



# Rural electricity access in India in retrospect: A critical rumination



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## ABSTRACT

Despite the large-scale efforts towards electrification in India since the time of independence, approximately 45 million households still continue to be without electricity access. This paper critically analyses the evolution of the process of rural electrification in India, the factors that potentially determine the household electricity access and juxtaposed that with the policies adopted over three distinct time periods: the pre-independence period; the period of state ownership and the post-reforms period. The paper then builds on the key insights that could be drawn from the evolution in retrospect and attempts to highlight key historical challenges that the electricity sector has been constantly grappling with. The paper observes that during the early period of Five Year Plans, electricity was mainly used for productive input in agro-industries and for irrigation. Household access was only given priority when it was started to be considered as a basic input in the 1980s. With the enactment of the Electricity Act in 2003, the importance of electricity as an infrastructure for changing the rural landscape was felt. Based on the insights gained from the critical analysis of process of rural electrification in retrospect, the paper provides specific inputs for policy making for rural electrification in India.

*Have you worked out the problem of electricity for every home? What is the cost? My remark quoted by you is a poser for the time being.... Since you believe in it I want you to work it out and demonstrate the physical and economic possibility of 'electrifying every home' of the seven hundred thousand villages of India.....*

- Mahatma Gandhi's letter dated 30 April 1945 to Shri Amiya Nath Bose<sup>2</sup>

## 1. Introduction

On the request of Mahatma Gandhi, Amiya Nath Bose, who had then just returned from Cambridge with an Economics Tripos, did work out a plan for rural electrification. However, Gandhi's ambition still eludes India with 45 million households having no access to electricity (REC, 2017). Over the last century, the landscape of rural electrification policies has undergone a sea change. Researchers, who have tried to analyse the historical information on the process of rural electrification, observed that the prolonged historical efforts have met with marginal success

(Chaurey et al., 2004; Modi, 2005; Bhattacharyya, 2006; Palit and Chaurey, 2011; Kale, 2014; Banerjee et al., 2015; Maithani and Gupta, 2015). This was largely attributed to the inadequacy in definition of the rural electrification at the first instance, which in the process of evolution had largely excluded households as a unit of access. The shifting regimes continued to underscore on the impressive figures at the village level (Fig. 1) without probing deeper into the issues and challenges of connecting households. What is all the more intriguing is that a lion's share of the rural households, who are connected to the grid, are yet to have access to reliable and adequate supply.

If one percolates down to the level of electrification at the sub-national level, one can further observe both interstate and income-based inequalities in access (Ramji et al., 2012). Going by the latest data on electrification from Rural Electrification Corporation (REC) (as of 31 December 2016), nearly all households in the state of Andhra Pradesh, Punjab, Tamil Nadu, Gujarat, Himachal Pradesh and Kerala have electricity access. In contrast, almost 55% of rural households in Bihar still remain unelectrified followed by Uttar Pradesh (52%) and Assam (47%) (REC, 2017). These variations- in the patterns of electricity sector development at the sub-national level could potentially be attributable to

*Abbreviations:* DDUGJY, Deen Dayal Upadhyaya Gram Jyoti Yojana; ERC, Electricity Regulatory Commission; FYP, Five Year Plan; INR, Indian Rupee; IPP, Independent Power Producer; kWh, Kilo Watt Hour; MBC, Metering, Billing and Collection; MNP, Minimum Needs Programme; NSSO, National Sample Survey Organisation; REC, Rural Electrification Corporation; RGGVY, Rajiv Gandhi Grameen Vidyutikaran Yojana; SEB, State Electricity Boards; UDAY, Ujjwal Discom Assurance Yojana

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<sup>2</sup> Quoted by Shri Chandra Kumar Bose (Son of Shri Amiya Nath Bose); Available at <http://www.dailyo.in/politics/mahatma-gandhi-indian-freedom-struggle-sarat-chandra-bose-partition-congress/story/1/6599.html>; last accessed on 20 November 2016.

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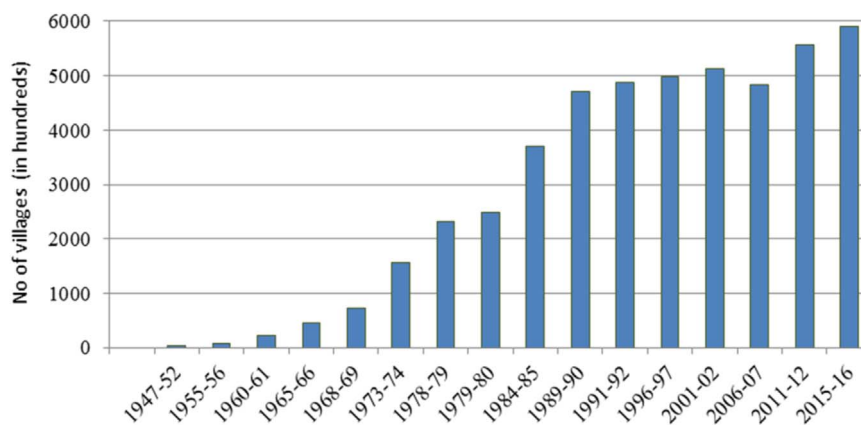


Fig. 1. Year wise growth in village electrification in India.

(Source: Centre Electricity Authority, 2016).

variations in evolution in the patterns of electricity sector development across the states that are further rooted in the variations in the social and political foundations (Kale, 2014).

While there is adequate literature analyzing the rural electrification in India for specific issues, programmes or periods (Venkatesan, 1983; Bhattacharyya, 1994, 2005, 2006; Rejikumar, 2005; Dubash and Bradley, 2005; Panda, 2007; World Bank, 2010; TERL, 2010; Palit and Chaurey, 2011; Maithani and Gupta, 2015), there are only a few scholarly works that illustrates how the process of electrification co-evolved with changing policies and priorities prior to independence and the post-independence period. Notable among these works are Samanta and Sundaram (1983); Kale (2014) and Banerjee et al. (2015).

In view of the paucity of scholarly research works that comprehensively tracks and analyses the history of the rural electrification, the present paper makes an endeavour to fill that gap by extensively reviewing and analyzing available literature, electricity policies and government documents and interviews with sector experts.<sup>3</sup> Based on the review, the paper critically analyses the evolution of the process of rural electrification and the factors that potentially determines the access to household electricity, and juxtaposed that with the policies adopted over three distinct periods: (1) the pre-independence period from 1900 to 1947; (2) the period of state ownership from 1948 to 1990s, and (3) the post-reforms period from 1991 onward. As the Planning Commission was responsible to finalise annual targets and financial outlays for States, depending upon fund availability and States' readiness to extend rural electrification, the paper covered different plan periods. The paper then attempts to highlight key historical challenges that the sector had been constantly grappling with and then summarises the key insights that could be drawn from the evolution in retrospect. In the light of the insights gained from the historical information, the paper then provides specific recommendations that could serve as inputs for policymaking to drive rural electricity access in India. This analysis of the process of rural electrification in a large diverse country, its successes and missed opportunities, and the insights gained is expected to contribute towards learning to enhance rural electrification in many countries of developing Asia and sub-Saharan Africa that continues to face challenges.

## 2. Evolution of the rural electrification process in India: a historical perspective

### 2.1. Pre-Independence period (1900–1947)

Electricity generation began under the colonial regime with demonstration of electric lighting in Calcutta (now Kolkata) in July 1879

<sup>3</sup> Selected electricity sector policy makers, policy influencers, regulators, practitioners and implementers representing grid and off-grid sectors were interviewed to know different perspectives.

(Tongia, 2003). During the same time, electricity arrived in Bombay (now Mumbai), to illuminate the Crawford Market (Kale, 2014). The first commercial generation of electricity was, however, initiated in Darjeeling when the 130 kW Sidrapong hydel power station was commissioned in 1897 (Seetha, 2003). This sparked off the establishment of a spate of small power-generating stations by different princely states as well as the then Government such as the 1 MW plant in Calcutta in 1899 to supply DC (direct current) electricity. It was only in 1910 that CESC Ltd commissioned a larger capacity 15 MW plant, generating AC (alternating current) at 6 kV, which was stepped down and converted to DC before supplying to consumers. Around the same time, the princely states of Mysore, Travancore and Kashmir set up hydro-electric plants (Sankar and Ramachandra, 2000). In 1915, Tata Hydroelectric Agency started supplying hydel power to Bombay, which also happens to be the first private sector generation by an Indian company in the pre-independence era.

Almost the entire power sector during the time was decentralised with local generation and supply. The industry was fragmented and so the Indian Electricity Act was introduced in 1910 to instill some cohesion through licensing mechanism and promoting safety standards<sup>4</sup> (Box 1). The total installed capacity in India in 1947 was 1361 MW, mostly owned by private electric utilities and licensed local authorities. While in the princely states (Mysore and Travancore) and British provinces (Madras) in South, the government had invested public resources to expand hydroelectricity, the two largest electricity systems of Bengal and Bombay were in the private sector (Kale, 2014). With profitability being the major consideration for the private utilities, they focused on providing electricity in the cities and towns, especially for the industries. While all the towns above 50,000 people and most of the towns between 20,000 and 50,000 people were electrified, settlements below 5000 were largely left out (Planning Commission, n.d).

Out of the approximately 560,000 villages in India at the time of independence, only around 1500 villages had electricity (i.e. less than 0.3% rural population), confined mainly to Mysore, Madras and Uttar Pradesh. Samanta and Sundaram (1983) observe that electricity use in rural areas was almost non-existent until 1933, when it was first considered for tubewell irrigation in Uttar Pradesh. They further note that with the launch of 'Grow More Food Campaign', in the 1940's supply of cheap electricity was considered essential for lifting water from rivers and/or wells. Madras and Karnataka also introduced electricity for pumping during the same time.

From the above analysis pertaining to rural electrification in the pre-independence period three key inferences can be drawn - (1) prior to start of India's planned economic development, electricity was

<sup>4</sup> The Electricity Act 1887, was the first legislation regulating the generation, supply and use of electricity. That was repealed and replaced by the Indian Electricity Act 1903, which later got replaced by the Indian Electricity Act 1910.

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