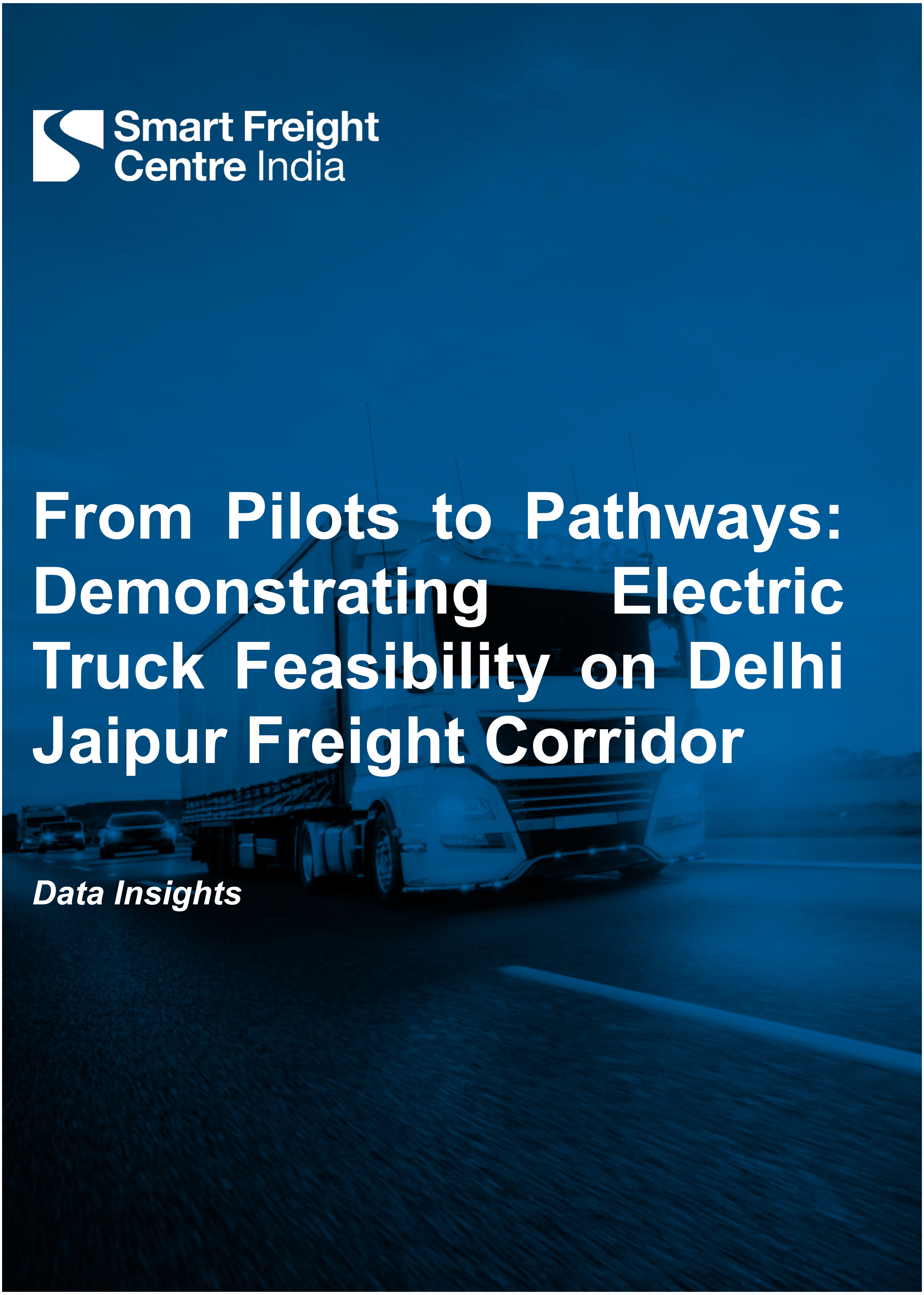

Smart Freight Centre India

From Pilots to Pathways: Demonstrating Electric Truck Feasibility on Delhi Jaipur Freight Corridor

Data Insights

About Smart Freight Centre (SFC)

Smart Freight Centre is an international non-profit organization working on Freight Decarbonization to minimize the climate impact of the global freight and logistics sector. Smart Freight Centre has also undertaken a host of Freight Decarbonization initiatives in India under its India program, working in close collaboration with the India Freight Industry, Policy Offices (national and sub-national), Academia & Research and other ecosystem partners, targeting one of the world's largest freight markets with the urgent mission to address the projected 400% increase in CO_2 emissions by 2047. Smart Freight Centre, with its India program, is deeply engaged with NITI Aayog's e-FAST India program, collaboratively working with various knowledge partners to advance specific aspects of ZET ecosystem development, while also leading on Freight Emissions Guidance Development and Industry adoption in India. Through these strategic partnerships and a collaborative approach, SFC India envisions and works toward a freight and logistics sector that is sustainable, environmentally responsible, and actively engaged in mitigating climate impact, seeking commitments from logistics service providers and shippers to adopt emission reduction strategies for a more sustainable future.

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Citation

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Acknowledgements

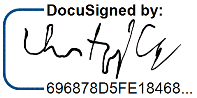
We extend our heartfelt gratitude to all the partners and contributors who played a vital role in shaping this demonstration across Delhi-Jaipur Corridor. This initiative would not have been possible without the deep engagement and shared vision of organizations committed to accelerating the transition to zero-emission freight in India.

At the heart of this initiative lies a clear and data-driven insight. The economic and operational viability of e-truck deployment can only be understood through real-world performance evidence, shaped by factors such as duty cycles, payload patterns, route conditions, and charging behavior. The program’s distinctive “Data Partnership” model, built on voluntary data sharing by industry partners across logistics, charging, and vehicle operations, has been central to generating these insights. We sincerely thank our partners for their collaboration, transparency, and commitment to advancing zero-emission freight, without which this analysis and demonstration would not have been possible.

We are especially grateful to the our demonstration partners – Amazon India Pvt Ltd, Safexpress Pvt Ltd, Jasveer Singh, CEO & Managing Director, Instant Transport Solution Private Limited, Sandeep Yadav, Founder & CEO, Yahhvi, Mr Mahesh Panjwani, Managing Director, Harsh Transport Private Limited, Chander Bindal, Chairperson & Managing Director, Tejas Cargo India Limited, Suvishesh Logistics and Golden Aero Logistics for their valuable contribution and support.

We also thank the Centre of Excellence on Zero Emission Trucks (CoEZET), especially Ajithkumar TK and Selvarajan T. We also want to extend special thanks to UC Davis for their continued thought leadership, technical expertise, and support throughout the design and execution of the program.

To all our partners - thank you for walking this path with us toward a more sustainable, inclusive, and low-emissions freight future.



Prof. Dr. Ing. Christoph Wolff

CEO, Smart Freight Centre

Contents

1. EXECUTIVE SUMMARY

India's ambition to decarbonize its transport sector, responsible for nearly 10% of national CO_2 emissions necessitates a transformative shift in freight movement. Heavy-duty trucks, though accounting for less than 3% of India's vehicle population, contribute over 53% of freight-related PM emissions (NITI,2022), making their electrification vital to achieving the country's net-zero and clean-air goals.

The Delhi–Jaipur Zero-Emission Truck Demonstration, conducted under the Smart Freight Centre's (SFC) Data Partnership Corridor Program, was designed to **generate real-world evidence on the operational, technical, and commercial feasibility of electric trucks** along one of India's busiest freight corridors.

Spanning 280 km along NH-48, the corridor was selected for its high freight density, flat terrain, and proximity to renewable energy zones such as Neemrana, Bhiwadi, and Kotputli. **The demonstration evaluated multiple electric truck configurations (5.5 -ton GVW, 14-ton GVW, 18.5-ton and 55-ton GVW) to assess performance across varied duty cycles, payloads, and charging requirements**. Engagement with fleet operators, charge point operators (CPOs), and shippers provided a comprehensive view of on-ground operational realities and infrastructure needs.

KEY FINDINGS

- Energy cost savings of 20–26% and Tank-to-Wheel CO_2 emission reductions ranging from 38 kg to 175 kg per trip compared to diesel vehicles across categories. leading to approx. 35,000 Tonne co2 emissions avoided annually with just 15% E-truck transition.
- Increase in total trip duration by 2.3–3.2 hours and approx. 22–34 km of extra non-revenue travel, underscoring the need for dedicated depot charging infrastructure and ultra-fast charging or battery-swapping solutions to minimize turnaround time.
- Energy efficiency varying (~ 0.98 to 1.67 Km/ kWh) across MHDTs vehicle categories
- TCO parity is attainable at **~6,000 km/month** with partial depot charging, further enhanced through **RE-integrated charging stations**, underscoring **utilization, charging mix and renewable integration** as key levers for e-truck cost competitiveness
- Charge point operators like Yahhvi have already begun deploying renewable-powered charging stations, signaling the early stages of a clean freight transition.

This **demonstration confirms the operational readiness of the Delhi–Jaipur corridor for** large-scale e-truck deployment, establishing a strong case for shifting from isolated electric truck pilots to a coordinated, corridor-based electrification strategy. Such an approach will enable faster, data-driven, and scalable adoption of zero-emission freight across India's key industrial routes and corridors.

2. INTRODUCTION

India's electric truck (e-truck) ecosystem is gradually taking shape, with over 400 medium- and heavy-duty electric trucks (MHDTs) currently operating across various industrial clusters. However, most of these deployments remain fragmented, small-scale pilots, often limited to individual shippers or specific routes constraining data sharing and scalability. Recognizing the need to move from scattered demonstrations to a coordinated, system-level approach, the Smart Freight Centre's (SFC) Data Partnership Corridor Initiative aims to enable corridor-based deployment of Zero-Emission Trucks (ZETs) across India's high-density freight routes.

Drawing insights from the PSA Corridor Report and aligning with the PM E-DRIVE initiative, this program seeks to kick-start large-scale cargo movement by electric trucks while generating real-world evidence on their technical, operational, and economic performance across diverse duty cycles. The Delhi–Jaipur corridor, which sees more than 4,000 MHDTs daily, was identified as a priority route given its optimal length, strong industrial base, and renewable-energy potential.

The Delhi–Jaipur Zero-Emission Truck Demonstration was undertaken to establish on-ground evidence on the feasibility and performance of e-trucks under real-world Indian conditions. The initiative aimed to assess operational parameters such as energy consumption, range, charging behavior, and turnaround time (TAT), thereby informing the design of large-scale ZET deployment strategies.

The study adopted a **data-driven methodology, combining telematics integration, GPS-based data logging, and in-person route recee conducted by the SFC team**. These tools enabled comprehensive monitoring of vehicle speed, energy use, State of Charge (SoC), and charging patterns along the 280 km Delhi–Jaipur stretch of NH-48. The exercise was further strengthened through direct engagement with fleet operators, drivers, shippers, logistics service providers (LSPs), and charge point operators (CPOs) to validate operational feasibility and infrastructure readiness.

By capturing empirical insights across multiple e-truck models and operational scenarios, the demonstration helped identify key technical and **operational enablers including optimal charger placement, energy consumption benchmarks, fleet utilization patterns, and driver behavior while also uncovering on-ground challenges related to vehicle range, grid reliability, and charging infrastructure.**

The findings from this initiative will directly inform the corridor-level implementation roadmap, guiding policymakers, industry stakeholders, and investors toward scalable, renewable-powered zero-emission freight deployment in India. This demonstration thus represents a critical step in accelerating India's transition toward a clean, efficient, and zero-emission freight ecosystem, aligned with the nation's net-zero and clean-air commitments.

3. BACKGROUND

3.1 Overview of Delhi- Jaipur Corridor

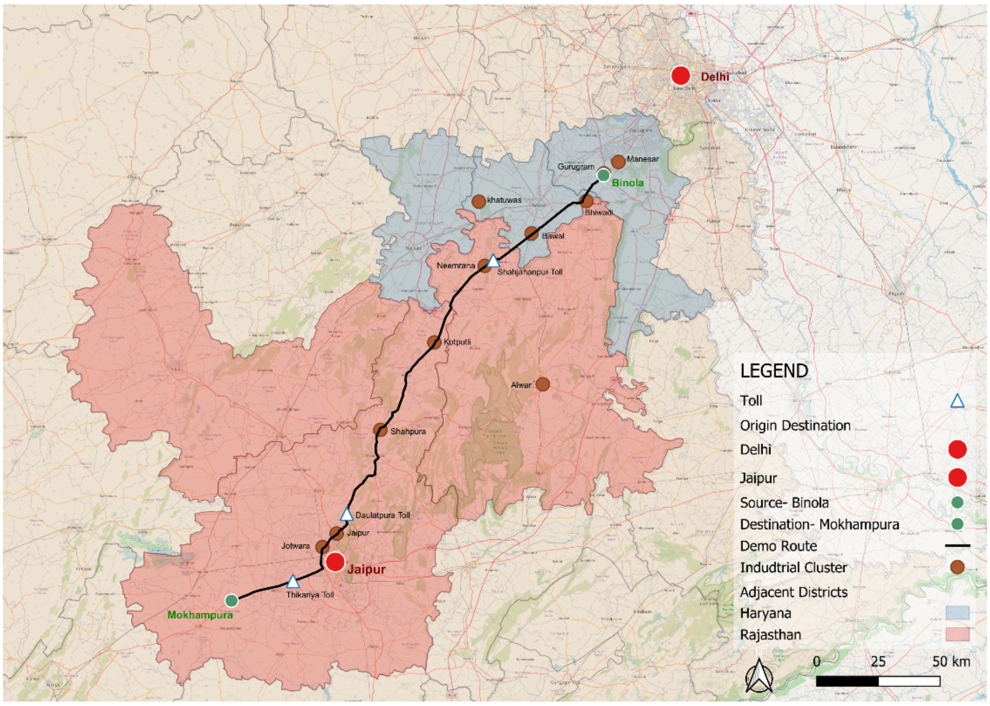
The Delhi–Jaipur corridor, spanning about 280 km along NH-48, is a vital segment of India's Golden Quadrilateral, linking northern and western industrial centres. It connects Delhi as a major consumption hub, Gurugram–Manesar–Bhiwadi–Neemrana as a dense industrial and logistics cluster, and Jaipur as both an industrial and consumption centre.

This corridor presents strong potential for Zero-Emission Truck (ZET) operations. Its distance aligns well with the **driving range of current ZET models**, making it ideal for demonstrating large-scale electric freight movement under Indian conditions. Anchored by robust industrial ecosystems and upcoming multimodal logistics parks, the route is further strengthened by reliable transmission and distribution infrastructure, ensuring grid readiness and power availability for high-capacity truck charging

Beyond its role in industrial logistics, the corridor has a strong potential to become a clean freight corridor powered by renewables. It is already included in the NHEV "E-highway" pilot program, with plans to deploy green-energy charging infrastructure. Because Rajasthan is actively scaling solar and wind capacity (e.g., via the **Bhadla Solar Park and state green energy corridors**), and because the highway aligns with existing transmission infrastructure, the corridor is well-suited to source renewable electricity for charging.

When combined with the corridor's freight density (industrial goods, e-commerce, aggregates, perishables), this alignment supports the establishment of a zero-emission, renewable-backed freight ecosystem, improving air quality, reducing carbon emissions, and validating ZET deployment under Indian conditions.

The state of Current Road side infrastructure Between Gurugram to Mokhampura (255 km stretch on Delhi- Jaipur corridor) is shared below



The State of Renewable energy on the Corridor

Delhi–Jaipur corridor emerges as one of India's most promising routes for establishing renewable-powered charging infrastructure, combining high freight intensity with exceptional renewable energy potential. Stretching along NH-48, the corridor benefits from robust grid connectivity and proximity to major clean-energy zones in both Haryana and Rajasthan, where renewable penetration and transmission readiness are among the strongest in the country.

Strategically, the corridor sits within India's **Green Energy Corridor** network specifically the **Jaipur–Neemrana–Gurugram transmission** segment designed by MNRE and PGCIL to evacuate renewable power from Rajasthan's solar- and wind-rich regions toward Delhi-NCR load centers.

Rajasthan already sources over 70% of its installed power capacity from renewables, anchored by the Bhadla Solar Park (2.2 GW), Jaisalmer wind-solar hybrid clusters, and emerging solar parks in Alwar, all interconnected through the RVPNL and JVVNL transmission systems (MNRE, 2024; CSTEP, 2023).

Under the state's Integrated Clean Energy Policy 2024, Charge Point Operators (CPOs) and logistics hubs along Neemrana–Behror can procure **renewable power through open-access solar contracts priced competitively at ₹3–4 /kWh**. The Neemrana and Bhiwadi industrial zones, part of the Delhi–Mumbai Industrial Corridor (DMIC), are already eligible for open-access solar supply from leading developers such as CleanMax, ReNew, and Fourth Partner Energy, reinforcing their role as critical renewable nodes along this route.

Additionally, studies by RAP and ICCT (2024) highlight that synchronizing truck-charging schedules with solar generation peaks could **lower system costs by 15–20%, improve grid utilization, and maximize renewable absorption.** Together, these factors position the Delhi–Jaipur corridor as India's first model clean-freight route, where renewable power, industrial demand, and grid infrastructure converge to enable large-scale deployment of Zero-Emission Trucks (ZETs).

The State of Air quality and emissions on this corridor

The Delhi–Jaipur corridor, experiences some of the highest freight and vehicular emission densities in North India. Air quality along this route consistently exceeds National Ambient Air Quality Standards (NAAQS), with average **$PM_{2.5}$ levels ranging between 70–110 μg/m³, far above the permissible 40 μg/m³ (CPCB, 2023)**. Key urban and industrial nodes Manesar (Gurugram district), Bhiwadi & Neemrana (Alwar district) and Jaipur are all designated non-attainment cities under India's National Clean Air Programme (NCAP) due to persistent exceedances of PM_{10} and NO_2 levels.

Heavy-duty diesel trucks are major contributors, accounting for nearly 60–70% of freight-related NO_x and PM emissions (CSE Study, 2016). Industrial activities and construction dust from hubs such as Neemrana, Bhiwadi, and Kotputli further compound localized pollution loads. Transitioning to renewable-powered electric freight movement along this corridor can therefore deliver substantial co-benefits reducing particulate emissions, improving regional air quality, and supporting India's NCAP and net-zero objectives.

Policy Support across Rajasthan, Haryana and Delhi

The Delhi–Jaipur corridor spans three progressive EV states Delhi, Haryana, and Rajasthan each at different stages of policy implementation. Delhi's EV Policy 2020 provides the strongest framework, **targeting 25% EV adoption by 2026** with purchase incentives,interest subvention, scrappage benefits, and waiver of road tax and registration fee.
Haryana's EV Policy 2022 focuses on industrial and logistics electrification, offering tax exemptions, SGST reimbursement, and targeted EV zones in Gurugram, Manesar, and Panchgaon to promote manufacturing and freight decarbonization. Rajasthan's EV Policy 2021 complements these efforts by linking e-mobility with renewable energy, incentivizing solar-based charging and offering registration fee waivers and SGST reimbursements. Collectively, these state policies establish a conducive policy ecosystem for scaling zero-emission truck operations along the corridor.

3.2 Zero Emission Trucks (ZETs) in Consideration

For this demonstration, a diverse fleet of electric trucks spanning vehicle categories from **10-foot light-duty models to 55-ton heavy-duty configurations was deployed along the Delhi (Binola and Sohna) to Jaipur (Mokhampura and Jotwara) route.**

These vehicles were selected to represent a cross-section of freight operations typical to the corridor, allowing assessment of performance across varying payload capacities, duty cycles, and charging requirements. The technical specifications of the trucks considered for this pilot are detailed below.

Specification of PRO 2055,14ft Truck

Specification and Model	
Manufacturer Name	Eicher Motors
Model Name	PRO 2055
Vehicle GVW (Ton)	5.5
Payload (Ton)	2.2
Battery Capacity	64 kWh
Motor Rating	91 kW

Specification of 32ft, SXL, Retrofit Truck

Specification and Model	
Manufacturer Name	Kalyani Motors
Model Name	Retrofit, 32ft
Vehicle GVW (Ton)	18.5
Payload (Ton)	8
Battery Capacity	200 kWh
Motor Rating	150 kW

Specification of 22ft, 14 Ton Truck

Specification and Model	
Manufacturer Name	Ashok Leyland
Model Name	Boss 14T EV
Vehicle GVW (Ton)	14
Payload (Ton)	6
Battery Capacity	201 kWh
Motor Rating	120 kW

Specification of RHINO 5536e Electric Truck

Specification and Model	
Manufacturer Name	IPLTECH
Model Name	RHINO 5536e
Vehicle GVW (Ton)	55
Payload (Ton)	38
Battery Capacity	282 kWh

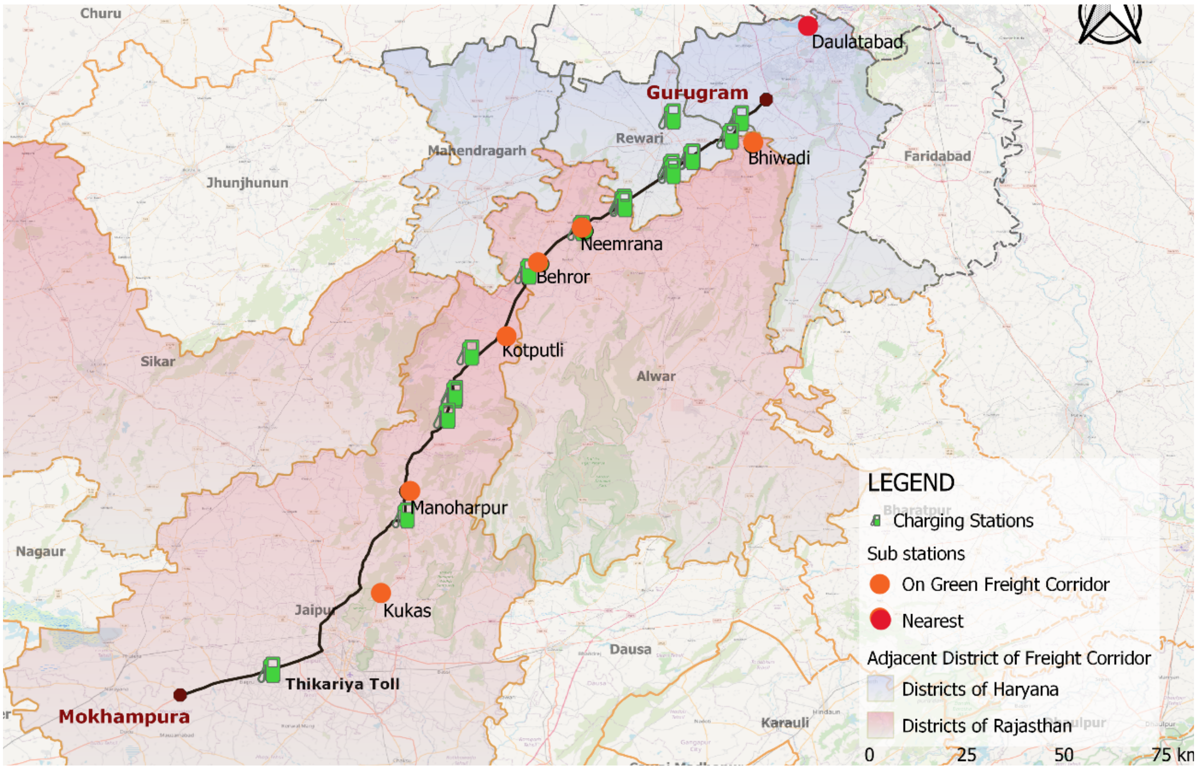
3.3 State of Charging Infrastructure

During Corridor stretch (Binola – Mokhampura) recee and consultation with CPO, it was observed that the **corridor already hosts over 15 public charging stations, each equipped with a minimum rating of 60 kW**. This makes it one of the few national highway segments with emerging readiness for medium- and heavy-duty electric vehicle (MHDV) operations. The details of existing charging locations, which can be leveraged for e-truck movement and route optimization, are summarized below

CPO	Location	Charger Rating
BPCL	Shri Siddhivinayak Fuel Station, Sangwari	60 kW
Jio BP	Bagru(Next to Jaipur)	60 kW
Jio BP	Rajashri Resorts, Chandwaji, Rajasthan	60 kW
Jio BP	Khelna, Rajasthan	60 kW
Tata Statiq	Hamjapur, Rajasthan	240 kW
Yahhvi	Panchgaon, Gurugram	60 kW
BPCL	Sangwari, Haryana	60 kW
Jio BP	Sanganer, Bagru, Jaipur	60 kW
Jio BP	Chandwaji, Sunder Ka Bas, Rajasthan	60 kW
Jio BP	Ladakavas, nearest town Kotputli	60 kW
BPCL	Shree Sidhi Vinayak Fuels, Sangwari.	60 kW
HPCL Best Fuels	Pinkcity Midway petroleum	60 kW
Statiq	Hans Resort, Rewari, Deodha	60 kW

Statiq	Rewari, Dharuhera	60 kW
Statiq	Shahpura, Rajasthan	60 kW
Glida	Kasola Chowk, Rewari, Haryana	60 kW
Glida	Mohanpur, Haryana	60 kW
Glida	Neemrana, Jaipur	60 kW
Chargezone	Behror, Jaipur	60 kW
Adani	Kotputli, Rajasthan	60 kW

Charging stations and Substations on stretch of Demonstration (Gurugram, Binola to Mokhampura, Jaipur) Corridor



4. Key Findings: Pilot Demonstration run with Electric Truck

Operational Findings

As part of the demonstration, the current As-Is process mapping for ICE vehicle operations was conducted. It was observed that the movement follows a **hub-to-distribution centre (DC) pattern**. On average, a vehicle at the client hub spends approximately three hours for loading, unloading, and completing associated paperwork. The transit SLA (Service level agreement), as aligned with most transporters, was found to be **seven hours**, excluding loading and unloading durations.

The client's warehouse operates round the clock (24x7), and since both the source and destination locations are situated outside city limits, trucks do not encounter entry restriction challenges. Over the course of a one-way trip, drivers typically take one rest stop of about 30 minutes after every 200 km, primarily for tea or short breaks.

From a terrain perspective, the corridor is characterized **by flat terrain and highway movement with minimal traffic congestion**. The average speed achieved by trucks ranges between 38–40 km/h, while the average fuel efficiency recorded was around 5.5 km per litre across vehicle categories.

A similar exercise was undertaken for various e-trucks operating along the same route. While the loading and unloading times remained unchanged, the overall transit time included charging durations, which varied by vehicle type and battery capacity resulting in **marginally higher journey times,** as presented in the section *"Journey Impact Analysis."* Additionally, minor route deviations were observed due to the location of charging stations, as detailed in the table *"Route Impact Analysis."*

Journey Impact analysis

Truck Type	Payload carried	Trip Duration (Travel + Charging)	Trip Distance	Avg vehicle Speed Km/ Hr	No of Charging Stops	Mileage (Km / Litre or Km/ kWh)	Total no of stops
ICE 18.5 Ton	8 Ton	07:00 hrs	223 km	38-40	0	4.5	1
E-Truck 55Ton	20 Ton	12:43 hrs	223 km	39.1	2	0.98	3
E-Truck 32ft Retrofit	8 Ton	11:38 hrs	295 km	38	1	1.23	1
E-Truck 22ft	3 Ton	14:13 hrs	234 km	44.48	2	1.67	3
E-Truck 14ft	1 Ton	8:55 hrs	173 km	34	3	3.33	4

Source: SFC Analysis

Key Takeaway:

Depending on battery capacity of the vehicle, the number of charging instances varied accordingly, directly influencing the overall transit duration. The average duration per charging instance ranged between 2.3 to 3.2 hours when using a 60 kWh charger, resulting in additional time added to the total transit cycle. This underscores **the need for ultra-fast charging infrastructure and the potential integration of battery swapping solutions** to minimize downtime and reduce the overall turnaround time (TAT) for electric freight operations

Route Impact analysis

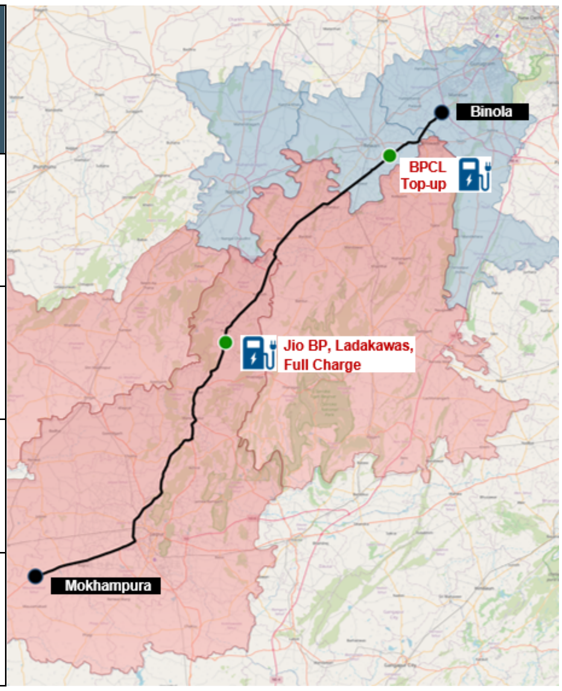
For different vehicle types the route was tracked and the impact on route deviation was observed

Truck 1: 32ft SXL | 8 T Payload | 200 kWh Battery | 60 kW Charger

Route: Binola (Gurugram) to Mokhampura (Jaipur)

Trip Distance : 295 Km

Location	Distance from Start (Km)	Activity	Charger Rating & Time
BPCL, Sangwari	-28	Charging	60kW ; 45 min
Safexpress, Binola	0	Loading	NA
Jio BP Ladakavas	130	Charging	60kW ; 2:31min
Safexpress Mokhampura	295	Unloading	NA

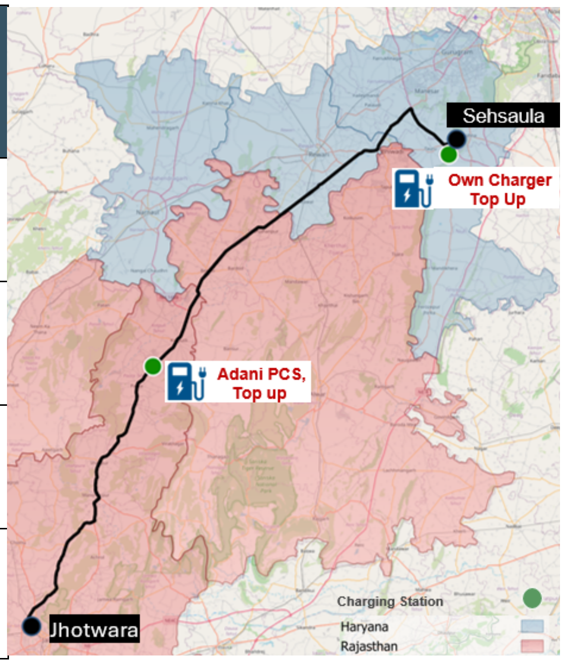


Truck 2: 55 Ton GVW | 20 T Payload | 282 kWh Battery | 60 kW Charger

Route: Sehsaula (Gurugram) to Jhotwara (Jaipur)

Trip Distance : 223 Km

Location	Distance from Start (Km)	Activity	Charger Rating & Time
SehSaula, Sohna Road	0	Charging	60kW ; 45 min
SehSaula, Sohna Road	0	Loading	NA
Adani Station Mehrampur	132	Charging	60kW ; 1:18 min
Jhotwara Warehouse	223	Unloading	NA

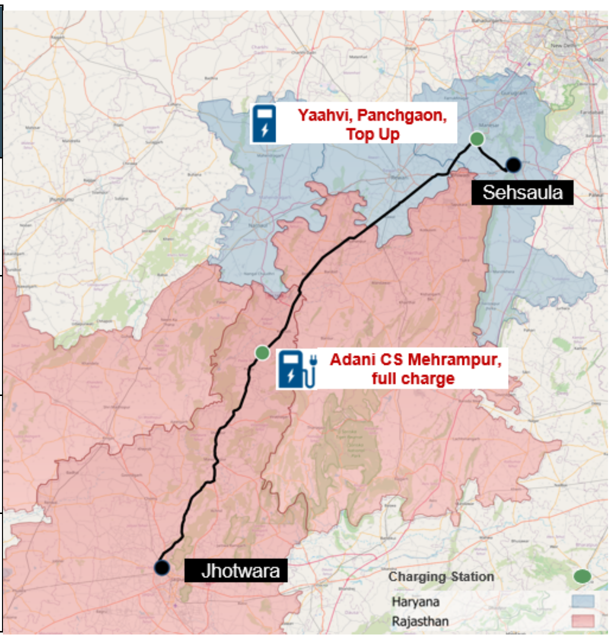


Truck 3: 22ft |14 Ton GVW | 3 T Payload | 201 kWh Battery | 60 kW Charger

Route: Sehsaula (Gurugram) to Jhotwara (Jaipur)

Trip Distance : 234 Km

Location	Distance from Start (Km)	Activity	Charger Rating & Time
Sehsaula, Sohna	0	Charging	60kW ; 34 min
Yaahvi PCS, Panchgaon	29	Loading	NA
Adani PCS Mehrampur	144	Charging	60kW ; 2:30min
Jhotwara Warehouse	235	Unloading	NA



Key Takeaway:

An additional distance of (~28 km) was travelled at the start of the trip, primarily due to the unavailability of a dedicated depot charger. This resulted in extra vehicle movement for pre-trip charging, highlighting the importance of **establishing adequate depot-based charging infrastructure to optimize route efficiency and minimize operational detours.**

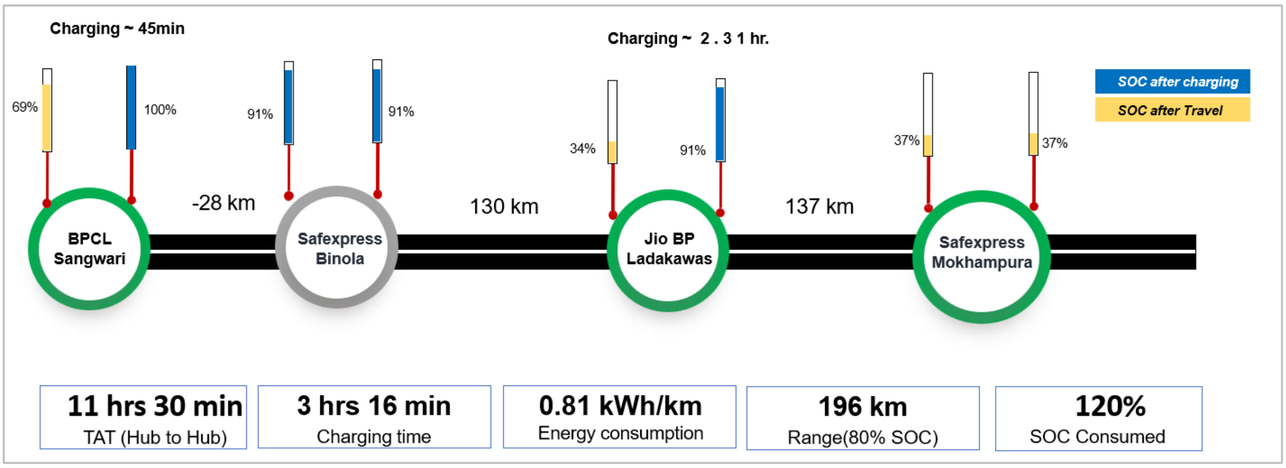
Real World Duty Cycle and SoC Analysis

Across the vehicle categories the on ground energy consumption and SOC are indicated below

Truck 1: 32ft SXL | 8 T Payload | 200 kWh Battery | 60 kW Charger

Route: Binola (Gurugram) to Mokhampura (Jaipur)

Trip Distance: 295 Km

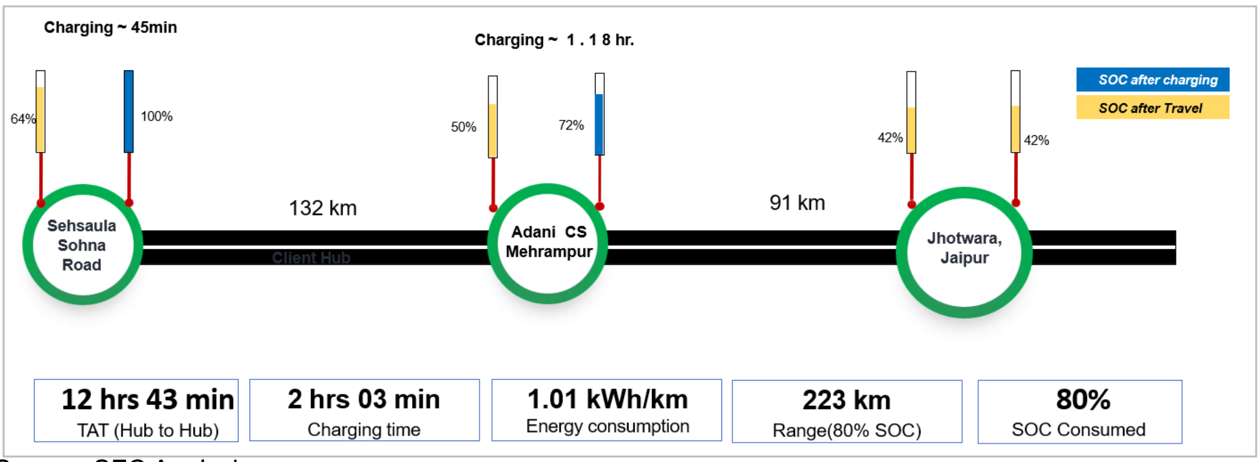


Source: SFC Analysis

Truck 2: 55 Ton GVW | 20 T Payload | 282 kWh Battery | 60 kw Charger

Route: Sehsaula (Gurugram) to Jhotwara (Jaipur)

Trip Distance: 223 Km

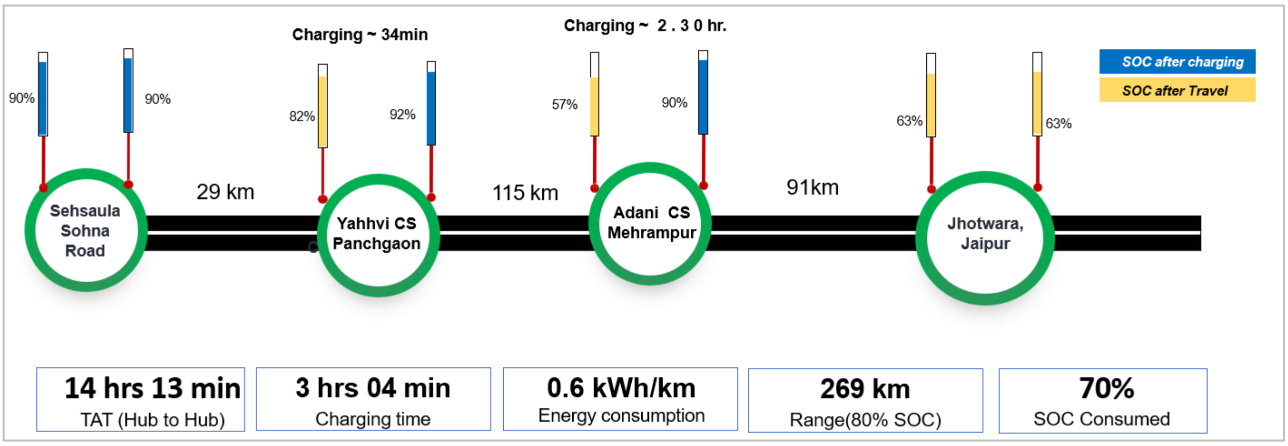


Source: SFC Analysis

Truck 3: 22ft |14 Ton GVW | 2 T Payload | 201 kWh Battery | 60 kW Charger

Route: Sehsaula (Gurugram) to Jhotwara (Jaipur)

Trip Distance: 235 Km



Source: SFC Analysis

Key Takeaway:

The analysis across three Real-world duty-cycle mapping validates that energy consumption and turnaround time are highly dependent on payload, charger type, and SoC management strategy. Strategic deployment of high-capacity or **ultra-fast chargers at en-route and depot locations can reduce total trip time by 20–25%, enhancing the commercial viability of e-truck operations along intercity corridors.**

Commercial and Emissions Findings

Across the evaluated vehicle categories, **energy cost savings in the range of 20–26%** were observed when compared to equivalent ICE vehicle operations. Correspondingly**, the Tank-to-Wheel CO_2 emissions avoided ranged from 38 kg CO_2 to 175 kg CO_2 per trip**, depending on vehicle type, payload, and total distance travelled, as illustrated in the table below.

For detailed TCO comparison between ICE and E-Truck refer Annexure.

These results highlight the dual advantage of e-truck operations achieving measurable reductions in operational energy costs while delivering substantial carbon abatement benefits under real-world duty cycles.

Vehicle Catergory	PowerTrain	Trip Distance	Mileage (Km / Litre or kWh)	Total Fuel Consumed	Co2 avoided (Kgs)
55 Ton GVW	ICE	223 km	3.5	63.71 Litre	**170.44**
	E-Truck		0.98	227.5 KWh	
32ft SXL, 18.5 GVW	ICE	295 km	4.5	65.56 Litre	**175.36**
	E-Truck*		1.23	239.8 KWh	
22ft, 14 Ton GVW	ICE	234 km	5.29	44.23 Litre	**118.30**
	E-Truck		1.67	140.12 KWh	
14ft , 5.5 Ton GVW	ICE	173 Km	12.04	14.37 Litre	**38.44**
	E-Truck		3.33	51.95 KWh	

*Retrofit E-truck

Source: SFC Observations

5. Stakeholder Insights and Observations

Driver Experience

"From a driver's perspective, the experience of operating an electric truck is notably smoother and **less physically demanding** compared to conventional diesel vehicles. As shared by drivers Avishkar Singh and Gaurav Chaudhary, the typical Delhi–Jaipur trip takes around 6-7 hours of driving, with an additional one and a half hours required for en-route charging. Drivers highlighted the **ease of operation** as a major advantage, the **absence of clutch** and gear shifting allows for better focus on the road and reduced fatigue during long hauls. This simpler, quieter driving experience not only enhances comfort and safety but also contributes to lower driver stress and **improved operational efficiency**, reinforcing the potential of e-trucks to improve working conditions in freight transport".

Charge Point Operator Experience
Yahhvi

"Yahhvi emphasized that the scalability of e-trucks hinges on developing dedicated, reliable, and renewable-powered charging infrastructure across highways. Unlike passenger EVs, which rely on home-based charging, medium and heavy-duty trucks require strategically located high-capacity charging hubs with stable grid connectivity. Yahhvi's current network already integrates over 60% renewable energy, with a target to reach 100% by 2026, demonstrating that clean energy integration is both feasible and necessary for sustainable logistics. However, **land acquisition, grid stability, and capital-intensive infrastructure setup remain critical barriers**. The company underscored that scaling e-truck adoption will depend on coordinated public–private partnerships, policy-backed investment incentives, and collaboration platforms like SFC that can align CPOs, OEMs, and transporters to build an interoperable, zero-emission freight ecosystem"

Transporter / Fleet owner Experience
Tejas Cargo India Limited

“Tejas Cargo emphasized that while the company has begun integrating electric trucks into its 15,000-vehicle fleet, the transition remains at an early technological stage. Current **range limitations (150–200 km per charge)** across available OEM models and **the absence of pan-India charging infrastructure** were identified as the two primary operational constraints. Despite these challenges, Tejas views electrification as a strategic shift toward sustainable logistics, aligning with both client expectations and environmental goals. The company underlined the need for strong policy incentives and accelerated infrastructure rollout to improve economic viability”

Transporter / Fleet owner Experience
Harsh Transport Private Limited

“Harsh Transport Pvt. Ltd. highlighted that the adoption of e-trucks is driven by the need to future-proof logistics and achieve cost stability amidst fluctuating diesel prices. With over 500 trucks, including 40+ EVs, the company has observed clear operational cost savings and reduced maintenance expenses compared to ICE vehicles. Key challenges initially included driver mindset shifts and **route planning around charging requirements**, though these have improved with experience. Also, emphasized the **need for low-interest EV financing, PPP-based charging infrastructure, and battery-swapping solutions** to reduce downtime and accelerate wider adoption”.

Transporter / Fleet owner Experience
Instant Transort Solutions Pvt Ltd

“Instant Transport Solutions Pvt. Ltd. shared that their e-truck adoption journey has demonstrated significant operational savings, particularly in intra-city applications, where **electric trucks operate at an estimated ₹2–2.5 per km, compared to ₹6–8 per km for diesel vehicles**. These cost advantages have helped offset the higher upfront purchase cost of e-trucks. However, for intercity operations, challenges remain due to high electricity tariffs (₹12–20 per unit) and **limited charging infrastructure,** especially along long-haul routes. The company emphasized that to make e-trucking viable at scale, reducing charging costs, lowering vehicle and battery prices, and accelerating access to green electricity connections are essential. Instant Transport also noted that with adequate planning, trained drivers, and predictable loads, as seen on the Delhi–Jaipur corridor, electric operations can be executed smoothly without major disruptions.”

6. Conclusion & Way Forward

The Delhi–Jaipur Zero-Emission Truck Demonstration establishes that electric freight movement is both technically feasible and commercially promising under Indian operating conditions. The pilot demonstrated that e-trucks can **deliver 20–26% energy cost savings and up to 175 kg CO_2 reduction per trip, while maintaining comparable performance to diesel vehicles on speed and payload capacity**. However, operational efficiency is currently constrained by charging time, depot infrastructure gaps, and range variability across vehicle models.

The exercise highlighted the importance of real-world data and collaboration among fleet operators, charge point operators, and policymakers to overcome early-stage challenges.

The corridor's strong industrial base, reliable grid, and renewable-energy potential position it as a ready-to-scale demonstration model for zero-emission freight.

Moving forward, the focus must shift from individual pilots to coordinated corridor-level electrification, supported by:

- ❖ Deployment of ultra-fast and depot-based charging infrastructure to reduce turnaround times
- ❖ Integration of renewable energy to ensure cost competitiveness and emission integrity
- ❖ Innovative financing and risk-sharing mechanisms to address upfront vehicle costs

7. SFC Data Partnership Corridor Program

At its core, the Data Partnership Corridor Program leverages operational and economic data from industry partners to identify, validate, and scale zero-emission truck (ZET) use cases along high-density freight corridors such as Delhi–Jaipur. Through its phased methodology **Identify, Qualify, Develop, and Apply & Scale Up, the program ensures that every step is grounded in real-world freight operations, vehicle duty cycles, and corridor-level energy dynamics**. The framework not only validates pilot outcomes but also serves as a scaling engine, bridging the gap between policy ambition and market adoption. By embedding risk mapping, financing readiness, and monitoring frameworks from the outset, it builds confidence among shippers, fleet operators, CPOs, and financiers, laying the foundation for sustained ZET deployment along national freight routes.

A critical function of the program is to move beyond theoretical projections by using real-world trip-level telematics and cost data to pinpoint where and when ZETs can achieve operational and economic parity. By analyzing fleet utilization, trip frequency, and TCO per ton-km across the use cases, the initiative identifies segments best suited for electrification, optimizing both vehicle range and charging infrastructure placement.

While the initial phases focused on generating technical and economic proof points through targeted pilots on the routes, the program is now entering a commercial scale-up phase aimed at 10x expansion in ZET deployment. This next phase will be driven by **demand aggregation, corridor-level planning, and shared infrastructure models, creating a replicable blueprint for India's broader freight electrification across priority corridors such as Bangalore–Mumbai, Pune–JNPT and others**.

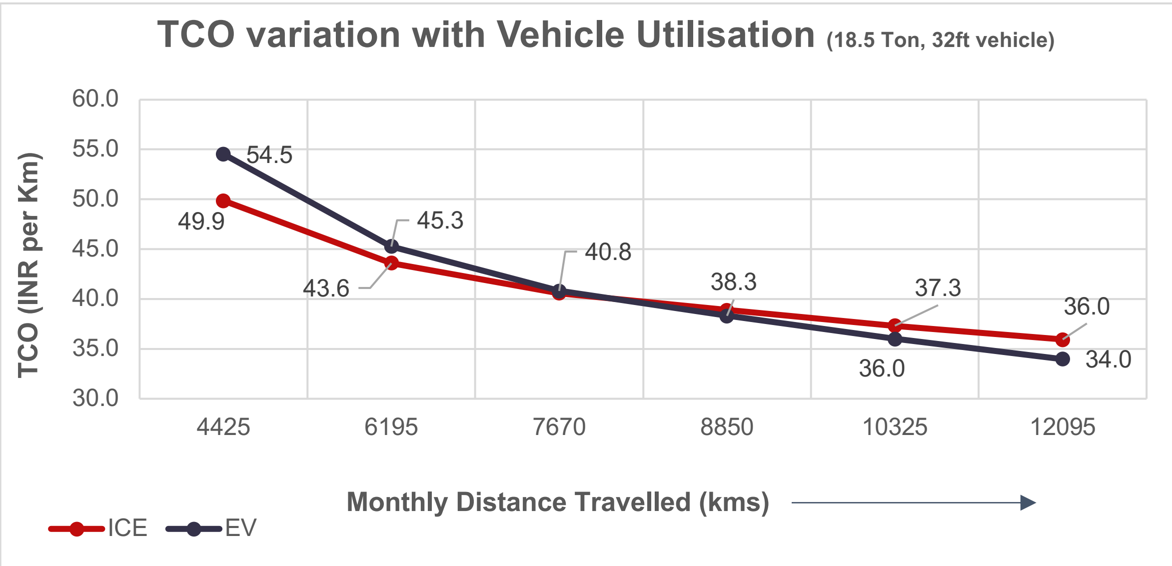
Annexure

Total Cost of Ownership (TCO)

The Total Cost of Ownership (TCO) analysis integrates all major cost components including vehicle acquisition, energy and fuel expenses, maintenance, charging infrastructure, and utilization rates across multiple operational scenarios. A key insight from this analysis is the dynamic balance between higher upfront capital expenditure for electric trucks and lower operating costs, which makes vehicle utilization a decisive factor in achieving cost parity with internal combustion engine (ICE) trucks.

The chart below, derived from real-world data captured through the demonstration, illustrates how **TCO decreases with higher monthly distance travelled**. As utilization increases, fixed capital and infrastructure costs are distributed across a larger distance base, resulting in improved cost efficiency. Beyond a certain threshold, **the EV curve converges with and eventually undercuts the ICE curve, indicating the operational "sweet spot" for economically viable zero-emission freight**.

These results underscore the **importance of optimizing charging time, reducing turnaround durations through green channel access, and improving route planning**. Together, these operational efficiencies enhance asset productivity along with financing solution will accelerate the pathway toward cost-competitive, large-scale ZET deployment across key freight corridors.



Source: SFC Analysis

A key consideration in the above TCO analysis is that it assumes 100% en-route charging, currently priced at approximately ₹21 per unit.

In scenario, with one depot-level charging cycle per day, TCO parity is achieved at roughly 6,000 km/month, further improved by ~10% when using RE-powered charging

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