



Performance Analysis of Karnataka Power Sector in India in the Context of Power Sector Reforms

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ABSTRACT

With the enactment of Karnataka Electricity Reform Act (KERA), 1999, Karnataka power utilities underwent major restructuring. The objective of the paper is to assess the Karnataka power sector performance in the context of reforms, using select technical and financial indicators. A Power Sector Performance Index (PPI) is computed to capture the overall performance. Some indicators, like energy and peak deficits, per capita electricity consumption, have shown improvement after reform, nonetheless, they still lag behind other major Indian states. The installed capacity increased fairly after reform, however, the capacity utilisation rate declined in the post-reform period. On the positive note, the transmission and distribution (T&D) loss in Karnataka reduced tremendously since 1999 as compared to other major states. Average revenue realisation rate rose after reform, however, the realisation rate varies widely across consumer categories, due to cross-subsidization by few categories. Overall, the PPI value increased from 1998–99 to 2012–13 indicating better performance after reform. The ranking improved from 8th to 3th position, implying higher progress over time vis-a-vis other states as well. There is, however, scope for further improvement. Future policies should focus on toning up poor capacity utilisation rate, and reducing price differential and power subsidy burden of the government.

1. Introduction

Power sector is a very crucial sector for economic growth. Its importance is well highlighted in the plan outlays and policy initiatives. About 10% of the Central plan outlay of India in 12th Five year plan was allocated for power sector (Planning Commission, 2013–14). Government of India launched the 24*7 Power For All Initiative in 2014 with State governments to provide 24*7 power access to all by 2019. Despite the policy support, the power sector performance has been stalled by numerous problems till present day. Power shortages, inefficient operational performance, and grave financial situation of the State Electricity Boards (SEBs) are major problems taking a toll on the overall growth of the economy, as electricity is one of the most important infrastructural inputs in all sectors of the economy. These problems prompted a series of reforms in Indian power sector, involving policy and regulatory changes.

To analyse the power sector performance after the reforms, we select one of the south Indian states, Karnataka, because of the following important reasons:

- The state has experienced considerable variation in the power sector performance, as it was one of the first states to invest in power generation¹ and attain industrial advancement due to power surplus. However, it turned into a power deficit state due to poor financial performance of the utilities, marked by irrational pricing, transmission and distribution (T&D) losses, so on.
- The state is highly proactive in introducing reforms. Karnataka was one of the first states to unbundle generation from other segments with the formation of Karnataka Power Corporation Limited (KPCL) in 1970, and also among the first states to undertake restructuring and unbundling in 1999 (Karnataka Electricity Reforms Act (KERA)). The reforms and policies are expected to improve the overall performance of power sector in Karnataka. However, the recovery is far from satisfactory as the peak deficit and energy deficit in the state (6.8% and 5.2% respectively in 2015–16) are still high and way higher than the 10 most populous Indian states, except for Uttar Pradesh (Central Electricity Authority, 2016).
- Among all the south Indian states, Karnataka is the only state with less than 100% village electrification (the definition of an 'electrified' village itself is questionable, as the definition requires a mere

Abbreviations: KEB, Karnataka Electricity Board; KERA, Karnataka Electricity Reforms Act; KPCL, Karnataka Power Corporation Limited; KPTCL, Karnataka Power Transmission Corporation Limited; KERC, Karnataka Electricity Regulatory Commission; ESCOM, Electricity Supply Company; PPI, Power sector Performance Index

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¹ Hydro power generation in Shivanasamudra, Karnataka in 1902.

10% of households to be electrified).

- Karnataka's fiscal performance is highly satisfactory sans the power sector subsidy, which has been high for a very long period of time and of concern for state finances. The state is among the top destinations of investment from all over the world due to its progressive nature with sound fiscal indicators, high industrial growth, and a thriving Information Technology (IT) hub.
- There is lack of a comprehensive study focusing on Karnataka electricity industry till recent years, and hence, this paper aims to analyse the Karnataka power sector performance in the context of the power sector reform in 1999, and fill the gap in literature. The analysis is expected to diagnose the good and weak aspects of performance after the reform by analysing relevant indicators. These indicators are expected to aid in policy reformulation to tone up the performance.

The paper is organised in the following way: the first section gives a brief introduction of the power sector reforms in India and Karnataka. The second section provides an overview of the background and existing literature in the related area. The third section presents the methodology, data and data sources. The fourth section gives the results and discussions. Section five presents the conclusions and policy implications.

2. Background and literature review

In India, power sector is in the Concurrent List,² and hence, both the Centre and State have the jurisdiction to make policy changes. At all India level, electricity generation was opened to private sector in 1991, to supplement the shortfall in investment from public sector. The wave of World Bank-led power sector reforms swept across different states in India, which led to unbundling and corporatisation of SEBs, along with setting up of independent Regulatory Commissions. Further, Electricity Act 2003 is considered to be the major power sector reform in India, which unified all existing laws and aimed to introduce competition in the sector. Karnataka is one of the largest states in India, covering about 5.83% of the total geographic area of India, with more than 61 million inhabitants (*Census of India, 2011*). The state has 30 districts with its capital at Bangalore, which is well known for its IT development and huge job market. However, it still has energy deficits and peak deficits in the state, along with many other technical and financial problems in the sector. This poses a serious concern for future growth and development of the state. Subsequently, many other reforms and policies were formulated to improve the power sector scenario in Karnataka. The major reforms are listed in [Table 1](#):

The important policies in the power sector are provided in [Table 2](#):

Existing literature mostly comprises of studies related to the problems in the power sector, the reform process, the main provisions, and a narrative discussion of the performance of the sector. Empirical understanding of the power sector performance is quite inadequate, especially in case of Karnataka. In general, the reforms and policy changes of institutional and regulatory nature are expected to mitigate the technical and financial challenges facing the power sector.

The problems pertaining to power sector, like subsidy burden to state due to de-metering of agricultural consumption,³ cash flow problems of State Electricity Boards (SEBs), cross-subsidies from industries

² India is a federal country and thus, legislative power is exercised by different levels of government, namely, the Central government (Union list), State governments (State list), and jointly the Central and State governments (Concurrent list).

³ Electricity consumption by agricultural consumers in India was de-metered around 1970s, thereby providing power at zero/minimal rates to these consumers, reflecting the political economy at play. The cost of supplying power to agricultural consumers is provided by the state government as subsidy, and partially met by other consumer categories, like industrial and commercial consumers who pay higher-than-cost- tariff (cross-subsidization).

leading to more expensive captive generation⁴ were discussed extensively in literature (*Dubash and Ranjan, 2001*). One of the key motivations for power sector reform in developing countries, including India, is to improve the financial state and attract private capital to the power sector, to reduce the burden on the public sector budget (*Jamasb et al., 2005; Singh, 2006*). However, the Independent Power Producers (IPPs) faced many hurdles in litigation/renegotiation of Power Purchase Agreements (PPAs), in financing, in risk sharing (eg. construction risk, market risk, fuel supply risk), in obtaining clearances (like cost estimate clearance, techno-economic clearance, so on) and thus, could not contribute significantly till late 1990s. The public sector remained dominant and demand-supply gap persisted (*D'Sa et al., 1999; Kannan and Pillai, 2002; Ninan, 2012*). Electricity Act 2003 introduced numerous policy changes, including licence-free thermal generation, non-discriminatory access⁵ to transmission system, multiple licensees, which aimed to introduce competition in the power market. Nonetheless, the improvement of distribution segment holds the key to achieve long term sustained growth of the power sector (*Singh, 2006*).

Jamasb et al. (2005) undertook a survey of empirical evidence on determinants and performance of electricity sector in developing countries and concluded that electricity sector reform has remained a work-in-progress and, there is a need for a more up-to-date analysis. *Sharma et al. (2005)* studied the performance of Indian power sector during 1991–2001 using select technical and economic indicators, and found that the restructuring that was initiated in 1991 has not improved the technical efficiency, financial position, and customer satisfaction. The efficacy of power sector reform in India was also analysed by *Bhattacharya and Patel (2008)*, by measuring the change in commercial orientation of the utilities. By calculating an Index of Revenue Orientation (IRO)⁶ for 2001-02 and 2004-05, they found that the sector is still not financially viable, and the AT&C losses are still high. The variability of commercial orientation of the utilities across states and even between utilities within states is very high.

Khurana and Banerjee (2015) assessed the financial performance of India's power sector through a state performance index created using the analytical hierarchy process (AHP) method. Using eleven factors for 5 year period - 2005-06 to 2009-10, they found that Gujarat, West Bengal, and Himachal Pradesh occupied the top positions. Karnataka's financial performance was poor, however, it improved immensely in the last two years to occupy the 4th rank among the top 5 performers. Uttar Pradesh, Bihar and Madhya Pradesh continued to be the worst performers over the entire 5 year period. The study concluded that power purchase costs played a key role in the worsening of the finances of the utilities, the High Tension/Low Tension ratio plays a significant role in T&D losses, and regular tariff revisions help in recovering the rising costs.

In case of Karnataka, we have so far not come across a comprehensive study focusing on the overall performance of power sector in the context of power sector reforms. *Sakri et al. (2006)* discussed the Karnataka power sector reforms and policy changes, including private sector participation since 1991, Electricity Regulatory Commissions Act 1998, Electricity Act 2003, Accelerated Power Development and Reform Programme (APDRP), so on. However, it is merely a narrative of the performance of the sector in pre- and post-reform period and empirical analysis is absent. Hence, this paper aims to provide a macro study of the overall performance of Karnataka power sector in the context of the reforms.

⁴ Captive generation refers to electricity generation by any person, or a group of persons, primarily for their own consumption.

⁵ Non-discriminatory access of the transmission system by any consumer, or licensee for power supply.

⁶ $IRO = (1 - ATC \text{ loss}) + (\text{Collection efficiency}) + (ARR - ACS) - (\text{Industry } ARR - ACS) + \text{Ratio of subsidizing to subsidized segments}$ (where, ATC – Aggregate Technical & Commercial, ARR – Average realisation rate ACS = Average cost of supply).

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