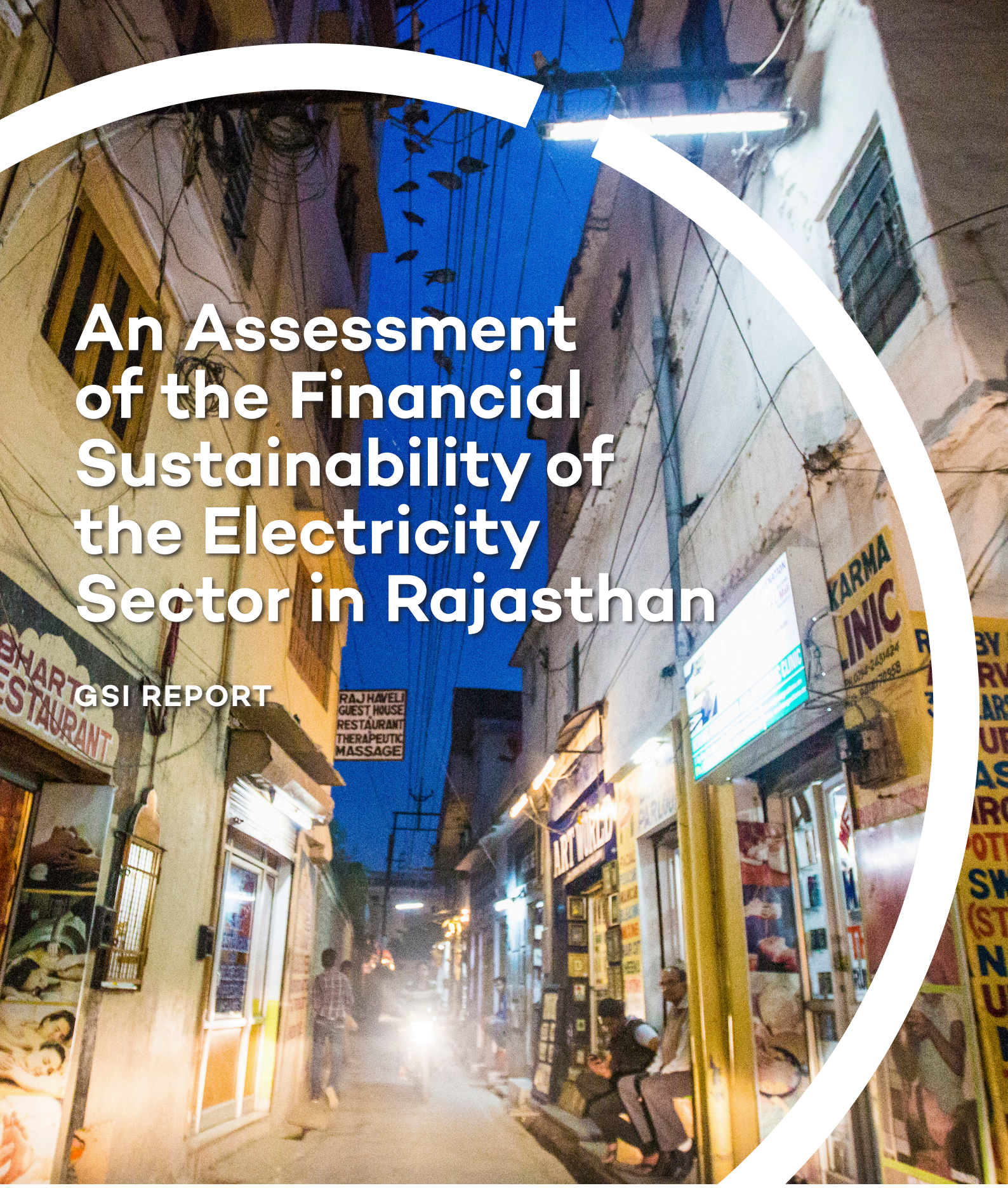

An Assessment of the Financial Sustainability of the Electricity Sector in Rajasthan

GSI REPORT

IISD
International Institute for Sustainable Development

Global Subsidies Initiative

Vibhuti Garg
Lourdes Sanchez
Richard Bridle

August 2016

International Institute for Sustainable Development

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An Assessment of the Financial Sustainability of the Electricity Sector in Rajasthan

August 2016

Written by Vibhuti Garg, Lourdes Sanchez and Richard Bridle

Executive Summary

This report examines the performance of the electricity sector in Rajasthan by applying a Financial Sustainability Electricity Sector (FSES) approach based on the analytical framework developed by the Global Subsidies Initiative (Nguyen, Bridle, & Wooders, 2014). Four aspects of performance are assessed, including the ability to: i) recover operating costs; ii) reliably meet demand; iii) make investments; and iv) operate according to environmental and social norms. Since 2000, the Rajasthan State Electricity Board has been through a process of unbundling in the power sector, leading to government-owned distribution companies (discoms) and an increasing share of private players in the generation sector.

The FSES approach demonstrates that Rajasthan discoms are facing serious difficulties in recovering costs. Owing to the rise in consumer arrears, rising power purchase costs, non-revision of tariffs and mounting revenue deficits over last five years, there is a significant increase in the borrowings of discoms. Loans and bonds more than doubled between fiscal years (FY) 2010 and 2014, and interest costs currently account for a significant portion of total operating costs. The rising gulf between revenue and expenditure has led to increasing dependence on fiscal transfers from state government, which increased by 269 per cent between FY 2007 and FY 2013.

In terms of the ability to meet the demand, between FY 2010 and FY 2014 total generation capacity increased by more than 80 per cent (41 per cent from renewable sources), leading to the reduction of peak shortages[1] to zero in FY 2014 from a high of 7 per cent in FY 2012. The energy deficit[2] has declined from 3.9 per cent in FY 2012 to less than 1 per cent in FY 2014, meaning generation reliability is increasing over time. However, there is still some way to go before there is no deficit between supply and demand, and accompanying improvements in transmission and distribution would positively contribute to more reliable electricity supply.

The increase in generation-sector investment has not been met with investments in transmission and distribution grids, which has led to technical and distribution loses and curtailment of renewable generation in the absence of sufficient grid capacity to transmit power to demand centres. Capital projects have gone ahead recently in state-owned electricity companies (discoms and generators).

Finally, the report evaluates the ability to operate according to social and environmental norms. The electrification rate of the region has increased, although the standard definition of electrification should be seen as a minimum baseline for adequate electricity access. Strong growth in renewable capacity suggests that policies have been effective at stimulating renewable investment, but that there are still barriers to integrating this into the sector.

Growth in electricity demand in Rajasthan has been met by increasing generation capacity (of which a considerable part is made up of renewables), but discoms have struggled to cover their costs through customer revenues and have repeatedly called for state government fiscal transfers to support the sector. The single biggest power sector challenge for Rajasthan is to enhance the financial viability of discoms by allowing them to increasingly cover their costs through sales.

[1] Defined as shortfall in generation capacity during the time when the electricity consumption is at the maximum.
[2] Defined as shortfall in generation capacity to meet the base load electricity consumption.

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Acronyms and Abbreviations

ACS	Average Cost of Supply
APDRP	Accelerated Power Development & Reform Programme
ARR	Average Revenue Realization
AT&C	Aggregate Technical and Commercial
AVVNL	Ajmer Vidyut Vitran Nigam Limited
BU	Billion units (1 unit = 1 kWh)
CAGR	compound annual growth rate
CEA	Central Electricity Authority
Crore	10 million
Discoms	distribution companies
FSES	Financial Sustainability Electricity Sector
FY	fiscal year
FYP	Five-Year Plan
GDP	Gross Domestic Product
GSI	Global Subsidies Initiative
GW	gigawatt
IISD	International Institute for Sustainable Development
INR	Indian rupee
JDVVNL	Jodhpur Vidyut Vitran Nigam Limited
JVVNL	Jaipur Vidyut Vitran Nigam Limited
kWh	kilowatt hour
lahks	100,000
MW	megawatts
O&M	operation and maintenance
PFC	Power Finance Corporation Ltd
R-APDRP	Restructured Accelerated Power Development & reform Programme
RES	renewable energy sources
T&D	transmission and distribution
UDAY	Ujwal Discom Assurance Yojana
USD	US dollar

1.0 Introduction

This report examines the performance of the electricity sector in Rajasthan by applying a Financial Sustainability Electricity Sector (FSES) approach that is based on the analytical framework developed by the Global Subsidies Initiative (GSI) (Nguyen, Bridle, & Wooders, 2014). Four aspects of performance are assessed, including the ability to:

1. Recover operating costs
2. Reliably meet demand
3. Make investments
4. Operate according to environmental and social norms

The FSES approach is designed to identify challenges facing the sector and to highlight opportunities for energy policy research to address barriers to improved sectoral performance. The report is structured around each of the four criteria listed above and concludes with a summary of findings and recommendations for further work.

A key challenge in Rajasthan is the difficulty experienced by distribution companies (discoms) in covering their costs though power sales, the lack of which has led to large and growing financial losses. The objective of this study is to use the FSES framework as a tool to understand the causes of this mismatch between revenues and expenditure, how this affects the operations of the sector and what might be done to improve the situation.

2.0 Context

2.1 THE NATIONAL-LEVEL PICTURE

India's electricity sector consists of private and state-owned energy generators that sell electricity directly to government, as well as privately owned discoms, power trading companies or power exchanges that are responsible for the retail of electricity to end-consumers. The transmission grid is operated by a mix of privately and state-owned companies. The revenues of discoms are dependent on tariff structures that are regulated at the state level, and which are legally designed to reflect supply costs. In practice, however, tariffs are not generally sufficiently high to allow for cost recovery by discoms.

Between FY 2010 and 2014, the average all-India cost of supply increased from INR 3.55 per kilowatt hour (kWh) to INR 5.15/kWh (an increase of 45 per cent). Over the same period, the gap between revenue from power sales and operational costs increased from INR 0.87/kWh in FY 2010 to INR 1.14/kWh in FY 2014 (see Figure 1). Even after accounting for fiscal transfers from the state government (subsidy), the corresponding revenue gap is INR 0.61/kWh and INR 0.73/kWh respectively (Power Finance Corporation Ltd. [PFC], 2013, 2015).

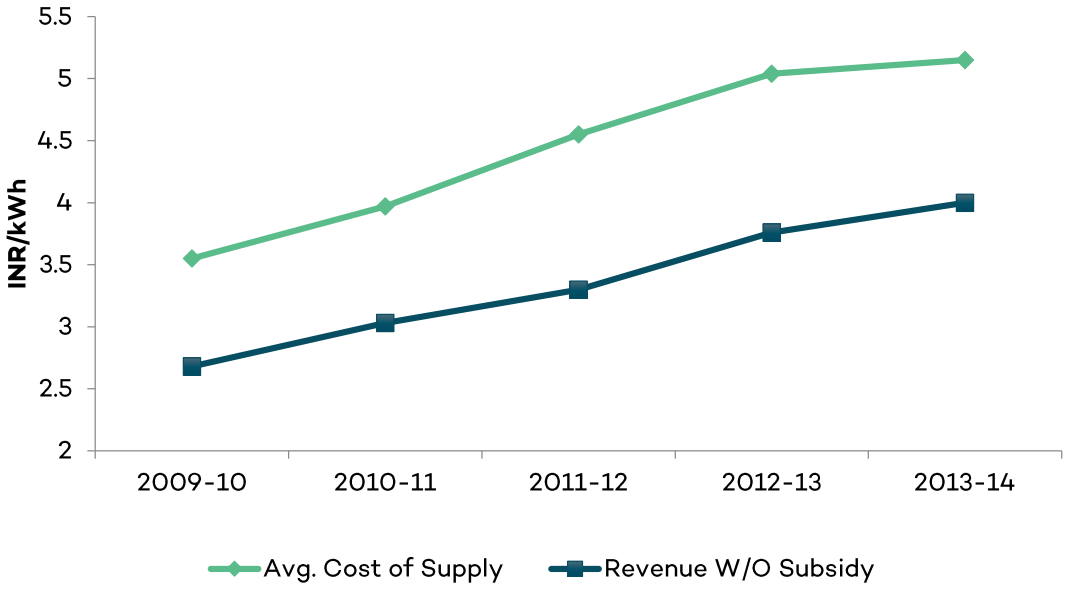


Figure 1: Average cost of supply and revenue (without subsidy)

Source: PFC (2013, 2015)

The revenue gap has been caused in part by the imposition of unviable tariffs and in part by increased costs due to high transmission and distribution (T&D) losses, systemic under-recovery of consumer bills and other operational issues. Planned improvements have not materialized as intended; Aggregate Technical and Commercial (AT&C) losses for the power utilities remain high, with several states reporting losses of over 30 per cent. Accumulated discom losses have risen to INR 3 lakh crore[3] (USD 45 billion, or 2.5 per cent of India's GDP), with discoms losing an estimated INR 100,000 crore (USD 14.8 billion) each year. The details of discom loss-making are provided in Figure 2 below.

[3] All conversion of Indian INR to USD is done at an exchange rate of 1 USD = 67.35 INR. Note that, in the Indian numbering system, 1 lahk is equivalent to 100,000 and 1 crore is equivalent to 10 million.

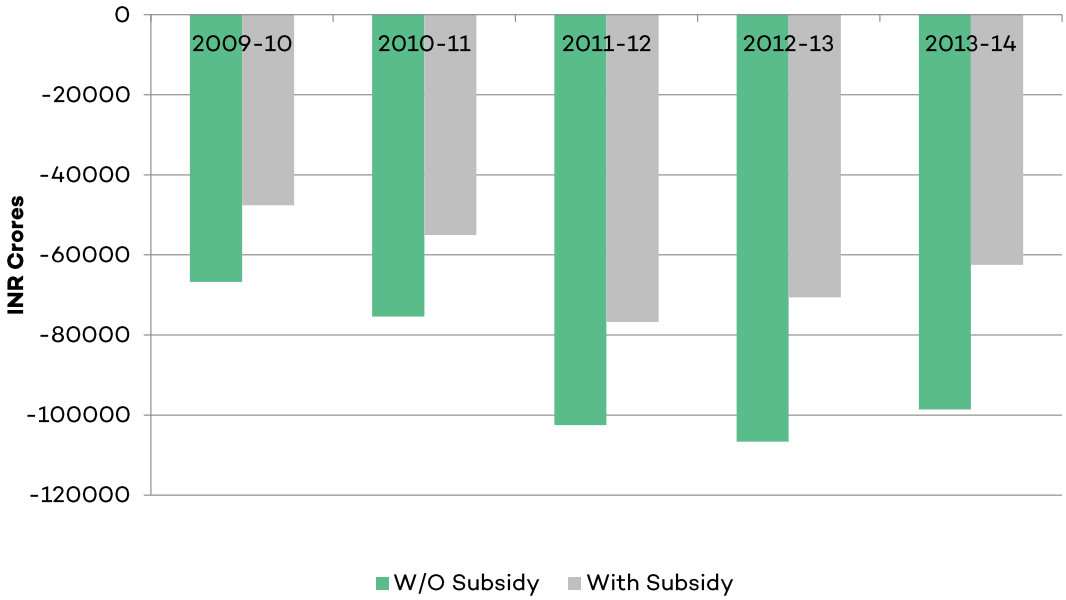


Figure 2: Aggregate book losses of power utilities with and without fiscal transfers

Source: PFC (2013, 2015)

Widespread opposition to price increases is the major barrier to greater financial sustainability in the distribution sector. Policy-makers are anxious to avoid higher tariffs out of concern for competitiveness impacts on commercial and industrial consumers and, most importantly, for fear of social impacts on the poor and agricultural households that make up a very large proportion of India's population. An impasse on electricity pricing reform has therefore developed in a large number of states, and in many cases there exists a resignation among policy-makers and experts that the current situation is intractable.

However, despite the challenges, the mounting losses in the distribution sector have several important implications that deserve careful consideration by policy-makers:

- Discom losses have to be frequently bailed out by state governments, placing significant pressure on government finances and creating significant opportunity costs in doing so.
- Discoms lack the revenues to buy power from generators even when capacity is available. This leads to low plant-load factors and load shedding by distribution utilities. Load shedding compromises electricity access and prompts many consumers to resort to expensive diesel-based generation.
- Discoms are often unable to meet their Renewable Purchase Obligation due to inadequate purchasing power.
- Discoms are unable to undertake timely investment in T&D network expansion and upgrades, actively impeding the important process of electricity access through rural electrification and the integration of renewables into the grid.

In order to improve the financial health of discoms, the Indian government, in concert with relevant state governments, has initiated several reform measures and packages over a number of years, including:

- The Accelerated Power Development & Reform Programme (APDRP) in 2001, for the strengthening of transmission and distribution networks and reduction of AT&C losses, which was restructured in 2008 (R-APDRP) to address barriers to using the grants and to strengthen scheme guidelines.

- The National Electricity Fund (Interest Subsidy Scheme) in 2012 to promote capital investment in the distribution sector.
- In 2012, the Government of India approved the Financial Restructuring Plan with capital incentives for 50 per cent of the short-term liability to be taken over by state government by issuance of special securities to lenders. The balance 50 per cent was restructured by providing moratorium on principle.
- The much-awaited Ujwal Discom Assurance Yojana (UDAY) in 2015, in which state governments agreed to convert 75 per cent of discom debt into state government bonds.

While there is great optimism regarding the potential for UDAY to free the discoms from crippling accumulated debt, UDAY does not in itself tackle the root cause of discoms' inability to recover costs—namely the persistence of low end-user tariffs, combined with inefficiencies in operations and management.

2.2 RAJASTHAN

In FY 2014, Rajasthan accounted for 6.2 per cent of India's total electricity demand, with an annual demand of 43.1 billion kWh (PFC, 2015). The electricity sector is a high priority for the Government of Rajasthan; the sector was allocated 23.4 per cent of all planned outlays in the FY 2016 public budget (Government of Rajasthan, 2015). Rajasthan's consumer mix is dominated by agriculture and domestic consumers (PFC, 2015). Figure 3 provides a summary of the demand mix for FY 2014.

Since 2000,the Rajasthan State Electricity Board has undergone a process of unbundling. There are three state-owned companies engaged in the business of distribution and retail supply of electricity in the State of Rajasthan. These are Ajmer Vidyut Vitran Nigam Limited (AVVNL), Jaipur Vidyut Vitran Nigam Limited (JVVNL) and Jodhpur Vidyut Vitran Nigam Limited (JDVVNL). During this period, discom losses have increased markedly (see Figure 4). The increasing losses between FY 2004 and FY 2009 can largely be explained by the context of generally rising international market prices for energy and the fact that only one tariff increase—an average increase of 10.2 per cent—occurred during this period. Three tariff hikes took place during the period FY 2009 to FY 2014, but these were not sufficient to arrest the rise in losses; indeed, discom losses reached unprecedented heights in FY 2014.

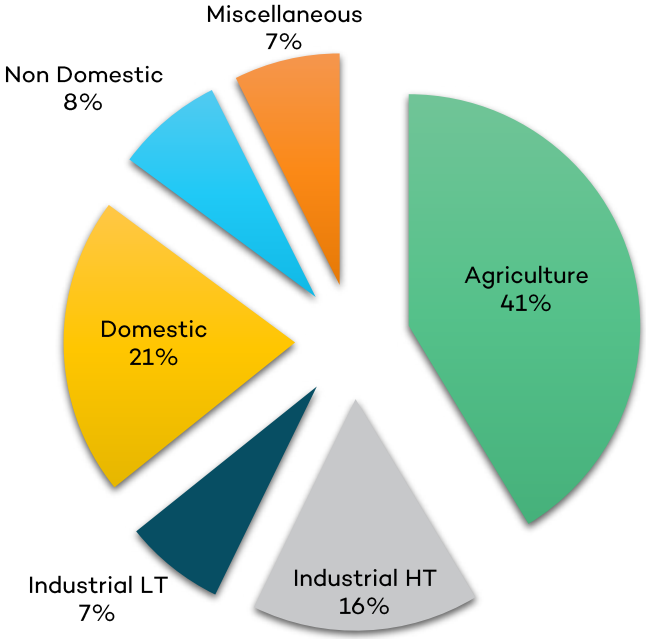


Figure 3: Rajasthan's demand mix for FY 2014

Source: PFC (2015)

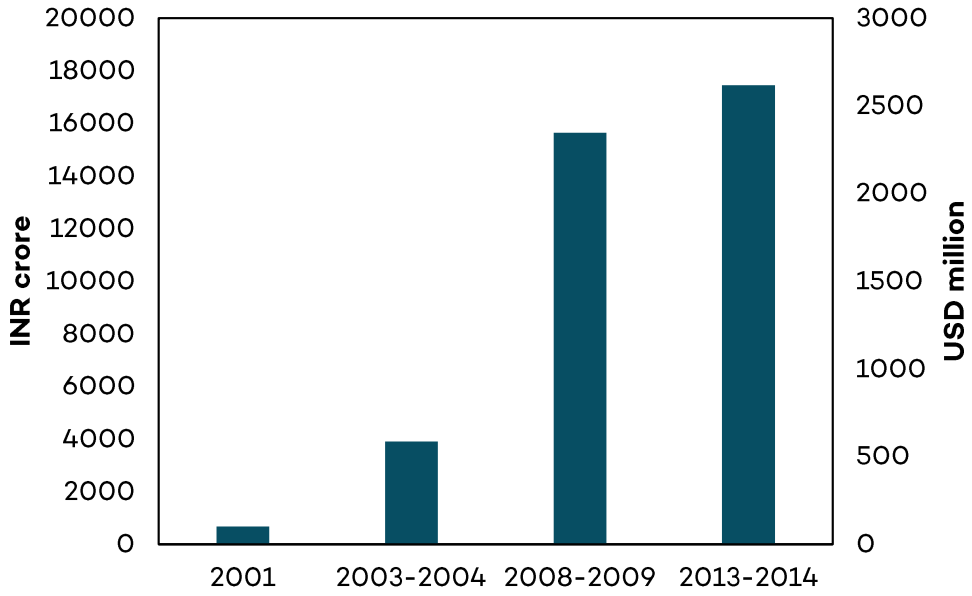


Figure 4: Discom losses in Rajasthan

Source: Government of India & Government of Rajasthan (2014)

Currently, discoms in Rajasthan have total accumulated debt of INR 80,500 crore (USD 12 billion), which accounts for 18.7 per cent of the country's total discom debt. Under the Integrated Rating Framework formulated by the Ministry of Power, the third annual integrated rating exercise in 2015 assigned a rating of C+ to AVVNL and JVVNL and B to JDVVNL (Ministry of Power, 2015). The low ratings are a reflection of poor operational and financial performance parameters, which include cost recovery, operations and management indicators. The key components of financial sustainability in Rajasthan's power sector are examined in detail below.

3.0 Assessment of Financial Sustainability in the Electricity Sector

3.1 ABILITY TO COVER COSTS

For the distribution utility to run sustainably, it is essential that they are able to recover their costs. To assess whether discoms are able to recover costs, it is important to understand the sources and levels of costs and revenues. Revenue is primarily derived from power sales and fiscal transfers, while costs can be divided into fuel, operation and maintenance (O&M) and the cost of interest payments on debt.

Owing to a rise in consumer arrears, rising power purchase cost, non-revision of tariffs and mounting deficits over the last five years, there is a significant increase in discom debt. Loans and bonds have more than doubled from INR 31,583 crore (USD 4.7 billion) in FY 2010 to INR 70,863 crore (USD 10.5 billion) in FY 2014 (PFC, 2013, 2015). Utility expenditure has risen faster than revenues from electricity sales leading to an increase in annual losses.

The rising gulf between revenues and expenditures has led to increasing dependence on fiscal transfers from the government. Transfers are reported to have increased by 269 per cent from INR 871 crore (USD 130 million) in FY 2007 to INR 2,345 crore (USD 350 million) in FY 2013, but declined thereafter to INR 1,525 crore (USD 230 million) in FY 2014. The very high costs in FY 2011 and FY 2012 were due to increasing reliance on expensive power purchase from the short-term market. In FY 2013, the gap reduced due to a decline in the cost of supply as a result of new capacity coming online, an improvement in collection efficiency and minor tariff revisions. After a seven-year period without electricity price rises, tariffs increased by 24 per cent, 19 per cent and 14 per cent in FY 2012, FY 2013 and FY 2014 respectively, but this was still insufficient to eliminate the gap between costs and revenues (PFC, 2015).

Table 1: Cost of supply and revenue gap FY 2010 to FY 2014

Parameter	FY10	FY11	FY12	FY13	FY14
ACS (Average Cost of Supply) (INR/kWh)	4.91	7.13	6.90	5.80	6.54
ARR (Average Revenue Realization) (INR/kWh)	2.24	2.34	2.64	3.15	3.65
Gap (ACS – ARR) (INR/kWh)	2.68	4.79	4.26	2.66	2.89
Total Revenue Gap/(Surplus) (INR Crores)	12,717	22,586	21,715	14,855	17,451
Subsidy (INR Crores)	871	1,204	1,763	2,345	1,525
Gap after Subsidy (INR/kWh)	2.48	4.53	3.91	2.23	2.64
Revenue Gap after Subsidy (Crores)	11,846	21,382	19,952	12,510	15,926

Source: PFC (2013, 2015)

The increase in costs is one of the big factors contributing to growth in discom deficits. Power purchase costs account for the largest share of cost of supply for utilities and have increased over time. The two primary drivers of this are increasing fuel costs and rising interest charges (Figure 5). Fuel costs for the generation utilities have gone up by 12 per cent, from 2.02 INR/kWh (USD 0.03/kWh) in FY 2010 to 3.18 INR/kWh (USD 0.0472/kWh) in FY 2014. However, since 2015, with falling coal and gas prices in international markets, distribution utilities have witnessed a downward trend in the fuel cost for electricity based on imported fuel. Payments servicing interest on debt increased by 25 per cent between FY 2010 and FY 2014 (PFC, 2013, 2015). The higher interest burden is reported to be due to increased borrowing to meet capital investment and regulatory requirements on working capital. The progression of fuel, O&M and interest costs is shown in Figure 5.

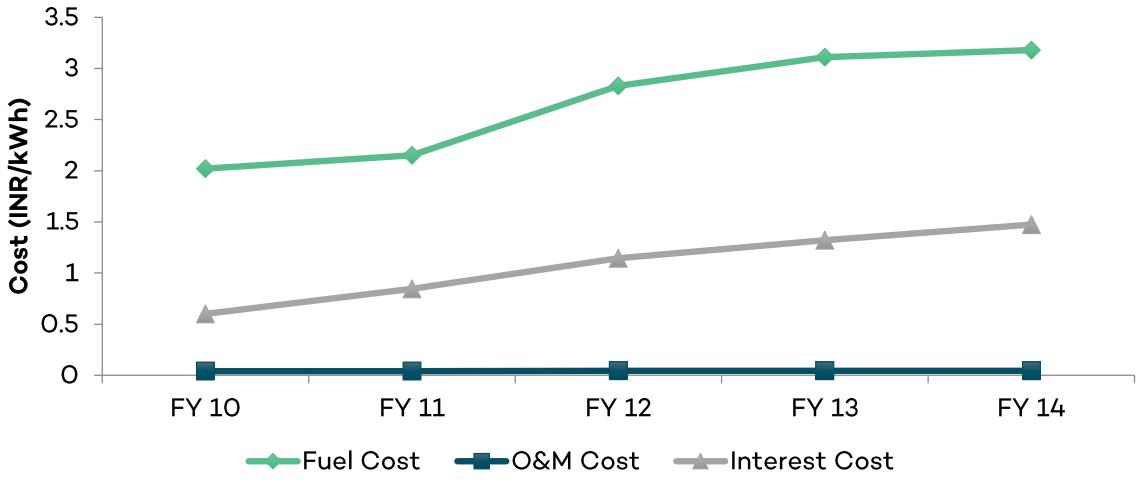


Figure 5: Cost of fuel, O&M and interest charges for discoms in Rajasthan (2010–2014)

Source: PFC (2013, 2015)

Capital investments have included spending on the Feeder Renovation Program, a program designed to reduce transmission and distribution losses that started in 2005. These investments have increased interest costs but should result in a relative reduction in fuel costs due to greater efficiency. Figure 6 shows a general trend towards reducing T&D and AT&C losses up until FY 2013. However, between FY 2013 and FY 2014, losses increased and collection efficiency fell. Decreases in collection efficiency are driven by power theft and increasing arrears, primarily from local bodies, which have increased from INR 1,767 crores (USD 262 million) in FY 2010 to INR 2,582 crores (USD 383 million) in FY 2014 (PFC, 2013, 2015).

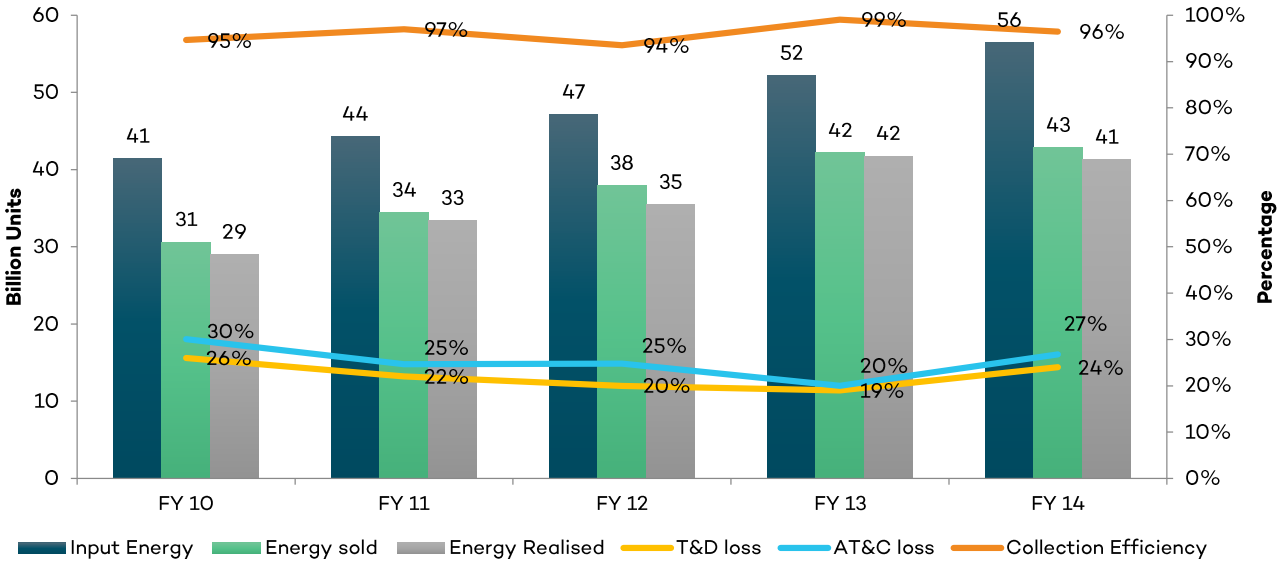


Figure 6: T&D, AT&C losses and collection efficiency, 2010–2014

Source: PFC (2013, 2015)

The data shows that there is a persistent gap between costs and revenues. Electricity companies are not able to cover the costs of their operations from power sales alone. As such, fiscal transfers constitute a major source of revenue for the sector. The provision of these transfers to bridge gaps

in costs and revenues presents a number of problems. First, since the rich tend to consume a disproportionate amount of electricity, these transfers are often regressive. Second, the money spent on transfers could be spent on other priorities such as health or education. In order to remove the need for fiscal transfers, costs must be reduced or electricity tariffs increased.

3.2 ABILITY TO RELIABLY MEET DEMAND

Electricity is at the heart of a modern economy and is essential to commercial and domestic life. For electricity to be reliably delivered, there must be sufficient generation capacity to meet peaks in demand; electricity should be consumed efficiently; and T&D systems should not suffer excessive outages.

Over the last five years, rises in generation capacity have increased the ratio of installed capacity to demand. This indicates that there is more likely to be capacity available to meet periods of high demand. When IISD reviewed 110 countries, comparing the ratio of installed capacity to demand, it found that a ratio of around two was typical (Nguyen, Bridle, & Wooders, 2014). Rajasthan is now around this level. Given that the share of renewable capacity has gone up in the total installed capacity mix, not all of this additional capacity is dispatchable. For similar reasons, the capacity factor[4] has fallen over the years.

An analysis of power intensity—the amount of power used to produce a unit of GDP—shows that the state is power-intensive by international standards, despite agriculture having a 41 per cent share in the total demand. Most countries use less than 1 kWh of electricity to produce one dollar (USD) of GDP (Nguyen, Bridle, & Wooders, 2014), whereas Rajasthan consumes more than 2.5 kWh. Agricultural economies normally consume less power per unit of GDP than industrial economies, indicating that there may be opportunities to improve energy efficiency and reduce power intensity. The ratio of installed capacity to demand, the capacity factor and the power intensity in Rajasthan are presented in Figure 7.

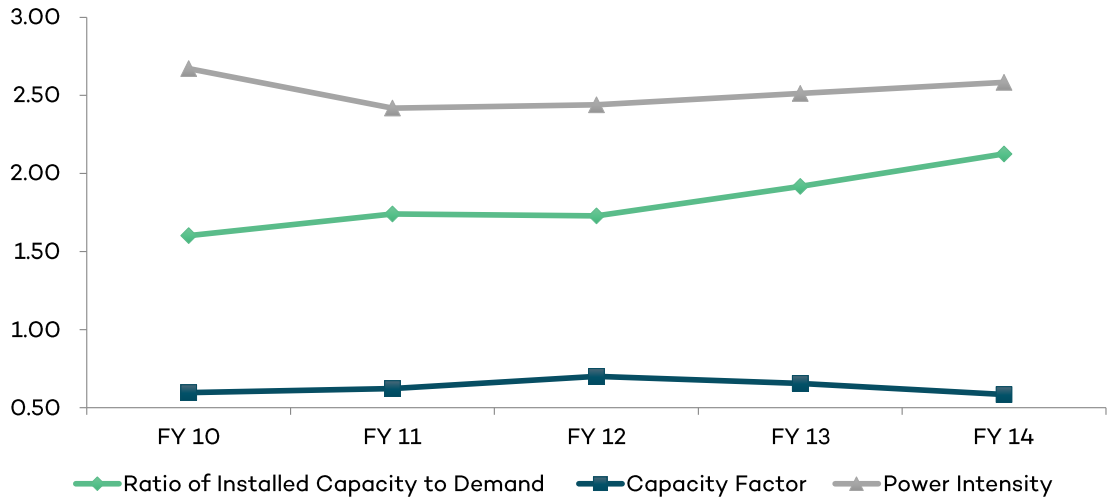


Figure 7: Ratio of installed capacity to demand, capacity factor and power intensity, FY10–FY14

Source: PFC (2013, 2015), CEA (2010–2015a, 2010–2015b, 2010–2015c, 2010–2015d); RBI (2015)

[4] Defined as the ratio of average hourly actual generation of power to maximum possible generation at the installed capacity level.

Power outages are an important indicator of reliability. Outages can be caused by an inability to dispatch sufficient generation capacity or by technical problems with T&D. On the capacity side, the number of peak shortages fell to zero in FY 2014 from a high of 7 per cent in FY 2012 (Central Electricy Authority [CEA], 2015c). The gap between energy requirement and energy availability in Rajasthan has fallen since FY 2012. The energy deficit has declined from 3.9 per cent in FY 2012 to less than 1 per cent in FY 2014. The power supply position has improved due to significant addition in generation capacity during the 11th Five-Year Plan (FYP) (2007–2012) and the 12th FYP period (2012–2017). These indicators are shown in Figure 8. On the distribution side, in March 2015 it was reported that single-phase agricultural users received an average of 24 hours of supply per day. However, suppliers with three-phase connections received just 6.75 hours per day (CEA, 2015c). This indicates that, in March 2015 at least, the reliability of the grid for single domestic (single-phase) consumers was good, though problems remain for other classes of consumer.

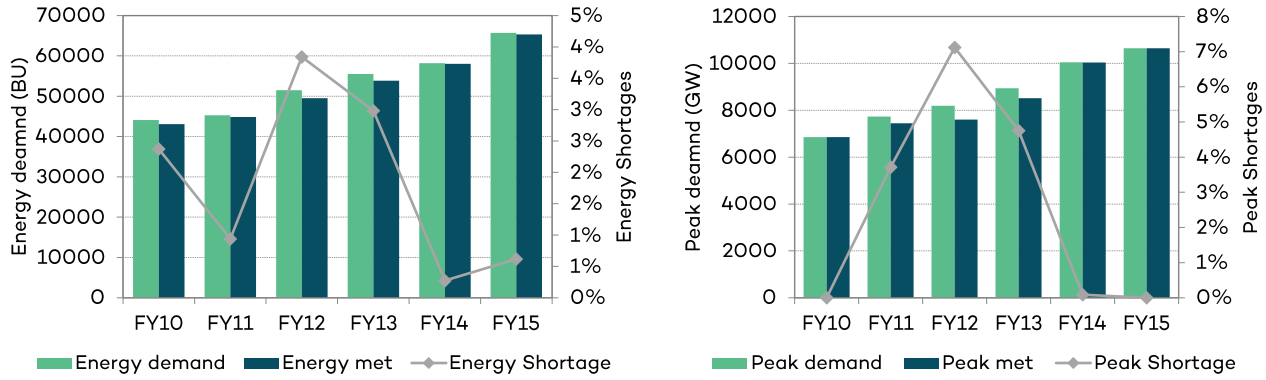


Figure 8: Rajasthan energy and peak demand shortages (2010–2014)

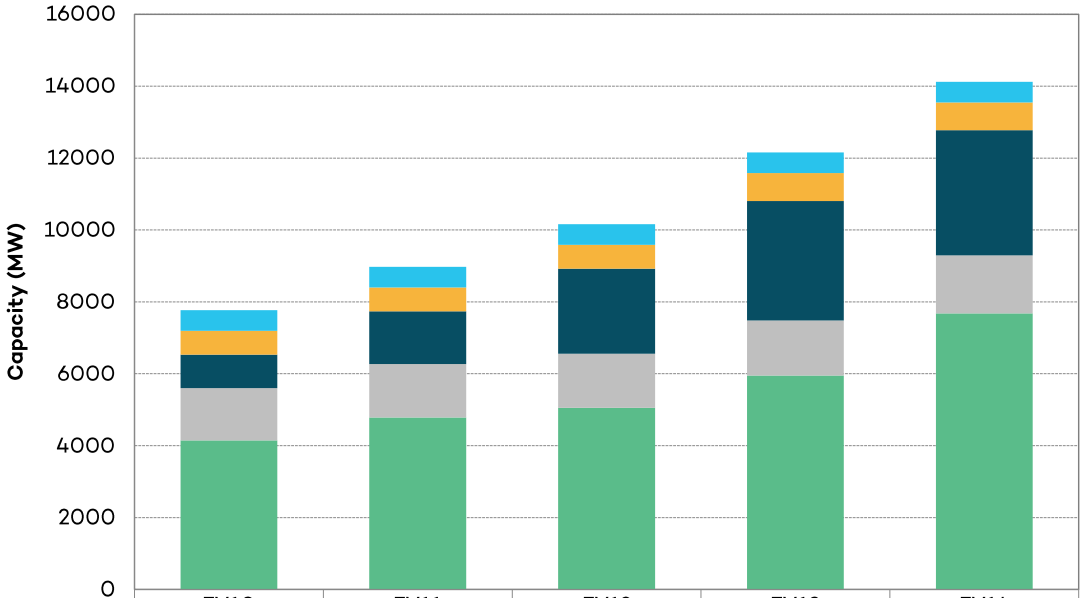
Source: CEA (2010–2015c)

The data on reliability is generally positive. More capacity is available to meet the existing demand and the indicators suggest that, as a result, generation reliability is increasing over time. However, there is still some way to go before there is no deficit between supply and demand. There remains a need for investment in T&D infrastructure, not least due to rising demand and continued grid expansion. It needs to be noted that though Rajasthan has achieved rural electrification of approximately 98 per cent, a village is deemed electrified if only 10 per cent of households in the settlement are connected to the grid, and there are no requirements for the quality of supply to these households. Thus, there is a vast population that is still not grid connected in rural areas, and agricultural consumers are also supplied power for 6–8 hours on a rotation basis. With the implementation of Deen Dayal Upadhyaya Gram Jyoti Yojana, a government scheme designed to provide continuous power supply to rural India, power demand is likely to increase in the future.

3.3 ABILITY TO MAKE INVESTMENTS

The demands placed on the electricity sector change over time and must be met by investment in generation, transmission and distribution systems. In Rajasthan, the expansion of demand, recent construction of generation capacity and the need to accommodate a higher share of renewable energy into the electricity mix all require strengthening of the grid itself. A lack of investment can be an indicator of problems in the future. If investment is not made in the years before demand exceeds capacity, then service will eventually suffer. To assess the historical level of investment, the change in capacity and investment expenditure are considered as indicators of the overall level of investment in the system.

The total electricity generation capacity of Rajasthan was 14,281 megawatts (MW) in FY 2014. The largest part of this was thermal generation at 59 per cent (54 per cent is coal based and 5 per cent is gas based). A further 11 per cent of capacity is made up of hydropower and 25 per cent is provided by other renewables. The share of renewable energy has been increasing in recent years, up from 11 per cent in FY 2010 to 25 per cent in FY 2014. Over the same period, hydropower and nuclear energy have declined. Coal generation has remained largely constant as a share of the total mix, indicating that installation of new coal capacity has kept pace with the overall capacity growth (see Figure 9).



	FY10	FY11	FY12	FY13	FY14
Diesel	0	0	0	0	0
Nuclear	573	573	573	573	573
Gas	665.03	665.03	665.03	775.03	775.03
RES	926.15	1467.79	2365.55	3327.62	3483.05
Hydro	1454.8	1484.8	1502.8	1527.8	1613.6
Coal	4149.48	4784.48	5054.48	5952.1	7679.72

Figure 9: Installed capacity mix over the period FY 2010 to FY 2014

Source: CEA (2010–2015b)

The overall compound annual growth rate (CAGR) of generation capacity has been 15 per cent over the period FY 2010 to FY 2014. Renewable energy grew at a rate of 40.8 per cent CAGR in the same period, the highest increase of any energy source. Coal generation grew at a rate of 14.9 per cent, while growth in other technologies was slower. The majority of the new installations is owned by the private sector, which now generates more power than state-owned generators.

The ratio of the growth of generating capacity to the growth of demand is a measure of the ability of the sector to invest in capacity at a comparable rate to demand growth (Figure 10). A value greater than one indicates that capacity is installed faster than demand is growing. The value each year remained above one between FY 2012 and FY 2014.

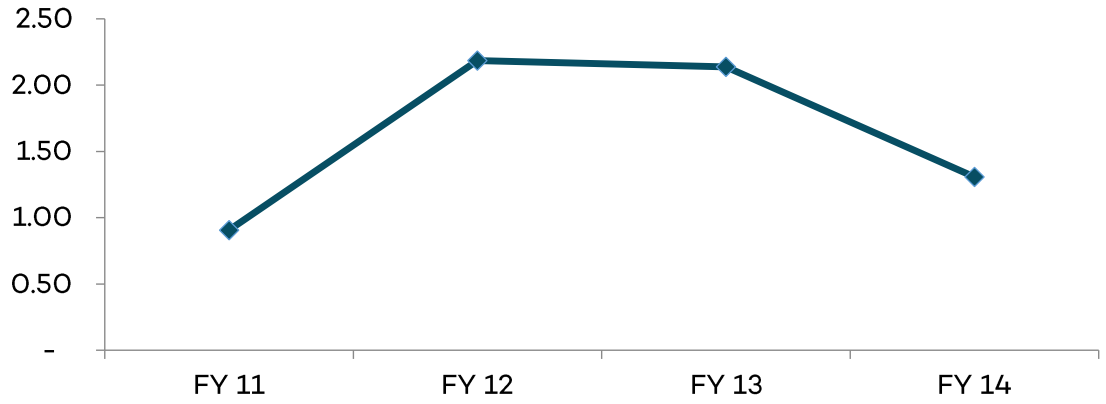


Figure 10: Ratio of installed capacity to demand growth, FY11 to FY14

Source: CEA (2010–2015a)

However, the increase in generation investment has not been met with investments in T&D infrastructure. The absence of sufficient grid capacity to transmit power to demand centres has led to technical and distribution losses and curtailment of renewable generation.

In FY 2012, capital expenditure declined in all three distribution utilities and the generation company compared to the previous year. In FY 2013, capital expenditure by Jaipur and Jodhpur discoms increased by approximately 35 per cent, followed by Rajasthan Rajya Vidyut Utpadan Nigam Ltd (22 per cent). In FY 2014, all the three distribution utilities invested heavily in capital expenditure (an increase of approximately 40 per cent) with the exception of the transmission company, which witnessed a decline in capital expenditure by 20 per cent. These results indicate that capital projects have been going ahead recently in these companies; however, it does not give a full picture of investment in the other companies in the sector, including the increasingly important private sector generators. Figure 11 shows the rate of change of capital expenditure in the discoms and in the state-owned generation company. Capital expenditure is relatively constant in the generation company, even as new generation is increasingly owned by the private sector; the state-owned generation company owned just 38 per cent of total generation in FY 2014 compared to 62 per cent in FY 2010 (CEA, 2010–2015b). Capital expenditure among discoms increased markedly in FY 2013 and FY 2014, indicating that investments are being made, particularly for distribution.

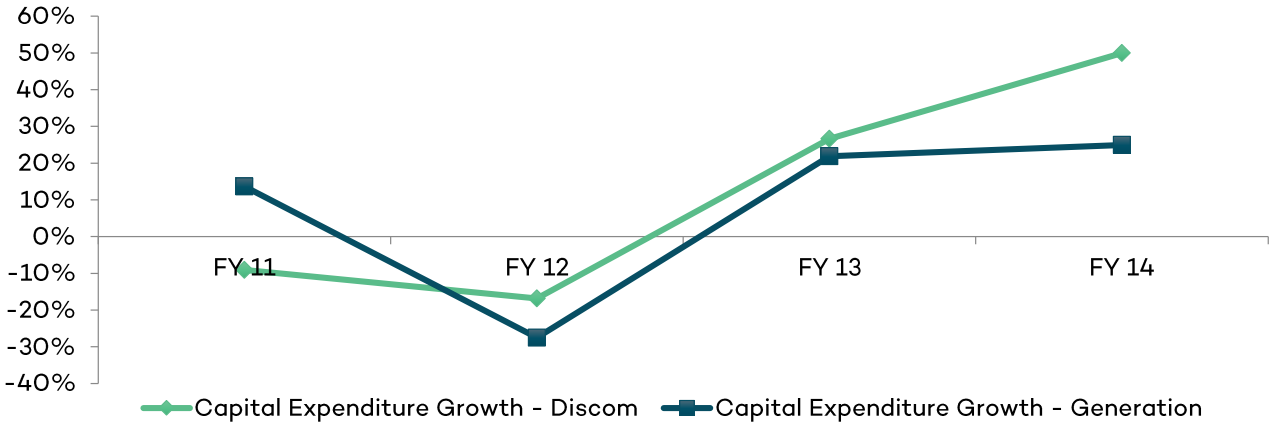


Figure 11: Growth in capital expenditure for state generation companies and discoms over the period FY 2011 to FY 2014

Source: PFC (2013, 2015)

The electricity sector in Rajasthan is able to make investments. Capacity has increased in line with demand, with a particular increase in renewable capacity; since FY 2013 investments made by the three distribution companies and the generation company have increased rapidly.

3.4 ABILITY TO OPERATE ACCORDING TO SOCIAL AND ENVIRONMENTAL NORMS

Measures that ensure that the electricity sector respects environmental and social norms are important to avoid the creation of social and environmental problems, such as air pollution and high levels of carbon emissions. If the sector relies heavily on polluting forms of energy, at some point there may be high costs to mitigate the damage. In this assessment, the rate of electrification and the proportion of renewable energy capacity in the electricity mix have been evaluated as a proxy for the ability of the sector to operate according to social and environmental constraints.

According to 2011 census data, there were approximately 125.81 lakh households in the state, and 67 per cent of these were using electricity as main source of lighting (Government of India & Government of Rajasthan, 2014). The state also has 98.2 per cent (CEA, 2015a) of villages electrified; however, as discussed, the current definition of rural electrification is weak. A more detailed picture of the current status of household electrification is provided in Table 2. This table shows that only 74 per cent of villages have more than 30 per cent of households connected to the electricity grid. This indicates that there is a need for significant distribution grid expansion.

Table 2: Status of village household electrification

	Number of Villages Supplied by Each Discom in Each Household Electrification Category					
Name of Discom	0 per cent	0 per cent> to <10 per cent	=>10 per cent to <20 per cent	=>20 per cent to <30 per cent	30 per cent and more	Total
Jaipur	887	480	609	779	11677	14432
Ajmer	1127	1051	776	776	11235	14965
Jodhpur	1678	1172	1074	1067	8818	13809
Sector as whole	3692	2703	2459	2622	31730	43206

Source: Government of India & Government of Rajasthan (2014)

Figure 12 shows that each of the three discoms has seen increasing consumption of electricity, with an overall CAGR of approximately 12 per cent. The rise in consumption is partly due to a rise in the number of grid-connected households and also due to the overall increasing number of power grid connections for use by other consumers. The data indicates that the sector is successfully delivering more electricity, but more data is needed to evaluate whether it is meeting its social obligations to provide energy to households across Rajasthan.

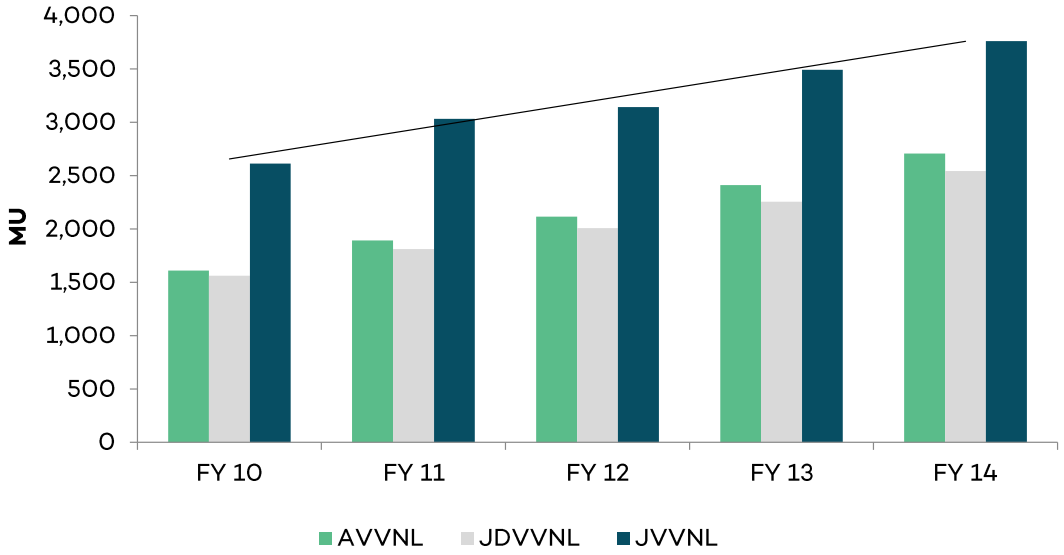


Figure 12: Household consumption, FY 2010 to FY 2014

Source: PFC (2013, 2015)

To enhance the sustainability of the power sector, a shift towards sustainable energy sources (i.e., renewable energy sources) is necessary. Two measures in this regard are considered here: the level of renewable capacity and levels of renewable generation. Installed capacity data reveals that there is a declining trend in thermal-based capacity in the state over the years, which is commensurate with the increasing share of renewable capacity in the state (both wind and solar). However, the share of state-owned thermal generation and renewable generation in the total generation mix has remained stable over the years. The share of generation generally reacts more slowly than the share of capacity, as renewable generators typically have lower load factors than thermal generators. Figure 14 below shows a very limited change in the share of renewable generation despite significant addition of renewable capacity in the state. While policies have been largely effective at stimulating the installation of renewables' capacity, this data suggests that barriers still exist to the integration of this capacity into the sector.

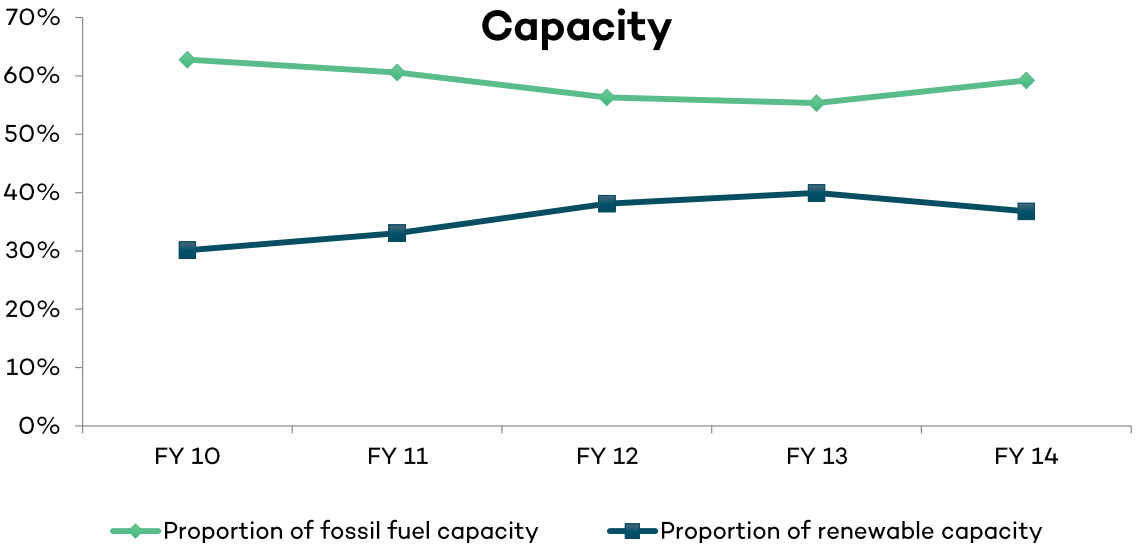


Figure 13: Proportion of thermal and renewable capacity in total capacity, FY 2010 to FY 2014

Source: CEA (2010–2015a)

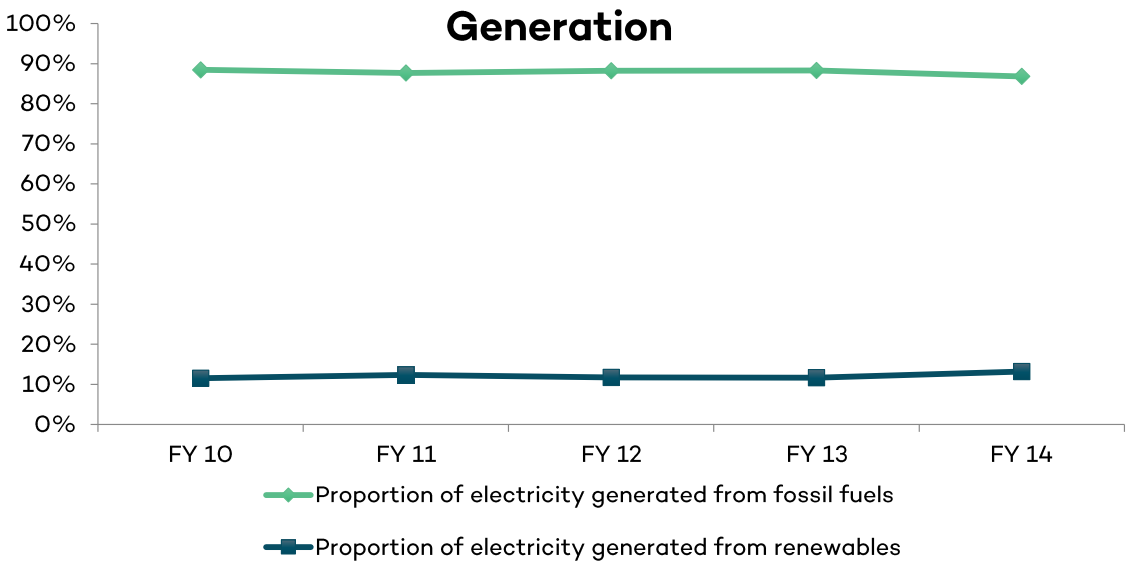


Figure 14: Proportion of thermal and renewable generation in total mix, FY 2010 to FY 2014

Source: PFC (2013, 2015)

4.0 Conclusions

The single biggest challenge for the state is to attain financial viability for the discoms by covering the costs of power generation and distribution from the sale of electricity. Currently, discoms are taking substantial losses, driven by the long-standing inability of discoms to raise electricity tariffs so they are commensurate with costs.

Despite the underlying financial problems, the sector is still able to function, and, to some extent, the main challenges have been isolated to the discoms. This report shows that new generation capacity is still being brought onstream, the level of reliability is generally improving and more consumers are being connected to the grid.

However, lacking cost recovery has a number of important negative implications. While the recent distribution sector investment picture is mixed, large debt burdens for discoms and limited borrowing capacity risk undermining timely T&D investment and therefore the achievement of urgent rural electrification and energy access goals, in the context of very low electrification rates and service reliability by international standards. While renewable generation capacity has increased more than any other generation source, the share of renewables in total generation has remained relatively static, and there remain challenges in integrating renewables, at least partly due to investment shortfalls in T&D. Government can help to maintain the financial sustainability of discoms by providing large fiscal transfers from period-to-period. However, this has large opportunity costs in terms of spending on other developmental priorities. It is up to policymakers to determine whether fiscal transfers to discoms to support low electricity prices is an effective use of scarce public finance. If it is deemed so, then it will likely be beneficial to make transfers more predictable and timely.

To address the primary challenge identified in this assessment, some reform measures have been taken by the government. In January 2016, the Government of Rajasthan, along with state discoms, signed a Memorandum of Understanding to join the UDAY scheme, and thereby to recycle much discom debt. Under the scheme, the Rajasthan government will take over INR 60,500 crore of the debt from the books of the electricity distribution utilities. The remaining INR 20,000 crore will be issued as state-guaranteed discom bonds at coupon rates around 3 per cent lower than the average existing interest rate. As a result, the distribution utilities of Rajasthan will save around INR 3,000 crore annually through reduction in annual interest cost (The Hindu Business Line, 2016). However, given the limited success of earlier bail-out packages by the government that had been designed to improve the financial health of discoms, the impact of the UDAY scheme will not lead to financial stability unless coupled with reform measures to address the underlying issue of structurally lacking cost recovery.

Addressing this challenge requires building the political will for tariff adjustments in Rajasthan. To complement this report, IISD has therefore undertaken a supporting study that employs political economy techniques and stakeholder analysis to attempt to identify both challenges and opportunities for tariff reform.

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