

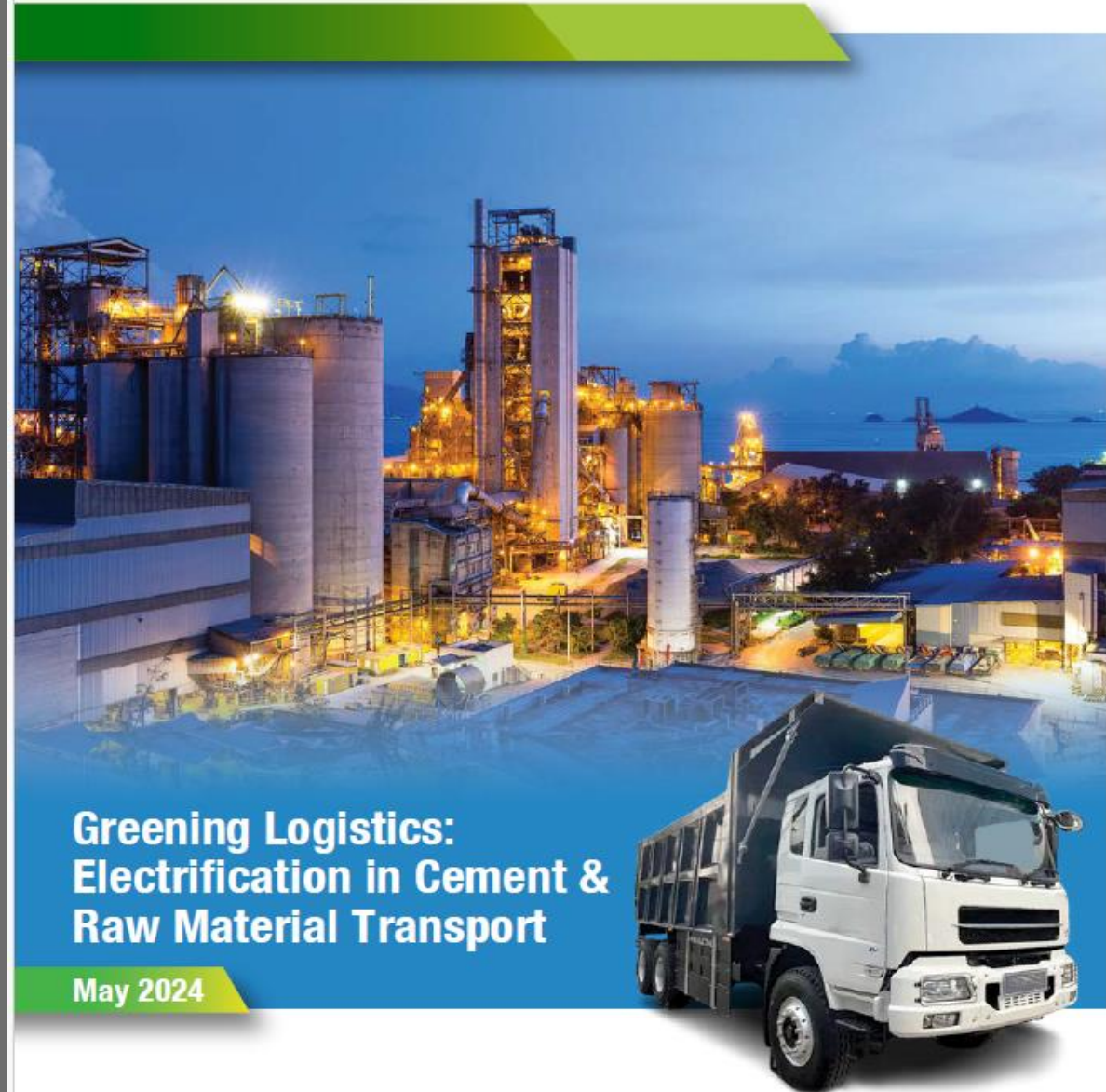
Greening Logistics: Electrification in Cement & Raw Material Transport



Confederation of Indian Industry



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**Greening Logistics:
Electrification in Cement &
Raw Material Transport**

May 2024

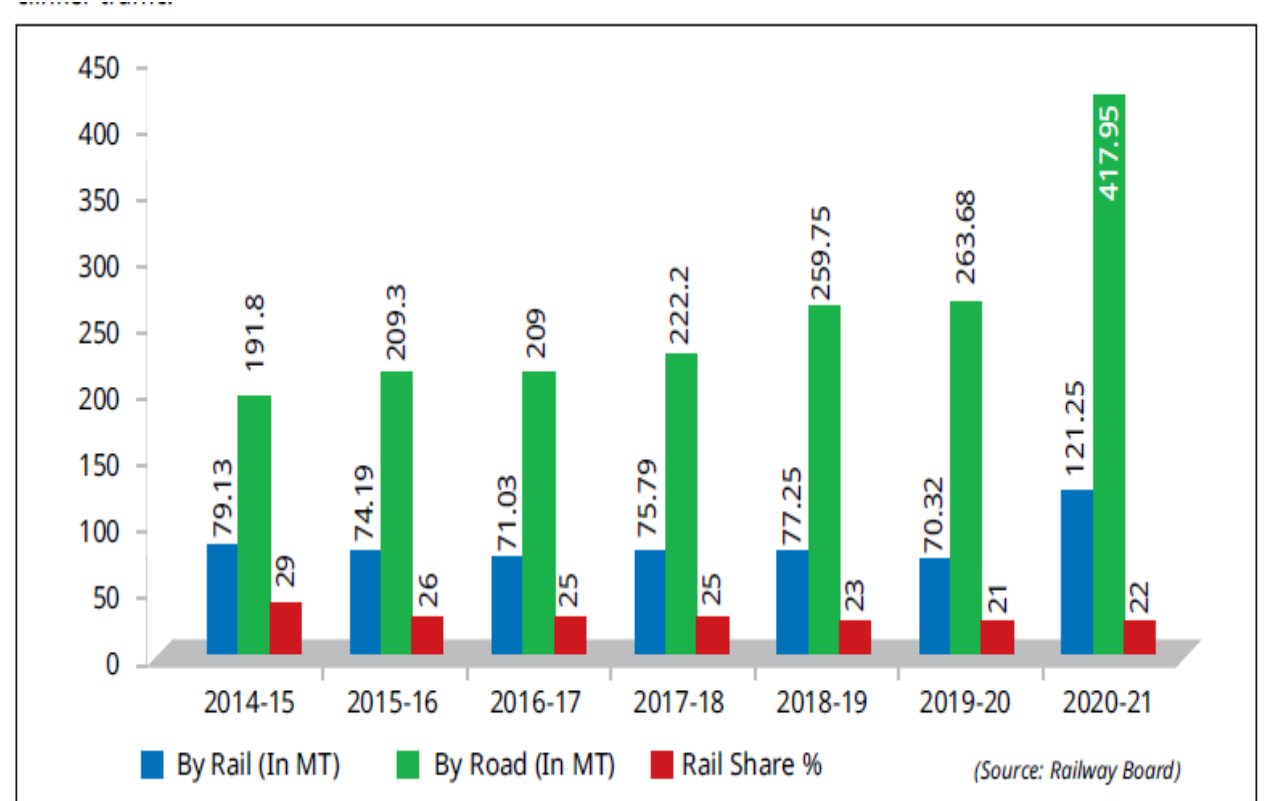
Freight scenario in India

- ❖ **India - sixth-largest market for medium and heavy-duty trucks (MHDTs)**
 - **Over 200,000 vehicles sold in 2021**
 - **More than 4 million trucks operating on Indian road**
- ❖ **Limitations of ICE trucks (e.g., emissions, fuel dependency)**
 - **Over 90% of trucks are diesel-powered**



Indian Cement Industry

- India is a rapidly growing economy with a robust cement industry
- Second-largest cement producer globally with an installed capacity of **~670 MTPA**



Rail vs Road Share in Cement & Clinker Transport

Logistic & Transport Scenario in the Indian Cement Industry

- **Cement** : 74-76% transported by road
- **Clinker**: 15 -20% transported by road
- **Limestone**: Transported primarily by road supplemented by belt conveyors
- **Slag**: Transported by rail and road
- **Fly Ash**: Mainly transported by road
- **Coal**: Primarily transported by rail
- **Other Additives**: Clay, bauxite, iron ore, red mud transported predominantly by road

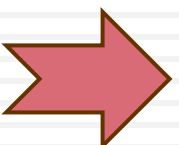
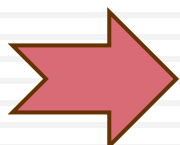
Particulars	Plant capacity	Commodity	Production (TPD)	Road share Considered	Vehicle capacity (Tons)	No of vehicle trips involved (Nos)	Logistic type	% share
Clinker	6,000 TPD	Limestone	9,000	100%	30	300	Internal movement	49%
Cement	10,000 TPD	Cement	10,000	75%	30	250	Outbound	41%
Product Portfolio (OPC - 20% PPC - 50% PSC - 15% CC- 15%) Clinker factor: 0.65		slag (@ 63% in PSC /30% in CC)	1,395	30%	30	14	Inbound	2%
		Fly ash (@ 33% in PPC /25% in CC)	2,025	90%	40	46	Inbound	7%
						Total trips	610 Nos	
						Total km @ avg 60 km/trip	36,571 km	
						Diesel consumption @ 2.5 kmpl	14,628 Ltrs	
						CO₂ emission / day	39,204 kg CO₂	

- **For 10,000 TPD cement plant**
 - **Emission due to transportation 39,204 kg CO₂**

Environmental and Economic Impact of Transportation

Logistics can account up to 30% of the total costs in cement production

India's total cement and clinker production



2.3 million tons per annum*
CO₂

74~76% of transportation using ICE

*Distance - 200 km (2-way)
Cement transport – 74% by road
Clinker transport – 50% of total production with 74% by road



Transition From ICE Trucks To Electric Trucks : Economic & Environmental Aspects

Adopting electric vehicles can address challenges associated with ICE trucks



Cost Efficiency:

- Increasing diesel costs
- Fluctuating global oil prices
- Operational expenses for E-trucks are also lower
- reduced fuel and maintenance costs



Regulatory Compliance

- GOI enforcing stricter emission standards
- E-trucks an attractive option



Driver Retention:

- The enhanced driver comfort, reduced fatigue, and ease of maintenance of EV



Reduced Logistics Costs:

- E-trucks can potentially reduce logistics costs by 25-40% compared to ICE trucks.

Drivers and barriers for E-truck adoption

DRIVERS



- * Lower Logistic cost
- * Industrial commitment
- * Lower GHG emission
- * Favorable Policy
- * Brand Image

BARRIERS



- * Operating Range
- * Charging Infrastructure
- * Long halt for battery charging
- * Reduced Payload
- * High Initial investment

Comparative Analysis of E Truck Adoption for Different Operational & Financing Scenarios

Operational & fixed cost components	Monthly 6,000 km		Monthly 8,000 km		Monthly 10,000 km	
	5 years finance loan		5 years finance loan		8 years finance loan	
	EV	ICE	EV	ICE	EV	ICE
Total travel (km)	6,000	6,000	8,000	8,000	10,000	10,000
Vehicle mileage (km/kWh or kmpl)	0.6	2.5	0.6	2.5	0.6	2.5
Fixed cost (INR/km)	50.8	20.6	38.1	15.4	22.7	9.3
Total cost (INR/km)	70.1	66.2	57.4	61.0	42.0	55.0
% Reduction	-6%		6%		24%	
Tailpipe emissions (T CO ₂)	0.0	77.2	0.0	102.9	0.0	128.6

❖ Comparative studies between operational scenarios of E-trucks and ICE trucks:

- 25-40% reduction in logistic costs
- E-trucks are profitable at higher monthly distances (>8000 km) due to their lower operational costs.
- Advancements in battery technology and increased government support through incentives and infrastructure development, E-trucks are becoming an increasingly viable option.

Available Options of E-Trucks in India

IPL Tech - IPLT Rhino 5536¹

Model Specification	IPLTech Rhino 5536
Gross Vehicle Weight	55,000 kg
Payload Capacity	25,000 kg – 27,600 kg
Battery	Lithium-ion phosphate battery
Capacity	258.08 kWh
Charger	160 kW fast-charger
Maximum Power	360 HP @1200 RPM
Maximum Torque	2,400 Nm @600 RPM
Clutch	430 mm dia dry friction
Transmission	12 Speed AMT (Automated Manual Transmission)
Front Axle	Meritor - 7T Heavy Duty Forging Type
Rear Axle	Meritor - 21T SRT Tandem Axle
Suspension	Front - Parabolic Leaf Spring, Rear - Hendrickson Bogie Suspension
Frame	Ladder Type, Heavy Duty Frame (285 mm x 65 mm x 7 mm)
Cab/ Cowl	Sleeper Cabin
Tyres	295/90R20 Radial Tube Tyres
Ventilation	Blower & Air Conditioning Options
Wheelbase	3,850 mm
Charging Time	90 min
Distance	185 km
Maximum Speed	90 kmph



Olectra Greentech - Meghaetron Electric 6x4 Tipper²

Model Specification	Meghaetron Electric - 6X4 Tipper
Gross Vehicle Weight	28,000kg
Battery	Lithium-ion phosphate battery
Capacity	450 - 540 kWh
Charger	180 kW DC Dual Gun
Rated Power	362 HP(270 kW)
Maximum Torque	2,400 Nm @600 RPM
Brake System	Drum Brake
Transmission	Automatic Transmission
Load Body Volume	14 / 16 m ³ – Rock Body 16 / 18 m ³ – Box Body
Gradeability	18%
Suspension	Front – HD semi-elliptical and Rear – HD Bogie
Frame	8770 x 2550 x 3978 – Rock Body 8625 x 2525 x 3678 – Box Body
Cab/ Cowl	Meeting AIS 093 Specification with Air Conditioning
Tyres	12 R 20.00
Steering System	Power-assisted
Wheelbase	4,975 mm
Charging Time	120 min
Distance	120 -150 km
Maximum Speed	80 kmph



Available Options of E-Trucks in India

BYD - BYD Q1R³

Model Specification	BYD Q1R Pure Electric
Gross Combination Weight (GCW) Max.	75,000 kg
Battery	Lithium-ion phosphate battery
Capacity	255 kWh
Charging Power	AC 40 kW / DC 120 kW
Maximum Power	210 kW
Maximum Torque	4,500 Nm @600 RPM
Brake System	Pneumatic Disc Brake, ABS optional, Regenerative Braking
Wheelbase	3,550 mm
Gradeability	20 %
Suspension	Front - Less leaf springs and double-tube hydraulic shock absorbers and Rear - More leaf springs and double-tube hydraulic shock absorbers
Frame	L = 6,200 mm, W = 2,550 mm, H = 3,110 mm
Gross combination weight rating (GCWR)	40,000 kg
Tyres and Wheel rim parameters	Radial tire: 11.00R20-18PR & Steel rim: 8.5-20
Approach/Departure Angle	13° / 30°
Turning Radius	7,000 mm
Charging Time	7 hr (40 kW) / 2.5 hr (120 kW)
Distance	200 km
Maximum Speed	85 kmph
Axle load parameters	Front axle/ Rear axle 4,496/3,880 at No load Front axle/ Rear axle 5,570/12,430 at Full load



Propel Industries Pvt. Ltd - Propel EV- Dumper Truck⁴

Model Specification	Propel EV- Dumper Truck - 470 MEV & HEV
Gross Vehicle Weight	45,000 kg
Battery	Lithium-ion battery
Capacity	163 kWh
Axle	Front : Steerable, 9.5T heavy duty I Beam, Rear : 37T Tandem, Hub Reduction cast axle
Maximum Power	350 kW
Maximum Torque	2,800 Nm @600 RPM
Brake System	Service Brake : Dual line air brakes with ABS, Parking Brake : Pneumatic Hand Control Valve, Hill Start assist: Integrated with service brake
Transmission	7 speed AMT without clutch
Body Volume	18 CuM Rock Body with Hardox steel
Gradeability	30%
Suspension	Parabolic Leaf Spring with Shock Absorber, Inverted Semi Elliptical inverted Bogie
Overall Frame Size	8,275 x 2,800 x 3,650 (L x W x H)
Cab/ Cowl	Sleeper Cabin, Tiltable, Air suspended driver seat
Tyres	12x20 Mining tyre
Steering System	Hydraulic integral power steering, Tilttable steering column
Wheelbase	4,300 mm
Charging Time	60 min
Turning Circle Diameter	16.5 m
Maximum Speed	40 kmph



Successful Case Studies

Case Study 1: Cement Bag Transport

application: cement bags from manufacturing plant to distribution hub.

Route: 45 km one way.

Number of E trucks Deployed: 2

Payload: 40 metric tons.

Battery Capacity: 258 kWh.

Approximate Monthly Travel per E truck:
3,000 km.

Case Study 2: Clinker Transport Application:
clinker from a manufacturing plant (integrated unit) to grinding unit.

Route: 250+ km one way.

Number of E trucks Deployed: 5.

Payload: 40 metric tons.

Approximate Monthly Travel per E truck:
6,500 km.

Successful Case Studies

Case Study 3: Slag Transport Application:

slag from the source plant to a cement manufacturing unit.

Route: 40 km one way.

Number of E trucks Deployed: 22.

Payload: 35-40 metric tons.

Approximate Monthly Travel per E- truck:
5,550 km.

Case Study 4: Cement Bag Transport

Application: cement bags from the grinding unit to the cement depot and return loads of slag from the steel plant.

Route: 35-40 km one way

Number of E trucks Deployed: 2.

Payload: 38-40 metric tons.

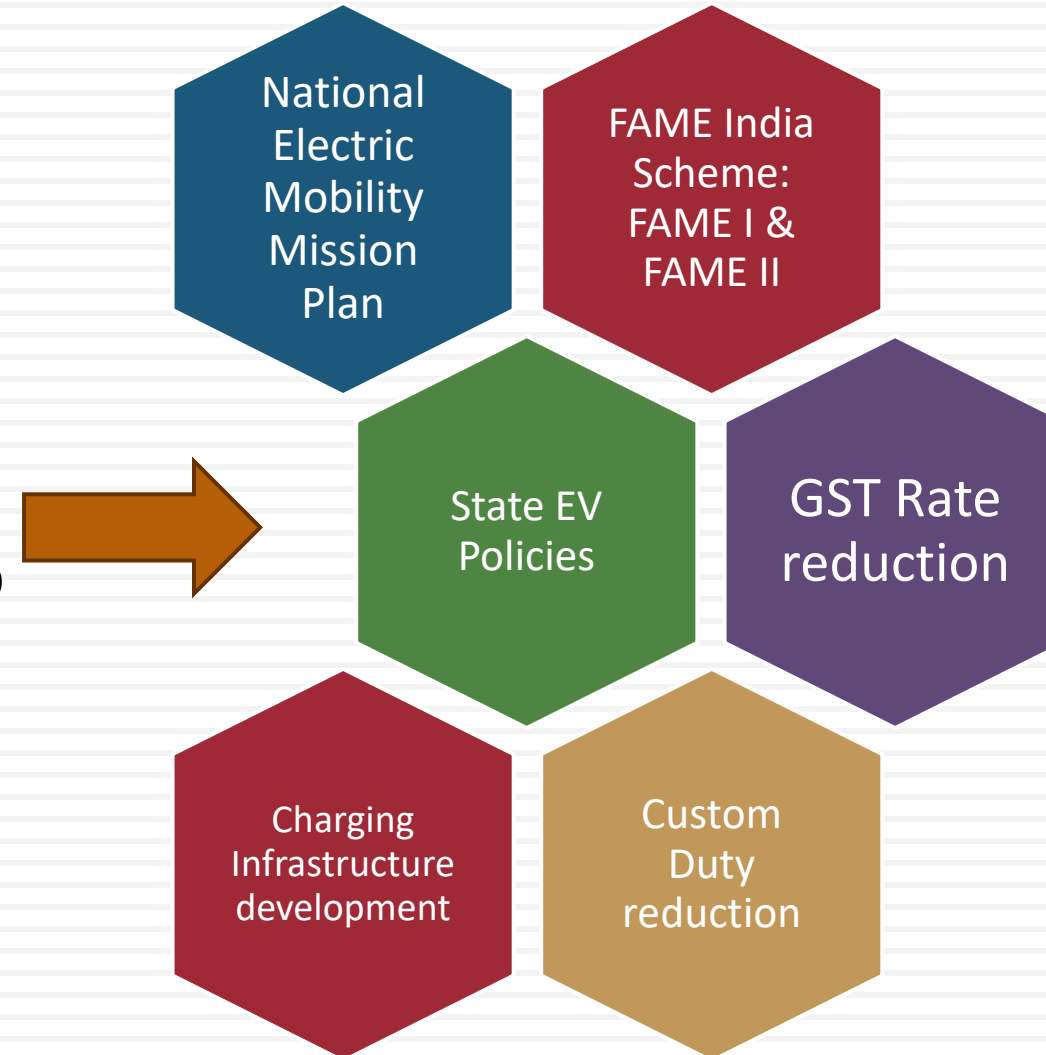
Approximate Monthly Travel per E truck:
3,500 km.

E Truck Deployment in Other Sectors

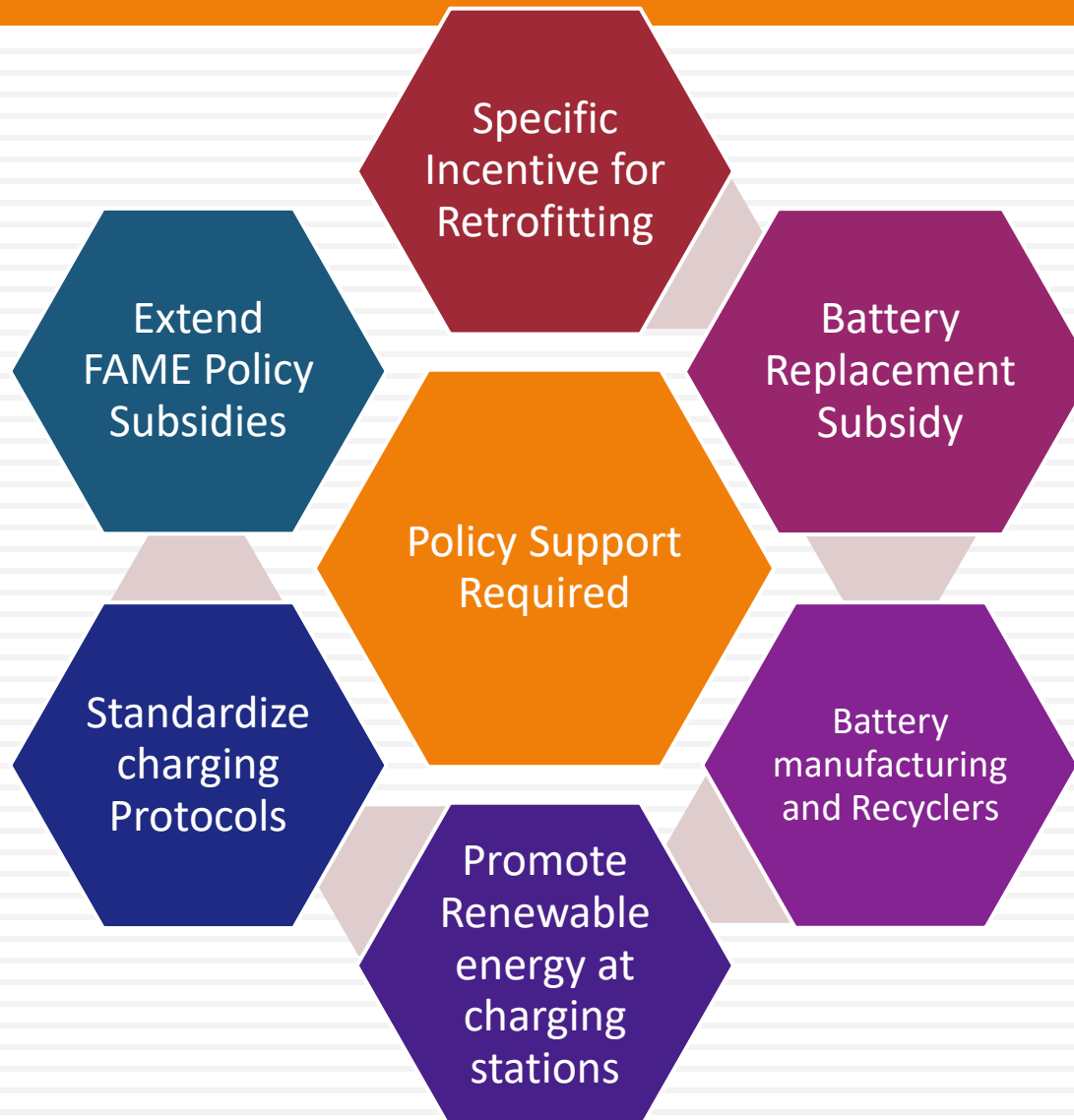
- ❖ **Transition to Electric Vehicles in Mining Operations**
- ❖ **Pioneering Electric Trucks in Global Mining Operations**
- ❖ **Electrification of Fleet in the Nonalcoholic Beverage Sector**
- ❖ **Sustainable Transition in Steel Manufacturing**
- ❖ **Deployment of E-trucks in Ecommerce**

Existing Policies For Electric Vehicle and way forward for cement Industry

Over the past decade, the central government has introduced various promotional initiatives to accelerate EV adoption:



Existing Policies For Electric Truck and way forward for cement Industry



Way Forward

Financing

Offer Green financing @low rate

- Mandate Green Financing
- Insurance Guideline
- Extended Vehicle Loan Period

Policy

To accelerate E-trucks adoption in cement sector

- Expanding FAME policy subsidy for commercial EVs
- Subsidizing power cost at public charging stations
- Supporting domestic battery manufacturing

Early Bird recognition

Streamline the process for adoption of E-Truck

- Faster approval from state electricity Board.
- Faster RTO registration
- Special categories Status
- Payload compensation

Way Forward

Enabling Initiative from Cement Organizations

- Long-term Contracts & increased compensation for Crew
- Green Channel for E-trucks
- Priority-based Loading of E-trucks

Maintenance Offering from Technology Suppliers

To convince fleet operators and driver partners of the viability of electric trucks

- Attractive long-term annual maintenance contracts and guarantees
- Comprehensive warranties for all parts except consumables
- Special pricing on batteries and charging infrastructure



Thank You

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