

## Chapter 1 - Introduction

### 1.1 Introduction

Indian Railways (IR) run 9,212 freight and 13,313 passenger trains over its vast network of 66,687<sup>1</sup> Route Kilometers (RKM) and carries more than 1,000 million tonnes of freight traffic per year and about 22 million passengers per day every day<sup>2</sup>. These trains are hauled either by diesel locomotives or electric locomotives. As on 31 March 2016, 27,999 (47 *per cent*) out of 58,825 Broad Gauge Route Kilometers (RKMs) have been electrified across IR. With 5,869 diesel and 5,214 electric locomotives as on 31 March 2016, 64.80 *per cent* of the freight traffic and 51.3 *per cent* of the passenger traffic is hauled by electric traction.

In comparison, electric traction is a more environment friendly option. By using electric traction over diesel traction, the nation reduces the use of fossil fuel, reduces import of petroleum and reduces its carbon footprints. For IR, electricity is a cheaper source of energy and electric rolling stock is also capable of regeneration process. Thus, increase in speed, ease of operation and better economic viability of the operations are the main positive aspects of using electric traction. Over the years, IR has undertaken the work of electrification of various routes/sections.

During 2015-16, the electricity consumption of IR for traction and other than traction purposes (excluding manufacturing units) was 18,226 million KWH units for which it spent around ₹ 10,425 crore. During the same period, diesel consumption of IR was 2,918 million litres for which it spent around ₹ 13,274 crore. The total expenditure on energy/fuel (on Broad Gauge routes) during 2015-16 was ₹ 23,699 crore which was about 22 *per cent* of the Ordinary Working Expenses. This expenditure was 19 *per cent* in 2009-10. Further, of the total expenditure on fuel, expenditure on cost of diesel was 56 *per cent*, while the cost of electricity was 44 *per cent* in 2015-16.

The Vision 2020 document stated that 33,000 RKMs would be electrified by March 2020. By 31 March 2016, 27,999 RKMs out of 58,825 RKMs have been electrified, 12,710 RKMs have been included in the Works Programme and the remaining 18,116 RKMs were yet to be sanctioned. In August 2016, the target has been revised by Railway Board to cover 24,427 RKMs under electrified routes by 31 March 2021, including 12,710 RKMs in progress and 11,717 RKMs (out of 18,116 RKMs) of missing links between already electrified sections.

<sup>1</sup> 66,687 RKM include 58,825 RKM in Broad Gauge, 4,908 RKM in Meter Gauge and 2,297 RKM in narrow Gauge

<sup>2</sup> Source: Indian Railways Year Book 2015-16

## 1.2 Organisational Structure

Member (Traction) has the responsibility to oversee and monitor RE projects. The Railway Electrification Directorate in Railway Board assists him in policy decision making.

The responsibility to carry out Railway Electrification (RE) was entrusted to a specialized agency of the Indian Railways, viz. Central Organisation for Railway Electrification (CORE), which was set up in 1979 at Allahabad. Projects are also entrusted to Rail Vikas Nigam Limited (RVNL), a Railway Public Sector Undertaking on nomination basis. Railway Board has also allocated some projects to Zonal Railways (Central Railway, Western Railway and East Coast Railway). Railway Board has also decided (August 2016) to assign RE projects to Indian Railway Construction Organization (IRCON), Rail India Technical and Economic Services Limited (RITES) (Railways' PSUs) and Power Grid Corporation of India Limited (PGCIL) (PSU under the Ministry of Power).

Till 2015-16, CORE and RVNL were the two main executing agencies for railway electrification (RE) projects. CORE is headed by a General Manager, who is assisted by officials from Electrical, Engineering, Signalling and Telecom (S&T), Finance, Stores, Personnel and Security Departments at headquarters in Allahabad. At present there are eleven project units to execute the works. These are headed by Chief Project Directors (CPDS). These units are located at Ambala, Lucknow, Jaipur, Secunderabad, Chennai, Bhubaneswar, Ahmedabad, New Jalpaigudi, Jabalpur, Kolkata and Danapur. CORE implements projects for electrification of important railway routes through these project implementing units for harnessing maximum benefits from their traffic potential. The Mission Statement of CORE envisages introduction of electric traction for 33,000 RKM by 2020, in steps of up to 1500 RKM per annum. The Mission Statement also envisages simplification of procedures and timely finalisation of tenders, timely execution of projects, improve the supply chain for ensuring timely supply of material to the projects and promote technological improvements in Railway Electrification works.

RVNL is headed by the Chairman and Managing Director (CMD) who is assisted by Directors in Personnel, Operations, Projects and Finance. The work of RE projects are supervised by Executive Director, RVNL and its field formations are headed by Chief Project Managers (CPMs) at various locations.

Further, respective Zonal Railways are responsible for providing inputs such as blocks for undertaking works, approvals of drawings and design etc. to the

executing agencies during implementation of RE projects and for post completion utilisation of electrified sections. This requires revision in existing loco link and crew link.

Ministry of Railways has taken new initiatives for accelerating the pace of Railway Electrification. While stating that the present capacity of IR to carry out the electrification projects is 2,000 RKMs annually, they have drawn up (August 2016) an Action Plan for railway electrification of 24,400 RKMs of BG network during 2016-17 to 2020-21. Ministry of Railways has decided to engage Public Sector Undertakings viz. Indian Railway Construction Organization (IRCON), Rail India Technical and Economic Services Limited (RITES) (Railways' PSUs) and Power Grid Corporation of India Limited (PGCIL) (PSU under the Ministry of Power) having expertise in laying the transmission lines in India and abroad.

### **1.3 Audit Scope and Objectives**

The review on Railway Electrification projects covered a period of five years, i.e., 2011-12 to 2015-16 and was undertaken with a view to assess

1. Whether approval process for taking up Railway Electrification Projects, identification of implementing agency and project planning were aimed at ensuring timely commencement of the projects?
2. Whether execution of the Railway Electrification Projects by various implementing agencies was done following best practices of project management and whether procedures followed ensured timely finalisation of tenders, timely execution of projects and promoted technological improvements in Railway Electrification Projects?
3. Whether optimal post project utilisation of the completed Railway Electrification Projects was ensured?

### **1.4 Audit Criteria**

Provisions contained in Chapter XII of Indian Railways Code for Engineering Department and Chapter VI of Indian Railways Finance Codes and Railway Board instruction/ orders issued from time to time on contract management have been adopted as criteria for conducting the review.

The criteria for Railway Electrification Project implementation with respect to economy, efficiency and effectiveness has been taken as cost, time and quality respectively. Comparison of cost, time and quality issues for similar project execution methodologies between CORE and RVNL was made by Audit.

Specific circulars issued by Government of India, Railway Board and subordinate authorities relating to Electrification Projects, creation of posts, provision of Direction & General (D&G) charges, utilization thereof, etc. were also used as audit criteria.

### 1.5 Audit Methodology and Sample

The methodology adopted included review/ examination of records maintained at various levels by Railway Administration/ Railway Board. Review of records available at various level, i.e. CPD offices, Zonal Railways, CORE, RVNL and Railway Board, was conducted by audit officials of Principal Directors of Audit/ Director General Audit of various Zonal Railways. Project execution methodologies viz. multiple tenders and supply orders based on item rate, turnkey projects and EPC projects were reviewed for selected CORE and RVNL projects.

An Entry Conference was conducted at the Railway Board on 13 July 2016 where representatives of Railway Board, RVNL and CORE interacted with Audit. Subsequently, mid-term engagement between the same stakeholders was held on 09 September 2016 at Allahabad. Exit Conference was held with CORE, Allahabad and RVNL on 19 Dec 2016 and 2 March 2017 respectively for discussion of audit findings and recommendations. Audit findings and recommendations were finally discussed with Member (Traction), Financial Commissioner and Additional Member (Traffic) and Additional Member (Budget), Director (Finance), RVNL, General Manager, CORE and other officials of Railway Board on 17 March 2017.

RVNL furnished reply to the specific audit issues raised in respect of the projects executed by them. Railway Board also furnished a reply, responding specifically to Audit Recommendations. Response of the Railway Board, CORE, RVNL and Zonal Railways at every stage have been considered and suitably incorporated in the Audit Report.

The criteria for sample selection and the sample selected is as follows:

Table 1.1- Sample of projects				
S. no.	Executing Agency/ Criteria	Total number of projects	Sample selected	Criteria for selection
1.	CORE (Completed projects)	24	12	50 per cent
2.	RVNL (Completed projects )	3	2	
3.	CORE (Ongoing projects)	22	11	50 per cent
4.	RVNL (Ongoing projects)	7	4	
5.	CORE (New projects)	24	6	25 per cent
6.	RVNL (New projects)	4	1	
<b>Total</b>		<b>84</b>	<b>36</b>	

Audit selected 14 completed projects, 15 ongoing projects and seven new projects for detailed review. For selection of the sample, projects where CRS sanction had been received for all sections as on March 2016 were treated as completed. Three projects were completed during June to November 2016, when audit was undertaken. As such, of the 36 projects reviewed there were 17 completed projects, 12 ongoing projects and 7 new projects. The list of projects reviewed in audit along with their status during the field audit is given below:

Table 1.2 – List of projects reviewed in audit			
S. no	Name of the RE Project	RKM	Status at the time of audit
1.	Bhubaneswar – Kottavalasa	414	Completed
2.	Krishnanagar – Lalgola	127.67	Completed
3.	Karepalli-Bhadrachalam Road-Manuguru	88.22	Completed
4.	Andal-Ukhra-Pandabeswar	20.34	Completed
5.	Ujjain-Indore and Dewas-Maksi	115	Completed
6.	Tiruchirapalli-Madurai	154	Completed
7.	Barabanki-Gorakhpur-Barauni	709.14	Completed
8.	Shakurbasti- Rohtak	60	Completed
9.	Jhansi - Kanpur including Ait Jn.- Konch Branch line of NCR and Kanpur Anwarganj- Kalyanpur	240.57	Completed
10.	Madurai-Tuticorin-VanchiManiyachchi-Nagercoil	262	Completed
11.	Varanasi-Lohta-Janghai-Unchahar including Phaphamau-Allahabad	207	Completed
12.	Barauni-Katihar-Guwahati	836	In progress
13.	Daund – Manmad including Puntamba Shirdi	255	Completed
14.	Shoranur – Kannur – Mangalore - Panambur	328	In progress
15.	Mathura-Alwar	123	Completed
16.	Ghaziabad -Moradabad	140	Completed
17.	Gooty - Dharmavaram - Yelahanka - including Dharmavaram - Sri Satya Sai Prashanthi Nilayam - Penukonda	306	Completed
18.	Gondia – Ballarshah	250	In progress
19.	Khana-Sainthia-Pakur including Pandabeswar-Sainthia	205	In progress
20.	Roza - Sitapur - Burhwal	181	Completed
21.	Alwar-Rewari	82	Completed
22.	Garhwa Road-Chopan-Singrauli	257	In progress
23.	Andal - Sitarampur	57	In progress
24.	Guntkal-Bellary-Hospet including Torangallu-Ranjitpura	138	In progress
25.	Amla-Chindwara-Kalumna	257	In progress
26.	Itarsi-Katni-Manikpur-Chheoki including Satna-Rewa	653	In progress

<b>Table 1.2 – List of projects reviewed in audit</b>			
<b>S. no</b>	<b>Name of the RE Project</b>	<b>RKM</b>	<b>Status at the time of audit</b>
27.	Titlagarh –Sambalpur- Jharsuguda	238	In progress
28.	Jakhal-Dhuri-Ludhiana	123	In progress
29.	Chhapra-Ballia-Varanasi-Allahabad	330	In progress
30.	Rohtak-Bhiwani	48	New work
31.	Jhansi-Manikpur including Khairar-Bhimsen	408	New work
32.	Erode-Karur-Tiruchirapalli	300	New work
33.	New Katni-Singrauli	248	New work
34.	Kiul-Tilaiya	87	New work
35.	Guntakal-Kallur	40.26	New work
36.	Ghazipur-Aunrihar-Manduadih	78.61	New work
<b>Total RKMs of selected projects</b>		<b>8367</b>	

### **1.6 Acknowledgement**

The report includes the responses of CORE, Zonal Railways and Railway Board gathered during various discussions/Exit Conferences held at Zonal/Railway Board level. The Audit team wishes to acknowledge the cooperation extended during this audit by the management and staff of the Railway Administration at CORE, Allahabad, its various CPD Offices, RVNL and its CPM offices, Zonal Railways and Railway Board.