BACKGROUNDERS
Press Information Bureau
Government of India

Mission 100% Electrification: Powering the Future of Indian Railways

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Key Takeaways

- **Indian Railways** has electrified about **99.2%** of its network by **November 2025**, making it one of the world's most extensively electrified rail systems.
- **Electrification pace** has surged from **1.42 km/day** (2004–2014) to over **15 km/day** in **2019-2025**, marking a massive acceleration in modernization.
- By November 2025, Indian Railways expanded its **solar power capacity** to **898 MW**, up from **3.68 MW** in 2014, marking a transformational growth in renewable energy adoption.

A Silent Revolution on the Tracks

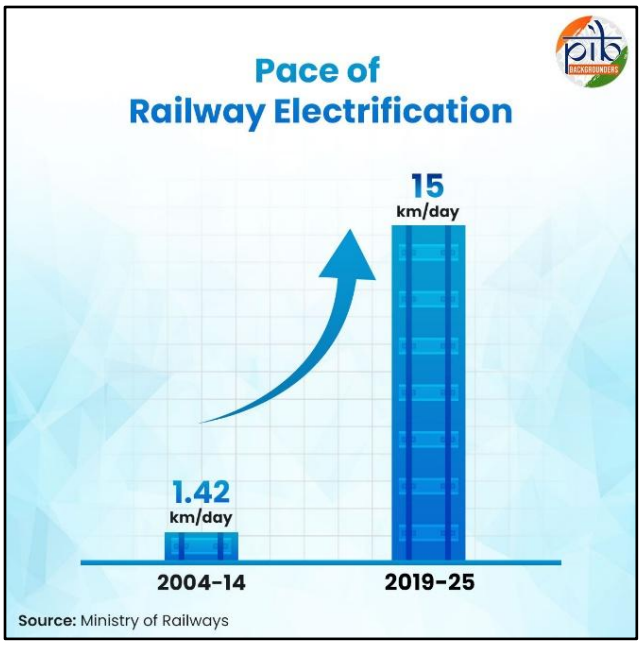
India's Railways, once powered largely by diesel, are now rapidly shifting to electric trains. This marks a major leap towards a modern and sustainable future. With wires spreading across the network under **Mission 100% Electrification**, the rail system is becoming faster and more efficient. This transformation represents India's strong commitment to reducing pollution. It ensures a cleaner environment and smarter transport for the nation. Today, almost the entire rail network runs on electric traction. Renewable energy, like solar power, is also being integrated across stations and operations. The focus is clear: greener trains, reliable power, and a cleaner environment.

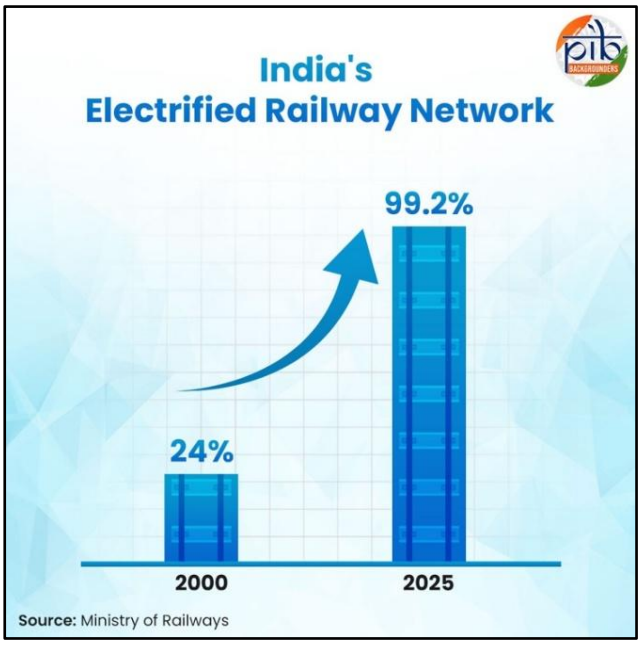
A Century of Progress: Journey of Railway Electrification in India

India's railway electrification story began in 1925, when the country's first electric train, powered by a 1500 Volt DC system, ran between Bombay Victoria Terminus and Kurla Harbour. It was a short route, but a historic leap: the first operational use of electric traction in India, signalling the dawn of energy-efficient, higher-capacity rail travel.

Progress in the early decades was modest. By the time India gained independence, only **388 Route Kilometers** (RKMs) had been electrified, with coal and diesel locomotives continuing to dominate the tracks. Over the years, electrification expanded steadily, but the real transformation took shape over the last decade, when Indian Railways intensified its push toward cleaner and more efficient operations.

The impact has been remarkable. Electrification has accelerated from just about **1.42 km per day between 2004 and 2014** to an average of more than **15 km per day between 2019 and 2025**. The pace underscores a transformative shift in how quickly the network is being modernised. Electrified track share rose from **24% in 2000** to **40% in 2017**, and **crossed 96%** by the end of **2024**. Today, that century-long journey is approaching its finish line. As of **November 2025**, India has electrified an impressive **69,427 RKMs**, covering about **99.2%** of its railway network, out of which **46,900 RKMs** have been electrified between 2014 and 2025.





What began a hundred years ago on a short suburban stretch in Bombay has grown into one of the world's most extensive and nearly complete electrified rail systems. Electrification now stands at the heart of Indian Railways' mission to reduce emissions, enhance efficiency, and deliver a greener, faster future for the nation.

Status Snapshot: Wiring the Final Miles

With **99.2% of India's 70,001 RKM Broad Gauge network already electrified**, Indian Railways stands on the threshold of complete electrification, marking a transformative achievement in sustainable, efficient, and future-ready rail transport. The state-wide details are as follows.

Railway Electrification Across States

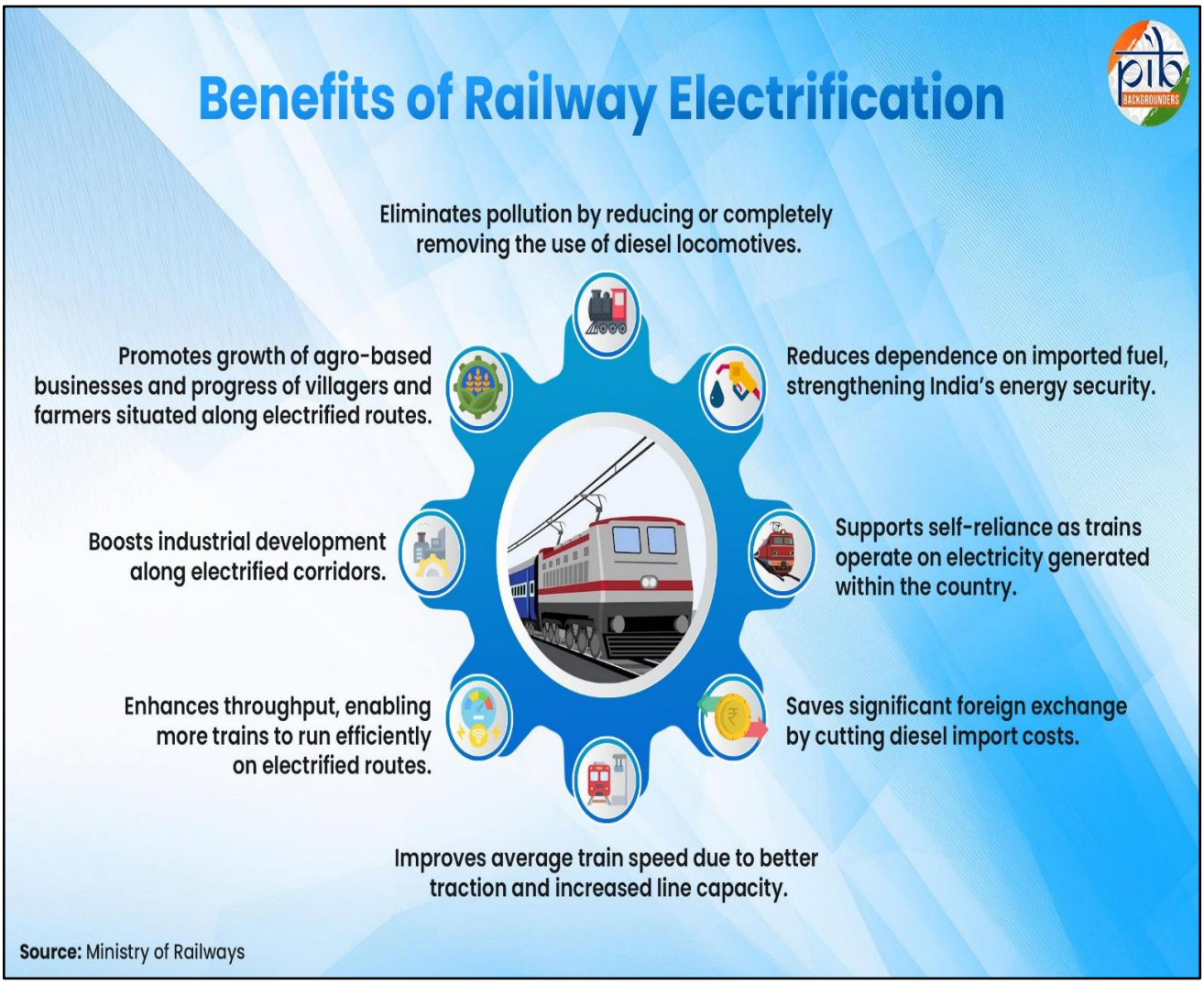
- **25 States/Union Territories are 100% electrified**, with no remaining BG route kilometers pending.
- Only **5 States** have residual sections under electrification, together accounting for just **574 RKM**, or **0.8%** of the total BG network.

States with Remaining Electrification Work

State	Total BG RKM	Electrified BG RKM	% Electrified	Balance RKM
Rajasthan	6,514	6,421	99%	93
Tamil Nadu	3,920	3,803	97%	117
Karnataka	3,742	3,591	96%	151
Assam	2,578	2,381	92%	197
Goa	187	171	91%	16

Why Electrification Matters

Railway electrification stands as a cornerstone of India's sustainable transport and economic growth strategy. Beyond reducing adverse environmental impact, it strengthens energy security, enhances operational efficiency, and drives inclusive development across regions. The benefits of electrification extend from faster and more efficient train operations to catalysing industrial and rural growth along railway corridors, making it a powerful enabler of national progress.



Global Benchmarking: India in Perspective

Achieving **99.2% railway electrification**, Indian Railways has positioned itself firmly among **the world's leading rail networks**. A comparison with major international railway systems highlights how electrification levels vary globally and underscores the scale and significance of India's progress. As per the **International Union of Railways (UIC) report, June 2025**, the extent of railway electrification in prominent countries is presented below:

Country	Railway Electrification (%)
Switzerland	100%
China	82%
Spain	67%
Japan	64%
France	60%
Russia	52%
United Kingdom	39%

This global comparison illustrates India's standing among advanced railway systems and reinforces the strategic importance of sustained electrification in achieving efficiency, sustainability, and international competitiveness.

Railways on Solar Power: Lighting the Future

With the growing focus on sustainable and efficient transportation, Indian Railways is increasingly prioritising electric traction as it is more environmentally friendly and also about **70% more economical** than diesel traction. With regard to Indian Railways' Mission for 100% electrification, two significant positive developments stand out:

- The commitment to electrify the entire Broad Gauge network in mission mode, ensuring an environmentally friendly, clean, and green mode of transportation for the public.

- The strategic decision to tap into renewable energy, particularly solar power, by leveraging the vast stretches of land available along railway tracks.

Major Solar Capacity Deployment

Indian Railways' transition toward renewable energy marks a decisive step in building a greener and more sustainable transport system. The scale and speed of solar adoption across the network underline this commitment.

- **Unprecedented Capacity Growth**: As of November 2025, Indian Railways has commissioned **898 Mega Watt (MW)** of solar power, a remarkable leap from just **3.68 MW in 2014**, reflecting nearly a **244-fold increase** in solar capacity.

- **Nationwide Clean Energy Footprint**: This solar power is now installed at **2,626 railway stations**, showcasing widespread adoption of clean energy solutions across diverse geographical and operational zones.

How Solar Energy Supports Railway Electrification

Solar energy contributes to the goal of electrification in multiple ways:

- **Supporting Electric Train Operations**: Out of the total 898 MW of solar capacity commissioned, **629 MW (about 70%)** is being utilised for **traction purposes**, meaning the solar power generated contributes directly to the electricity requirements of **electric train operations**. This reduces reliance on conventional grid electricity for traction.

- **Meeting Non-Traction Energy Needs**: The remaining **269 MW** of solar capacity is used for **non-traction purposes** such as **station lighting, service buildings, workshops, and railway quarters**. By meeting these energy needs with solar, Indian Railways reduces conventional energy use and electricity costs in a **clean** and **sustainable way**, improving overall energy security and operational efficiency across the network.

Engineering the future of Electrification

Indian Railways is increasingly adopting modern technologies and innovative construction methods to improve efficiency, safety, and speed in railway electrification projects. By reducing manual dependence and embracing mechanisation, project execution has become faster, more reliable, and of consistent quality.

Cylindrical Mechanised Foundation

Traditional overhead electrification (OHE) foundations required intensive manual excavation and slowed project progress. The adoption of cylindrical foundations installed through mechanised augering has streamlined the process, reducing labour effort and significantly saving time.

State-of-the-Art Automatic Wiring Train

The Automatic Wiring Train enables simultaneous installation of catenary and contact wires with accurate tension control. This advanced system speeds up the wiring process and ensures the timely completion of electrification works.

More Than Modernisation, A Movement

Electrification is redrawing the energy profile of Indian Railways, turning an age-old system into a contemporary powerhouse. What was once a diesel-driven giant is rapidly evolving into a sleek, electrified network that moves millions with less noise, less cost, and less carbon. It's not just modernization, it's momentum. Railway electrification in India is no longer just a technical upgrade; it is a national story where infrastructure meets aspiration, and where every newly energized route becomes a promise of faster, greener, and more connected journeys ahead.

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