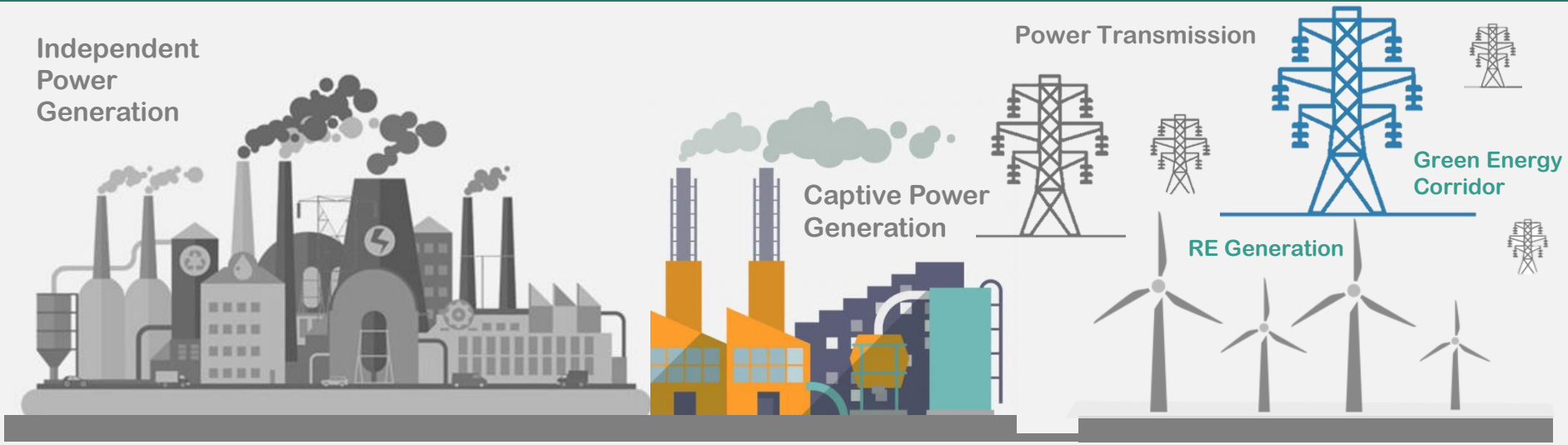




Railway Electrification Market Opportunities in India 2018

June 2018

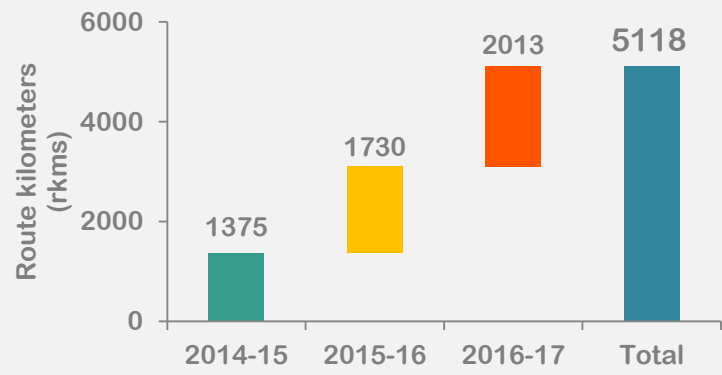
Exhibit 1: Railway Electrification Trend & Roadmap for India till FY 2022



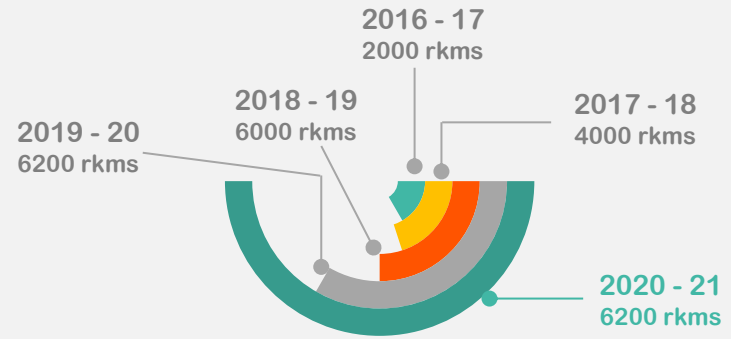
5186 rkms

5186 Route kilometers

Of railway lines have been electrified during last tree years (i.e. from 2014-15 to 2016-17)



Railway Infrastructure Upgradation



24,400 rkms

24,400 Route kilometers planned till 2020-21

Source: eninrac research & analysis, Ministry of Railways, Gol

Why eninrac's report upon "Railway Electrification Market Opportunities in India 2018"

RAILWAY ELECTRIFICATION PLANNED CAPACITY ADDITION RATE PROMISES GREAT OPPORTUNITY MIX FOR VALUE CHAIN PLAYERS

\$ 5000 MILLION OPPORTUNITY GALORE FOR EPC PLAYERS , OEMs, IPPs, CPSUs & POWER TRANSMISSION & DISTRIBUTION UTILITIES

Railway electrification has now opened up as a fresh opportunity area for multiple players involved in the business of facilitating it. Though not a nascent concept the electrification in India now has been committed with a fresh investment of INR. 35,000 Crores to electrify the entire network and eliminating the cost of fuel under transportation which shall be amounting to a massive savings of INR. 10,500 overall. This shall be a boon for savings for the Government to channelize the investments in modernization of the railway infrastructure. Incidentally, the cost on per "km" basis boils down to INR. 1 Crore over parts of the 66,000 km network which remains yet to be electrified for the country.

Post 70+ years of independence India has been able to add to railway network impressively but the extent of electrification trails, resulting in close half of the entire network length of country being electrified. But the advantage of this electrified network is that it accounts for 55% of passenger traffic and 65% of freight traffic for the Indian railways at only 35% of the total fuel bill incurrence. Hence, the need for full electrification has been long felt and is regarded as a game changer in pushing railways further to handle greater freight tune as well as passenger traffic with enhanced speed and lowered fuel expenditure. This has pushed the Gol to have an ambitious plan in order to secure the required infrastructure for full electrification in the railway network of the country. Currently, railways consume for 15.6 billion units of electricity per annum and foots a bill of INR. 9500 crore which clearly shall be doubled once the entire network shall be electrified but shall also render in savings of INR. 17,000 crore incurred towards diesel bill annually. Thus, this shall open up great opportunity galore for both conventional and renewable power generation players as the business rationale for railways favors either direct power purchase or setting up its own captive infrastructure. In either of the cases EPC players shall have another set of opportunities being generated for their businesses.

Not only the need for power shall go up for the electrified network but the entire infrastructure shall be requiring a facelift which opens up a massive opportunity of aligning business interests for system providers like overhead line equipment providers, component vendors etc. Also, the need for electric locomotives shall gain momentum which shall be a boon to “Make in India” initiative of the Government and shall favor the rolling stock companies as well. Solar plant & wind power developers are witnessing the tariff hitting rock bottom and the delays observed in the pay cycles of the power distribution companies have opened up the market for direct power purchase transactions for which railways is absolutely suitable. Hence, railway electrification shall serve of great interest to the power generation capacity enhancers to have tied up their generation capacities to have sustained cash flows which can ensure them better bankability as well. Further, to transmit the amount of power required shall need power transmission infrastructure improvements which shall translate into massive business opportunity for the like of PGCIL and STU’s involved. Also, the power distribution companies shall be interested as well in the urban transportation part of the electrified network as the supplies to railways always shall be a stable proposition without having any deviation of demand or demand fluctuations to cater to. Hence, eninrac team of experts pondered to discover all these opportunities and present them in form of a dossier which factors both high end analysis and robust datasets for seamless transition of business decision making for the industry leaders and associated value chain players.

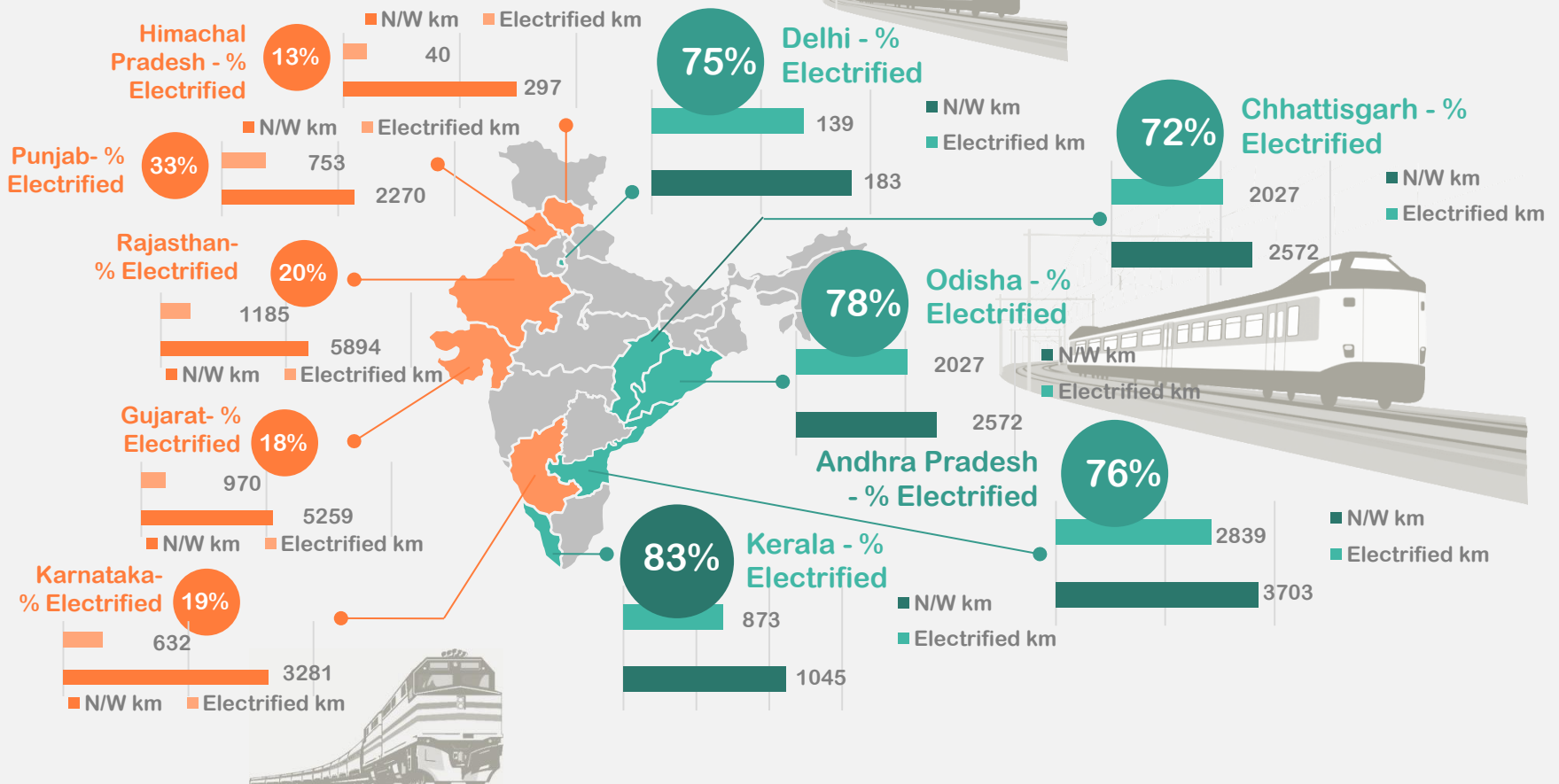
Exhibit 02-Railway Electrification Rate for Leading & Laggard State's of India



Poor Electrification Rate States – Indicates bottom 5



Best Electrification Rate States – Indicates top 5



BUSINESS CASE FOR RAILWAY ELECTRIFICATION IN INDIA

- Government of India plans to fully electrify the balance 50% network in coming four years time i.e. till 2022
- Cumulative planned investment for over \$5000 Million planned till 2022 for electrification of railway network in India
- Close to 30 Billion units of electricity shall be required for railway electrification on annual basis by 2022 leading excellent opportunities for IPPs of conventional power
- Direct power purchase agreements likely to go up with more solar & wind power installations coming up may supply directly for railways
- Overhead line equipment suppliers to gain massive opportunities to supply for the equipment's like conductors, transformers & insulators etc.
- Sub-station capacity to enhance leading for opportunities for transmission & distribution utilities
- EPC contractors shall have multitude of opportunity in terms of infrastructure creation for railway electrification
- Opportunity for rolling stock companies shall be massive, electric locomotives shall gain pace
- OEM's shall have greater opportunity coming their way in terms of equipment supplies & order

REPORT INSIGHTS

- Complete trend for railway electrification in India – Region Wise Track
- Spread of 1,66,000 km of network electrification program of India as per announced and upcoming capacity with tender details indicating easy business opportunities
- Exact quantification of opportunity for power transmission, distribution and generation utilities for enhanced demand due to railway electrification
- Opportunities for IPP's of thermal, wind & solar power generators to initiate direct power purchase agreements involving railways and dedicated capacity creation
- Quantification of Opportunities for renewable energy IPP's to enter into open access transaction with railways
- Opportunities for off-grid installations for Indian railways for it's own electricity requirements
- Expansion of inter-regional and intra-regional transmission network opportunity and establishing of sub-station for transmission utilities in India
- Opportunities for EPC contractors for OHE line, sub-station, power generation and power transmission infra construction
- Quantified opportunities for System providers under railway electrification
- Opportunity track for electric locomotives and for rolling stock manufacturers in India

KEY HIGHLIGHTS

- Trend & outlook of railway electrification in India till 2022
- Opportunities for 15.6 BU's Rise in Power Consumption by 2022 Due to Electrification – Region wise analysis of D2I Model feed
- Opportunity for Direct Power Purchase Agreement for Railways
- Opportunities for RE IPP'S to Enter into Open Access Transaction With Railways - D2I Model Based Findings
- Opportunity for Off-Grid Installation for Railways Electrification-D2I Model Based Findings
- Quantification of Opportunities for Power Transmission Utilities
- Quantification of Opportunities for Power Distribution Utilities
- Opportunities for EPC Players in Railway Electrification in India
- Opportunities for System Providers in Railway Electrification
- Opportunity in Loco Electrification in Railway Electrification
- Track for Upcoming Tenders for Railway Electrification – Project Tracker
- Company Profiles of rolling stock companies like BHEL, GE-Alstom, Cimco, EPC companies like L&T, Kalptaru, Siemens & ABB etc.

PRESS EXCERPTS

“Indian Railways has prepared a INR. 35,000 crores plan to electrify its entire network in the next four years, a move that will help save INR. 10,500 crores a year in fuel bill. The cost works out to be slightly more than INR. 1 crore per kilometre over parts of the 66,000-km network yet to be electrified

Economic Times

“Importantly, the national transporter has plans to award individual tenders as large as 1,500km. The move would not only lower electrification costs due to better economies of scale but also make the tenders more appealing for large companies. Indian Railways has hitherto been awarding tenders for smaller lengths”

Live Mint

KEY QUERIES ADDRESSED

- What shall be the trend & outlook of railway electrification in India till 2022?
- What will be opportunity for power consumption by railways due to complete electrification by 2022?
- What shall be scale of opportunity for EPC contractors under railway electrification projects in India?
- How shall be the Direct Power Purchase Agreement market for Railways & how shall be the outlook?
- What shall be region wise opportunity in India for open access for railway electrification in India?
- What shall be the tune of opportunities for RE IPP'S to Enter into Open Access Transaction With Railways
- What shall be the Opportunity for Off-grid Installation for Railways Electrification-D2I Model Based Findings
- How would be the Quantification of Opportunities for Power Transmission Utilities
- What be the Quantification of Opportunities for Power Distribution Utilities
- How would be the Opportunities for EPC Players in Railway Electrification in India
- What shall be the Opportunities for System Providers in Railway Electrification in India
- What shall be Opportunity in Loco Electrification in Railway Electrification in India

MUST BUY FOR

- EPC Contractors involved in Railway Electrification
- System Integrators & equipment suppliers involving transformers, conductors & insulators etc.
- Rolling Stock Companies
- Sub-station EPC contractors
- Railway Electrification Value Chain Players
- Utility Solar Power Project Developers
- Roof-top Solar Power Project Developers
- EPC Contractors for Solar & Wind Energy Projects
- Smart Grid Service Providers
- Power Distribution Utilities
- Power Transmission Utilities
- Government & Regulatory Bodies
- Research Institutions/Bodies
- Funding Bodies/Banks

COMPANIES MENTIONED

- General Electric
- CORE
- Alstom
- Siemens
- L&T Infrastructure Limited
- Kalpataru Power Transmission
- PGCIL
- Sterlite Grid
- CIMCO
- BHEL
- RITES
- ABB
- Siemens
- Hitachi Limited



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vantedget⁺

THANK YOU!

Happiness does not come from doing easy
work but from the afterglow of satisfaction
that comes after the achievement of a
difficult task that demanded our best

- Theodore Isaac Rubin