purported basis for this was restructuring to exclude members who hold up discussions, one source indicated that RERC regarded CUTS as one such member.

Be that as it may, an NGO worker noted that some retired discom and RERC employees have started their own NGOs using their personal connections and expertise, and that these could play a useful role. But he complained that when discoms did release funds earmarked for consumer issues, the public tender was availed by an NGO created by people associated with the RERC, while nobody else got to know what happened. As far as NGOs in rural areas or districts other than Jaipur are concerned, neither the RERC nor the discoms seemed to regard them as stakeholders exercising real influence in the sector, as reflected in all participatory tariff hearings being conducted in Jaipur and often witnessing low response (cf. Table 5), perhaps unsurprisingly since tariff hikes were rare for long periods. Summing up NGO participation, an RERC official said "*Chhote-mote koi hain*" (some piddling little ones), explaining that they deal mostly with grievances rather than tariffs.[65]

Table 5: Public participation on tariffs through written responses and hearing attendance over time

Year	Number of written responses	Number of hearings	Number of locations
2005	2	1	1 (Jaipur)
2010	5	2	1 (Jaipur)
2015	5	1	1 (Jaipur)

Source: Based on tariff-related reports available on the RERC website

Participation in the form of responses to petitions on specific technical issues was far more common than on tariffs, but largely limited to discoms, energy consultants and other commercial stakeholders. It also proved difficult to ascertain the number of participants during tariff hearings, as interviewee estimates ranged widely and seemed unreliable, and records were ambiguous on this count. For instance, RERC mentions 60 objections in response to the three discoms' petitions on ARR and tariffs for 2013-2014, which marked a third consecutive annual hike after a long freeze on tariffs, but the section on the tariff proposals only mentions that "the Commission has given due consideration to the

[63] Interview with a professor in Jaipur, 8 August 2016.
[64] Interview with CUTS employees, 10 August 2016.
[65] Interview with RERC representative, 3 August 2016.

proposals of licensees, comments of stakeholders, decisions thereon and the position of cross-subsidy", without enumerating any objections that specifically concerned tariffs.[66]

While public engagement has apparently witnessed only limited success, Rajasthan's distribution sector has done better on another social parameter, its renewable purchase obligations (RPOs). Between 2006–2007 and 2010–2011, total RPO amounts specified by RERC steadily increased from 2.00 to 8.00 percent for wind and from 0.50 to 3.25 percent for biomass sources. Biomass is not a major source in Rajasthan because most crop waste is used as cattle feed, given the state's preeminent role in animal husbandry.[67] In these initial years after introduction, RPOs achieved by licensees consistently failed to comply with targets, with a high of 3.02 percent for wind, in 2010–2011, and 0.45 percent for biomass, in 2008–2009. In 2011, the state solar policy followed the national one, and RPOs were amended to include solar sources (only for discoms).[68] Compliance was slack at first, with concessions and waivers by the RERC as in other states, but has been on the rise in the past two years. A notable case, Hindustan Zinc Ltd. Vs. Rajasthan Electricity Regulatory Commission (Civil Appeal No. 4417 of 2015), with national implications for RPO compliance was decided with the Supreme Court mandating RPOs, and compliance reporting by obligated entities (around 280 in the whole state) went up from approximately half in 2014–2015 to over two-thirds in 2015–2016. The RERC has amended RPO regulations, envisaging a regular increase in obligations by 1.2 percent annually, from a level of 9 percent during 2015–2016, for both captive power plants and discoms.

Popularly seen as boasting high solar energy potential,[69] Rajasthan has begun to aggressively pursue solar generation, for which capacity has already doubled from 800 MW since 2015, besides its approximately 4 GW of installed wind energy capacity. It made headlines recently by becoming the first state to raise bids (through reverse e-auctions) for instituting solar capacity at a rate lower than traditional sources such as coal (420 MW at Rs. 4.34 energy charge per unit through six 70 MW plants).[70] Several GW worth of memoranda of understanding (MoUs) have been signed during conclaves such as Resurgent Rajasthan, and Raje, who holds the energy portfolio, has been an aggressive advocate for this, along the lines of BJP Prime Minister Narendra Modi at the national level. But the MoUs are typically for large ground-mounted projects in hundreds of MW.[71] After some controversy,[72] land banks for these have been identified in West Rajasthan,[73] so solar growth hinges on spatially concentrated mega-solar parks rather than being locally distributed. Rajasthan's low population density and high costs of transmission suggest that a more decentralised approach might have served the state well. Several experienced sectoral stakeholders put this preference down to kickbacks being easier to manage from

[66] RERC, "Determination of Annual Revenue Requirement (ARR) & Revision of Retail Supply Tariff for FY 2013-2014" (2014), accessed 5 January 2017, http://www.jaipurdiscom.com/tariff/2013/01_gen_comments_07-06-13.pdf and http://jaipurdiscom.com/tariff/2013/03_tariff-2013-14_07-06-13.pdf.
[67] ABI Energy Consultancy Services Private Limited, "Biomass fuel supply study (Rajasthan)", RRECL (2015), accessed 5 January 2017, http://biomasspower.gov.in/document/Reports/Rajasthan%20biomass%20fuel%20supply%20study%202015%20(1).pdf.
[68] MNRE, "Analysis of state-wise RPO Regulation across India", http://mnre.gov.in/file-manager/UserFiles/Solar%20RPO/analysis-of-state-RPO-regulations.pdf.
[69] Shreemat Pandey, Vijai Shanker Singh, Naresh Pal Gangwar, M. M. Vijayvergia, Chandra Prakash, and Deep Narayan Pandey, "Determinants of success for promoting solar energy in Rajasthan, India", *Renewable and Sustainable Energy Reviews* 16; 6 (2012): 3593-3598.
[70] Anand, Kunal. "For The First Time In Modern India's History, Solar Energy Is Cheaper Than Coal", *India Times*, 27 January 2016.
[71] Interview with a state Department of Energy representative, 17 August 2016.
[72] Saket Parihar, "World's largest solar park may face environmental hurdle", Thomson Reuters Foundation (11 February 2014), accessed October 30, 2016, http://news.trust.org//item/20140211101258-0te7q/.
[73] Saket Parihar, "In India, solar surge aims to reshape the country's energy future", Thomson Reuters Foundation (13 May 2014) accessed October 30, 2016, http://news.trust.org//item/20140512150843-8oq64/.

some large developers and bureaucracy working as a barrier against small developers, noting that this has shut developers of 1-10 MW projects out of the solar market and is a loss for social inclusion.[74] One consultant described this as "*bhed chaal*", or clustering everything in one area to lower costs, pointing out that this fails to address one main problem of loss due to theft.[75] Emerging research shows that utility-scale solar benefits from economies of scale over distributed solar energy systems,[76] but also points out the need to weigh differences across scale in a contextualised manner.[77] This sort of thinking does not seem to be determining the nature of solar energy growth in Rajasthan at present.

Political interference and financial pressures notwithstanding, discoms have been managing to meet their RPO mandates courtesy central government schemes, and other obligated entities (industrial captive power plants, or CPPs) have shown an increase in compliance after the 2015 Supreme Court ruling on RPO mandates.[78] The RERC has instituted the most ambitious RPO mandates in India, but rather than perceiving renewables as a strategic must, discoms see them as a financial burden due to existing PPAs with thermal plants in the state that already generate sufficient power and are too expensive to shut down due to high associated fixed costs.[79] Despite the fanfare over the MoUs mentioned above, solar energy growth faces a bottleneck in terms of translating into PPAs. The Department of Energy's hopes of demand from other states seeking to fulfil their RPO mandates have not materialised so far, though a national green corridor is coming up, constituting what one specialised journalist pointed out to be a highly investment-intensive evacuation option to transmit upcoming solar capacity to the national grid.[80] An energy consultant pointed out that substations take three years to build and face problems such as getting right of way for drawing lines, while solar capacity can be added within six months.[81]

These developments have effectively sidelined small players in the 1-10 MW range, especially in solar and to some extent wind energy, and risk losing out on the social inclusion gains associated with distributed renewables in rural areas.[82] The Rajasthan Renewable Energy Corporation Limited (RRECL) is universally regarded as more of a catalyst than a prime mover, focusing on 37 W and 100 W distributed systems for remote rural hamlets. A researcher noted that while RRECL is responsible for distributed solar, it lacks the manpower to connect with people on the ground, and has a presence primarily in terms of channelling subsidies.[83] Meanwhile, the growth of distributed solar energy systems in the 10s and 100s of KW is spurred on largely by private solar companies, which typically target rural and peri-urban consumers, rather than by any state schemes.[84] Open access consumers prefer purchasing conventional energy from the power exchange which offers lower rates than in-state despite the open access charges added by the RERC, while renewable sources do not yet have a sufficient differential. An

[74] Interviews with a Rajasthan Solar Association representative, 16 August 2016, and with a former RRECL employee, 23 August 2016.
[75] Interview with energy consultant, 16 August 2016.
[76] R.R. Hernandez, S.B. Easter, M.L. Murphy-Mariscal, F.T. Maestre, M. Tavassoli, E.B. Allen, C.W. Barrows, et al, "Environmental impacts of utility-scale solar energy." *Renewable and Sustainable Energy Reviews* 29 (2014): 766-779.
[77] Morgan Bazilian, Ijeoma Onyeji, Michael Liebreich, Ian MacGill, Jennifer Chase, Jigar Shah, Dolf Gielen, Doug Arent, Doug Landfear, and Shi Zhengrong, "Re-considering the economics of photovoltaic power." *Renewable Energy* 53 (2013): 329-338.
[78] Interview with an RRECL representative on 8th August 2016.
[79] Interview with discom representative, 23 August 2016.
[80] Interview with journalist, 16 August 2016.
[81] Interview with energy consultant, 19 August 2016.
[82] Akanksha Chaurey, Malini Ranganathan, and Parimita Mohanty. "Electricity access for geographically disadvantaged rural communities—technology and policy insights." *Energy Policy* 32;15 (2004): 1693-1705.
[83] Interview with researcher, 22 August 2016.
[84] Interview with private solar developer, 24 August 2016.

expert explained that there is no policy visibility in the long run for consumers to choose open access in a big way in terms of investing in their own solar CPP.[85]

While net metering guidelines were put in a place in 2015, implementation of feed-in tariffs for urban domestic consumers is still very limited.[86] Discoms are dragging their feet and lack any incentive to promote this, while RRECL lacks the dynamism to push for aggressive uptake of rooftop solar, which is so far seen as an expensive option with unviable high installation costs for domestic consumers, and is not even popularly adopted by public institutions, thus constituting a definite missed opportunity. Demand-side efficiency measures have primarily taken the form of Rajasthan's use of LEDs for public lighting;[87] a slump in demand relative to expectations in the past two years coupled with Rajasthan's recent energy surplus status discourages discoms' push for demand-side management in general. Wind energy, of which Rajasthan boasts 4 GW, also suffers from this problem of surplus capacity, especially due to its infirm nature, which discoms see as posing a problem given a lack of adequate demand projections, large seasonal variations in demand and lack of sophisticated scheduling techniques, leaving wind generators facing the prospect of shutdown on occasion.

Thus, despite ambitious and now-enforced RPO mandates, an overall lack of dynamism, autonomy and long-term planning is evident in Rajasthan's renewables trajectory, with the distribution sector merely trying to meet the required minimum levels and leverage central schemes rather than envisaging a radical shift towards a future strategy premised on large-scale renewables. This reluctance can partly be attributed to discoms' existing PPAs with state-run thermal plants and unwillingness to take on greater costs and losses at present, but this hardly justifies the failure to adequately promote small- and medium-scale distributed renewable growth, for which the RRECL's lack of dynamism, despite being chaired by the secretary to the chief minister, must squarely shoulder the blame. This is especially unfortunate when, despite Rajasthan having achieved energy-surplus status and high electrification rates, many of its rural households continue to lack adequate supply, given that both distributed solar can be a relatively inexpensive solution compared to grid expansion,[88] and that India's national policy attributes the state a front-running role in widespread adoption of renewables as integral to addressing critical challenges associated with climate change. While private participation shows promise, its market logic might well leave out the most vulnerable energy-poor consumers, whom RRECL is targeting through provision of subsidised small PV systems. Rooftop solar systems are currently held back due to perverse incentives for discoms which are reluctant to reduce their urban domestic demand, despite net metering guidelines having put in place adequate safeguards against potential grid management problems.

III. Conclusion

In probing Rajasthan's under-researched electricity distribution sector, this study has identified several thrust areas in need of urgent attention and improvement. Current attempts at enhanced efficiency and loss-cutting measures, necessitated by the norming of financial fiascos and entrenched political meddling in the sector, require a system overhaul that UDAY and other schemes are trying to push through an emphasis on feeder renovation and separation, meter repair and maintenance and the like.

[85] Interview with Rajasthan Solar Association representative, 16 August 2016.
[86] Interview with a former RERC employee, 5 August 2016.
[87] Interview with RERC employee, 3 August 2016.
[88] M.R. Nouni, S.C. Mullick, and T.C. Kandpal, "Providing electricity access to remote areas in India: An approach towards identifying potential areas for decentralized electricity supply", *Renewable and Sustainable Energy Reviews* 12;5 (2008): 1187-1220.

This must be accompanied by drastic changes in organisational culture, which are not sufficiently visible so far. Despite structural reforms, political influence from outside continues to characterise the sector, agricultural supply continues to be limited and characterised by high subsidies and theft levels, and procurement processes and human resource issues remain problematic.

Overall, the preceding analysis of the political economy of the sector suggests the following characterisation of particularly significant recent developments: (i) The RERC-discom structure is attempting a move towards greater efficiency through lower losses, but without sufficient political autonomy or an enhanced fear of financial implications due to repeat bailouts; (ii) Domestic and industrial consumers are dealing with higher tariffs in recent years but also experiencing better service with Rajasthan having achieved surplus energy status, while agriculturalists continue to receive highly subsidised but limited supply with much latent demand going unsatisfied due to long delays in securing connections; (iii) The impact of open access has been tempered through high surcharges to cushion the impact on discoms while offering industrial consumers limited benefits, resulting in a sort of homeostasis where the state grants open access but partly recoups losses by imposing surcharges that industrialists grudgingly acquiesce to; and (iv) While the renewable sector has begun to see rapid growth especially in solar energy, this is taking the form of large-scale rather than distributed development, and enabling neither savings on transmission infrastructure nor gains in terms of the social inclusion of energy-poor scattered rural households.

Together, these dynamics suggest a sector that continues to function in a largely top-down manner, enacting the institutional memory of RSEB as a bureaucratic public utility despite reforms. Given the intractability of these problems, the signs are in place that Rajasthan would welcome increasing privatisation in distribution, which it has partially moved towards with the recent introduction of a franchisee model. In doing so, it has adopted a strategy aimed at ensuring steady revenue flow from urban areas with heavy losses, to allow discoms to focus on operations elsewhere. But this might well be the beginning of a dual-track sector with privatisation of services for high-tariff urban consumers while the incumbent discoms cater to low-tariff consumers: a problematic prospect vis-à-vis equitable development. Another persistent concern takes the form of suboptimal long-term PPAs signed with costly state-level thermal plants, whose associated fixed costs make shutdown unviable while simultaneously holding back Rajasthan's growth trajectory for renewable energy due to adversely configured policy incentives and implementation outcomes.

Thus, despite significant sectoral growth in recent years and having become an energy-surplus state, Rajasthan continues to grapple with all-too-familiar issues in electricity distribution that reforms have been unable to sufficiently resolve. The state is also trying to cope with the introduction of competition by balancing the interests of industrial consumers and discoms through levying high open access charges, as well as grudgingly bringing in demand-side efficiency measures such as LED lights and rooftop solar generation. But these latter measures, targeted at lowering demand, have been rendered problematic by Rajasthan's newfound status of having adequate and increasing installed capacity, which its discoms cannot afford to be stuck with if demand growth does not keep pace. In this sense, the electricity distribution sector in Rajasthan serves as a potent reminder of the significance of temporal development across various aspects that imply real gains and losses for various stakeholders upon modulation by its political dynamics. These dynamics continue to be very much determined from the top down, rather than being co-defined by various consumer categories, who remain peripheral stakeholders in a discom-dominated sector.