





FICCI

Electric Vehicle Public Charging Infrastructure: 2030 Roadmap

Interaction done with 25+ industry stakeholders and experts

Not Exhaustive

Key CPO stakeholders / experts



Chief Operating Officer, Jio BP

25+ years of experience specializing in Operational excellence and expanding e-mobility ecosystem



Director (Strategy & Business), ChargeZone

40+ years of experience in business strategy role; 6+ years at ChargeZone



Founder & CEO, EVRE

15+ years of experience in EV OEMs and related businesses



E-Mobility Head, Shell

14+ years of experience driving expansion of EV charging businesses



Business Head, Bolt.Earth

Leads the business & growth verticals for electric mobility



Operations and BD Head, Statiq

Led Statiq's public charging network set up in Bangalore

Key OEM stakeholders / experts



Vice Chairperson, Kinetic Engineering Limited

Founder & CEO, Kinetic Green Energy & Power solutions Ltd.



COO, Mahindra Electric Automobile Limited

Leading E2E operations including sales, service, supply chain of electric SUVs



Vice President, Mahindra Group Strategy

11+ years of experience in growth strategy, EV charging infrastructure strategy



Head EV Charging Solutions at Tata.ev

12+ years experience enabling growth in the charging ecosystem



National Head - Sales & Service, TI clean mobility

23+ years of experience in Automotive sector including 10+ experience in EV space



Functional head - E-mobility, Hero MotoCorp

15+ years of experience in CleanTech sector



Product and Price planning, BMW Group

14+ years of experience in automotive space including EV business building



Head - New Technologies, Ashok Leyland

30+ years of experience in automotive space including E-buses



National Operations Lead - EV Charging Infra

Responsible for EC charging infrastructure for Hyundai

Agenda



EV Penetration and Public Charging Infra Capex

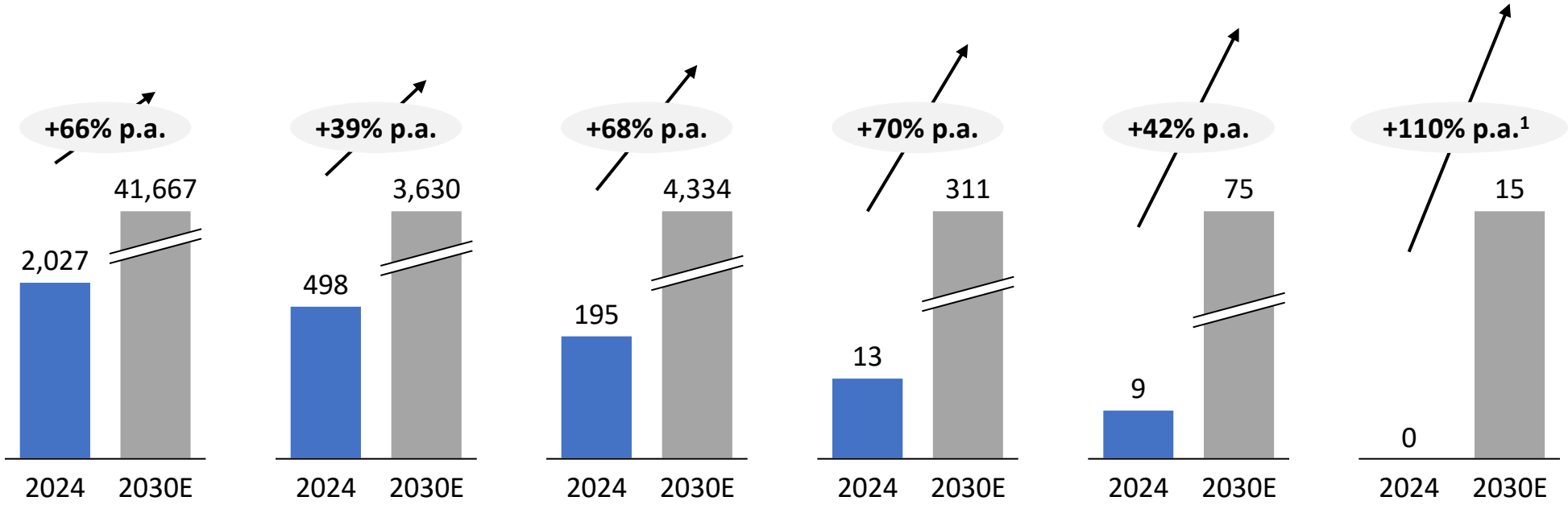
Prioritizing Cities & Highways

Implementation Roadmap: Driving Unit Economics & Key Challenges

Key Initiatives & Recommendations

With requisite demand and supply side enablers in place, India can achieve its mission of 30-40% electrification by 2030

EV Parc (All numbers in '000s)



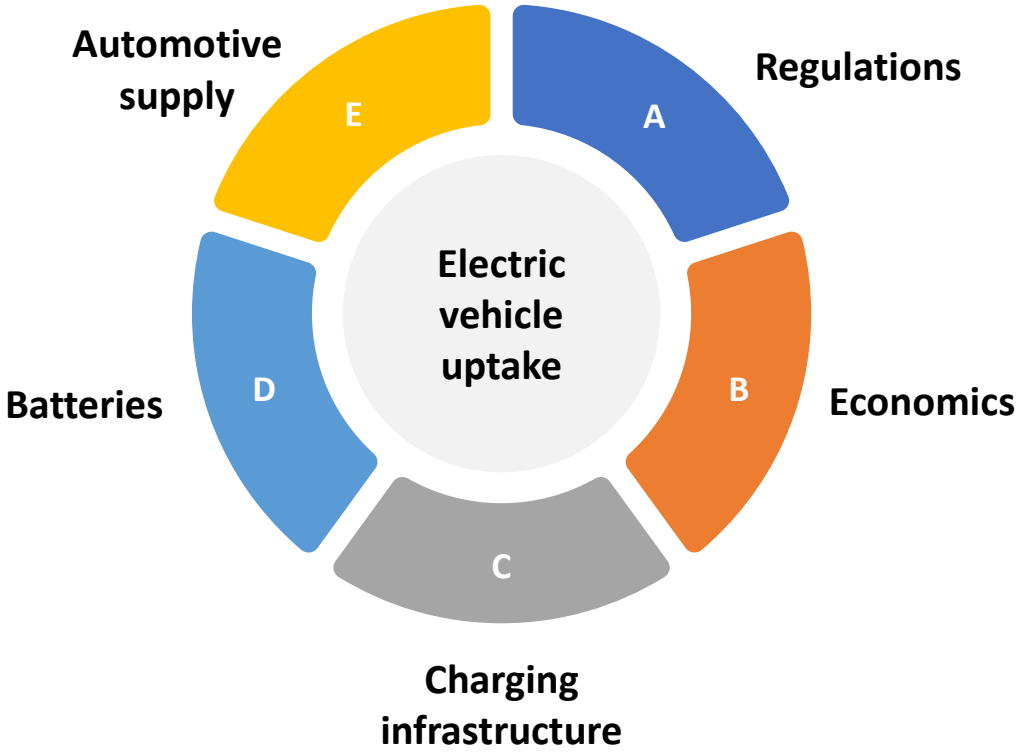
Vehicle type	2W	3W[2]	4W	LCV	Bus	MHCV
Penetration						
2024	4-6%	30-34%	1-3%	2-4%	5-8%	~0%
2030E	45-48%	63-67%	16-20%	15-20%	30-35%	1-3%

1. Growth rate between 2026E to 2030E
2. Includes Lithium-ion battery based electric three-wheelers, e-rickshaws and e-carts only. Lead acid battery based E3W have not been considered

Uptake of EVs is driven by 5 interdependent factors, involving multiple stakeholders

Deep-dive ahead

Economics, battery developments, regulations, OEM supply/consumer pull and state of charging infrastructure



A
- Subsidies and incentives
- ICE restrictions
- Fuel efficiency and CO2 emission targets

B
- Total cost of ownership (TCO) parity
- Capex: Battery | Engine | Electronics
- Opex: Fuel cost vs. electricity cost | Maintenance

C
- Charging station deployment (public and home/office charging)
- Power demand & load curve

D
- Raw materials (Cobalt, lithium, graphite and nickel)
- Battery production
- Applications (e.g., V2X, stationary storage)
- Used batteries recycling

E
- Availability of models
- EV production ramp-up

A. India has multiple regulatory incentive schemes to encourage EV growth

As of H2 2024

Not Exhaustive

1

Demand incentives

- After the **expiration of the FAME II scheme in FY 2024**, the government announced the **PM E-DRIVE scheme through FY 2026**, which offers an incentive of **INR 5,000/kWh[1] for E2W & E3W** up to 15% of the ex-factory cost **and INR 10,000/kWh for E-buses** up to 20% of the ex-factory cost

2

GST and Import taxes

- GST on EVs applicable at **5% flat vs. 28-50%** for ICE products, this currently has no end date
- **Higher taxation on imports of EV components** and built-vehicles to promote local production

3

Production Linked Incentives

- Allocates **INR ~26,000 Cr. total budget for 13-18% cash back** per vehicle for 4W EV OEMs
- Separate scheme for aiding **local Li-ion cell production** in India, with an **outlay of INR 18,000 Cr.**

4

State-level EV Incentives

- State incentives vary widely from **waived fees/ tolls/ taxes, preferentially electricity rates, to infrastructure subsidies** and low-interest loans

1. Only for FY 2025. Subsidy amount declines to INR 2500/kWh for FY 2026

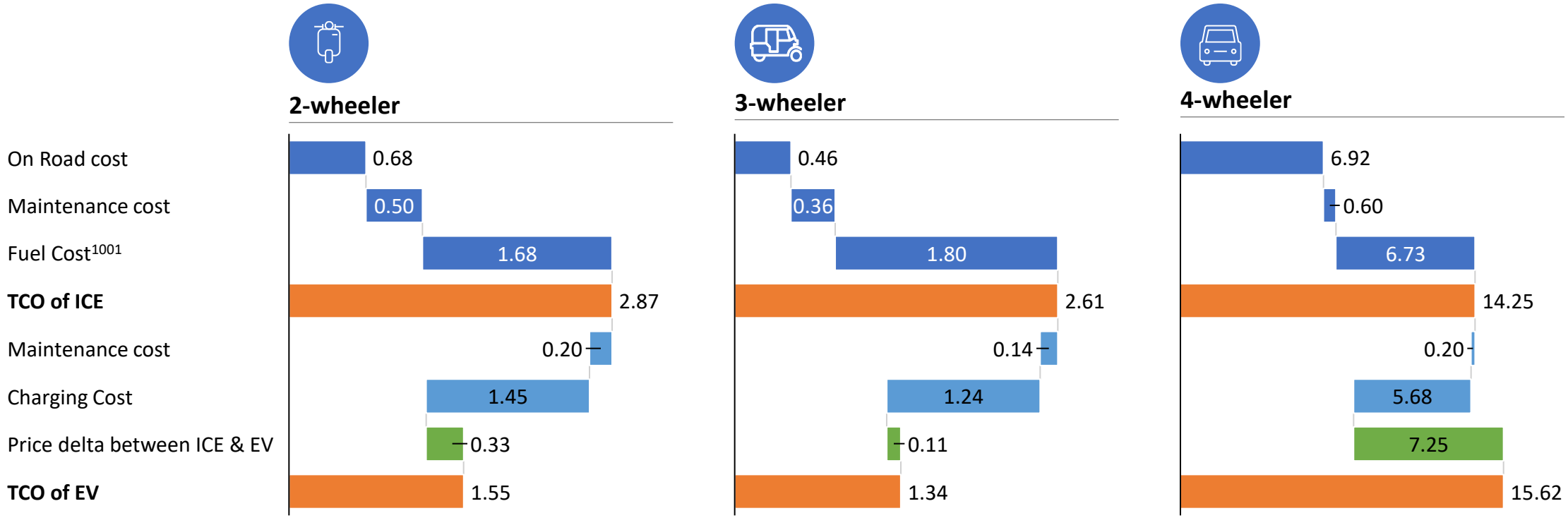
Source: Industry reports, expert interviews

B. In India, E2W and E3W have underlying positive economics; E4W may need financial support to accelerate adoption

As of H2 2024

Preliminary **Illustrative**

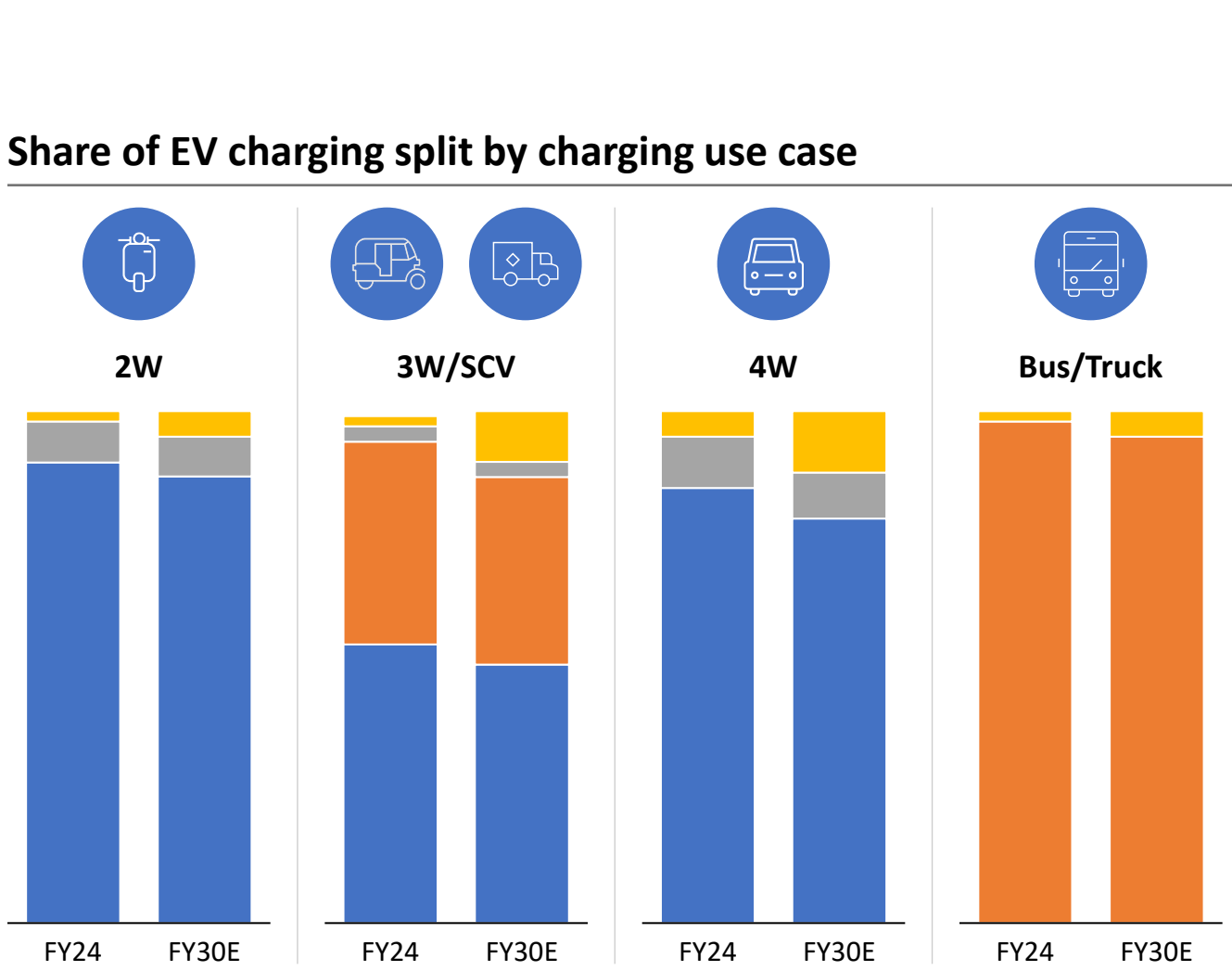
TCO comparison of EV vs. ICE fleet, INR per km



TCO for Electric 2W and 3W is estimated to be 40-60% lower than ICE, however TCO for the retail segment 4W is much higher

C. Charging preference likely to be defined by vehicle segment; 4W and buses can leverage public charging infrastructure

Share of EV charging split by charging use case



Factors for increasing dependence on public charging

Larger batteries requiring fast charging

Higher battery capacities (ranging from 35-100+ kWh) result in high charging times, making public fast chargers essential

Moderate-to-long distance commutes

Most personal and commercial round trips are >100km long, necessitating intermittent public charging

Range anxiety minimization

Fast chargers reduce charging time to <10 mins, replicating the experience of ICE refueling and alleviating range anxiety

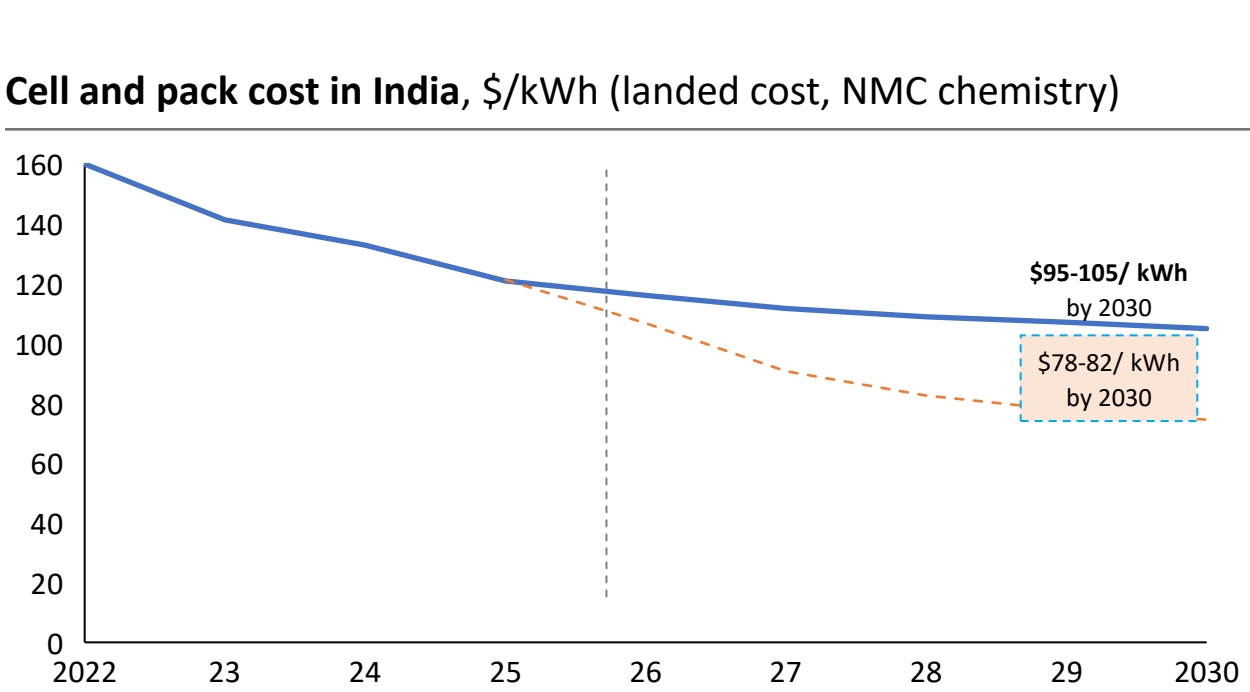
Mid-fill charging

Buses & E4W, especially the ones plying on highways, to use PCS for mid-fill charging

Source: Expert interviews

D. Landed Li-ion battery costs in India are expected to decline by ~45% till 2030 on the back of larger scale, optimized technology and localized manufacturing

Cell and pack cost in India, $/kWh (landed cost, NMC chemistry)



Two potential scenarios can play out

1. Overall battery cost in India declines moderately based on raw material cost optimization (e.g., reduction in cobalt) and scale
2. Overall battery cost in India declines based on global trends and local factors like:
   - Higher EV penetration (scale)
   - Local manufacturing of cell and pack

Key drivers of cell cost decline

The following are the **major cost assumptions** for estimating future cell costs:

a. Organic cell cost decline of ~2% YoY

b. ~3% cost decline from FY 2025 to FY 2027 due to company scale

c. ~4% decline due to company scale from FY 2028

d. Innovation in material for cathode & anode for aluminum, cathode and separator upgrades (impact in 0.5% in FY 2025 and 0.5% in FY 2030)

e. 0.3% reduction due to localization and capacity increase (resulting in improved yields) from FY 2028 onwards

f. Prices for Indian OEMs will normalize in next 3-4 years on account of volume increases and local production by competitors

EV charging landscape: Four charging archetypes exist; impetus is on setting up public charging infra

Deep dive

Charging landscape

	Public	Semi-public	Captive	Home charging
				
Model	Open for all EV users	Shared charging for a restricted set of EV users	Exclusive to the EVs used by fleet operators (ride-hailing, quick commerce, last mile delivery, etc.)	Dedicated charging for personal EV
Locations	Public parking lots, on-street parking, charging plazas, petrol pumps, highways, metro stations	Apartment complexes, shopping malls, corporates, universities, etc.	Independent charging station locations exclusive for a fleet	Independent homes, RWAs, dedicated parking spaces

Source: CPO Consultations

Broad range of EV chargers used across vehicle and charging station archetypes; public charging expected to leverage fast chargers

Focus of roadmap

Vehicle Type	Charger Type and Protocol	Focus for public charging[1]	Public Charging	Semi-Public Charging	Captive Charging	Home Charging
E2W and E3W 	AC Slow (Bharat AC-001)	✗	~3x longer charging time	3.3 kW	~3x longer charging time	3.3 kW
	DC Fast (LEVDC Type 6)[2]	✓	12 kW	~6x higher capex	12 kW	~6x higher capex
	Combined CCS Fast (LECCS Type 7)	✓	12 kW	~6x higher capex	12 kW	~6x higher capex
E4W and E-LCV 	AC Slow/Moderate (Type 2-AC)	✗	~4x longer charging time	3.5 / 7.2 / 11 / 22 kW	~4x longer charging time	3.5 / 7.2 / 11 / 22 kW
	Combined CCS Fast (CCS Type-II)	✓	60 kW[3]	~10x higher capex	30 / 60 / 120 / 240 kW	~10x higher capex
E-Bus and E-MHCV 	Combined CCS Fast (CCS Type-II)	✓	240 kW[4]	~20x higher capex	30 / 60 / 120 / 240 kW	~20x higher capex

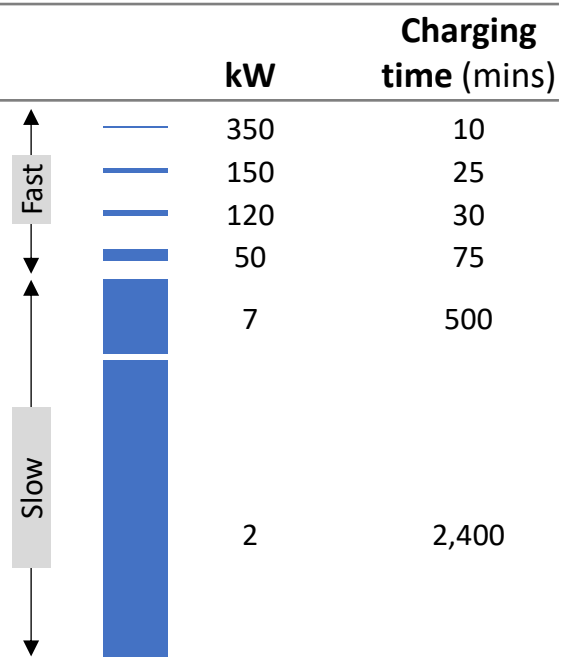
1. For 2030
2. Limited compatibility with currently available E2W & E3W models. Fast charging adoption expected to take place mainly through the LECCS standard that allows for combination of AC and DC charging
3. Other configurations with 30-, 120- and 240-kW output also available, but 60-kW is considered from a capex and speed standpoint
4. Other configurations with 30-, 60- and 120-kW output also available, but 240-kW is considered from a capex and speed standpoint

Source: Expert Interviews

Public fast charging in India will see growth driven by both demand trends and supply viability…

Fast chargers reduce charging time to <10 mins, replicating the experience of ICE charging and alleviating range anxiety

Time to fully charge a 60 kWh battery, minutes



	kW	Charging time (mins)
Fast	350	10
	150	25
	120	30
	50	75
Slow	7	500
	2	2,400

A Space constraints at residential locations

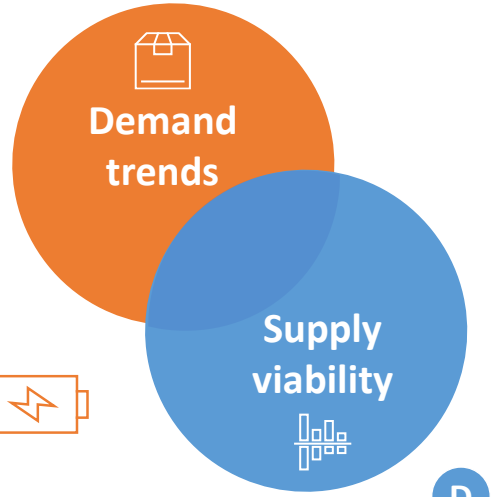
Low space availability at homes

Higher dependence on public charging (vs. developed markets like US & EU) will necessitate adoption of fast charging

B Increasing battery capacities

Fast charging needed as the EV portfolio shifts towards high battery capacity vehicles (buses, etc.)

EVs will be employed for high-intensity use cases as range anxiety reduces



C Despite reduction in charging time by 80-85%, penetration of fast charging will be gradual

Commercially, fast chargers are capital intensive investments and require technology standardization to maintain high utilization

D Key shifts in EV ecosystem will impact fast charging set-up

Improvement in unit economics through policy support and charger cost reduction will enable expansion

Source: Expert interviews

…leading to a higher share of public charging by 2030 across vehicle types

Vehicle Type	Share of Charging Archetype – Current (2024)				2030
	Home	Semi-public	Captive	Public	Public
E2W	90%	8%	0%	2%	4-5%
E3W[1]	55%[2]	3%	40%[3]	2%	8-10%
E4W (Private)	85%	10%	0%	5%	10-12%
E4W (Commercial)	10%	5%	80%	5%	8-10%
E-Bus	0%	0%	98%	2%	4-5%

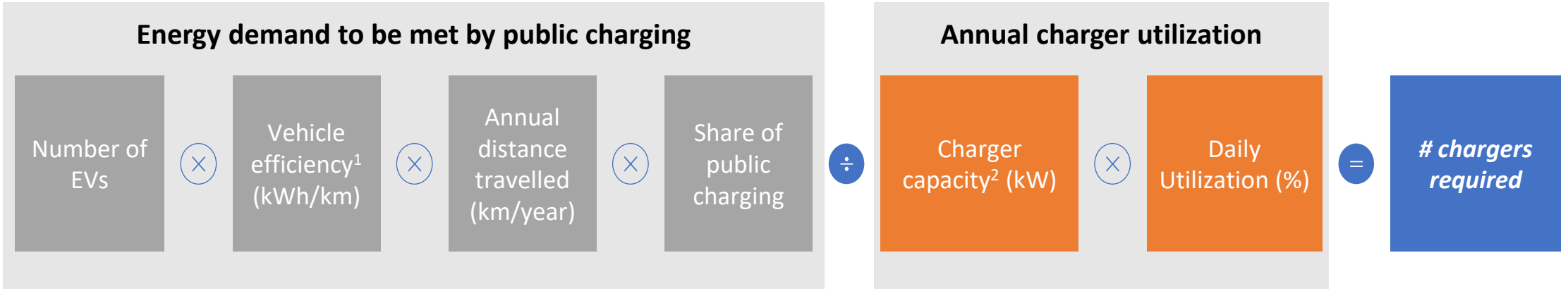
Key Insights

- **Private 4W & buses segment** to leverage public charging **to reduce 'range anxiety'** & **mid-fill option** respectively
- Three-wheeler and commercial 4W to be charged overnight at captive stations to minimize downtime; **public charging will be used as a mid-fill option**
- Two-wheelers to continue to be **charged predominantly at homes**

1. Includes Lithium-ion battery based electric three-wheelers, e-rickshaws and e-carts only. Lead-acid battery based electric three wheelers have not been considered
2. Primarily L5 and Lithium-ion based passenger electric three wheelers
3. Primarily L5 goods carrier electric three wheelers

Source: Expert interviews

Methodology to forecast public EV charger requirement



2030E Illustrative calculation for public chargers required

Private E4W

~2,200K	×	0.14 kWh/km	×	~13K km	×	12%	÷	60kW	×	9%	=	~10K

2W

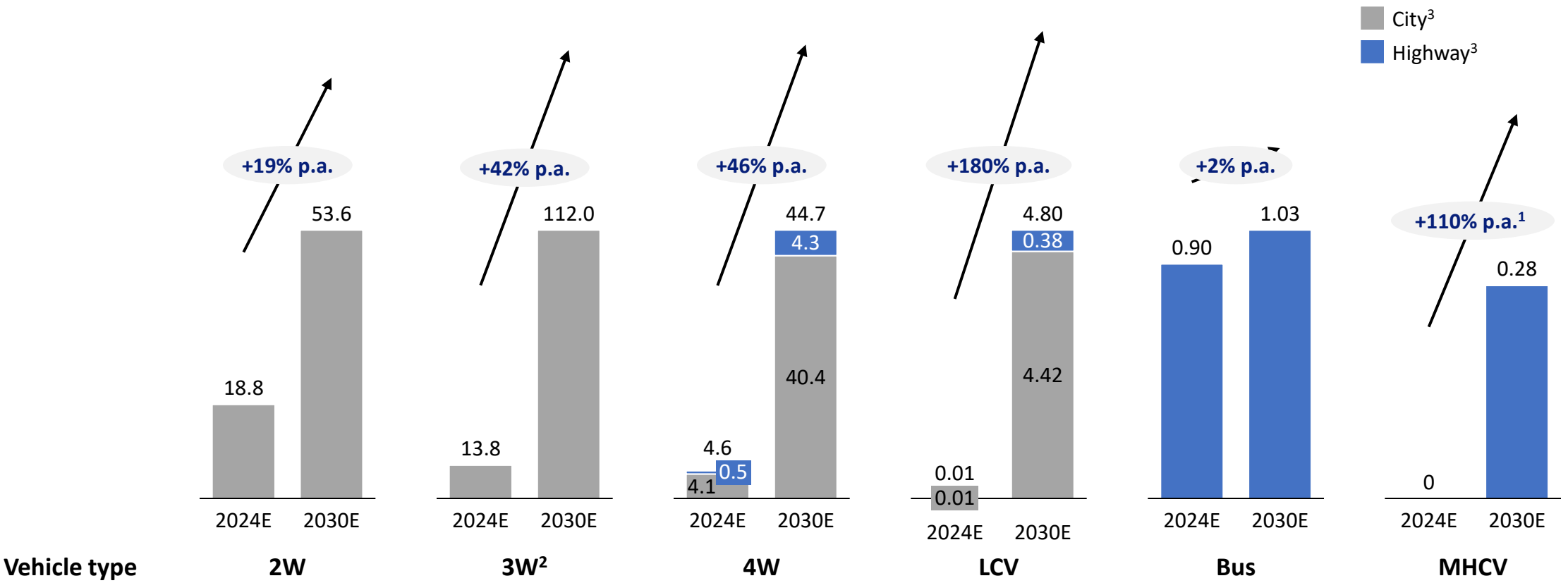
~42,000K	×	0.03 kWh/km	×	~9.2K km	×	5%	÷	12kW	×	9%	=	~54K

1. Based on battery capacity and range of popular EV models
2. Charger capacity is annualized as the energy demand is annual

Source: CPO Consultations, expert interviews

Public EV charger requirement by 2030 based on energy demand

Operational EV chargers required (All numbers in '000s)



1. Growth rate between 2026E to 2030E
2. Includes Lithium-ion battery based electric three-wheelers, e-rickshaws and e-carts only. Lead acid battery based E3W have not been considered
3. The split between in-city and highway chargers is calculated based on usage and charging patterns by vehicle segment. For 2W & 3W, 100% usage/public charging happens in-city, while for buses and MHCVs, 100% public charging takes place on highways. For LCVs and 4W, 5-10% and 10-15% of public charging takes place on highways respectively

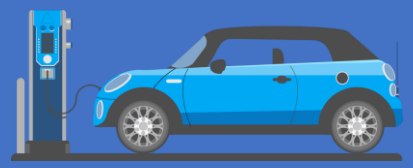
Assumptions for calculating public charging infrastructure capex

Vehicle segment	EVSE unit cost (INR lakh)	Upstream infrastructure cost[1] per charger (INR lakh)
2W	1.5-2.5	2-2.5
3W	1.5-2.5	2-2.5
4W	8-10	10-12
Freight (LCV)[2]	8-10	10-12
Bus	20-22	25-26

1. Includes capex costs for transformers and cabling and varies from state to state based on load requirements
2. Freight (MHCV) excluded considering low prospects for substantial electrification, considering significantly higher charging requirements than other EV classes

Source: CPO Consultations, expert interviews

Capex of INR ~16,000 Cr needed to meet India's public EV charging demand by 2030



Total Capex requirement[1] to serve 2030 public charging demand (INR Cr)

EV Type	2026E	2028E	2030E
2W	800-850	1,400-1,500	1,600-1,700
3W	800-850	2,100-2,200	3,900-4,000
4W	1,800-1,850	4,800-5,000	8,000-8,200
Freight (LCV)[2]	5-10	150-160	1,000-1,200
Buses[3]	280-300	300-320	320-350
Total[4]	**3,700-4,000**	**9,000-9,300**	**15,000-16,000**

1. Calculated as the product of public EV chargers required (units) and the capex per charger
2. Freight (MHCV) excluded considering low prospects for substantial electrification
3. The energy demand from buses is expected to be fully met by chargers installed by 2027-28, leading to marginal incremental capex required in subsequent years
4. Includes capex that has already been operationalized till date

Source: CPO Consultations, expert interviews

Agenda

EV Penetration and Public Charging Infra Capex

Prioritizing Cities & Highways

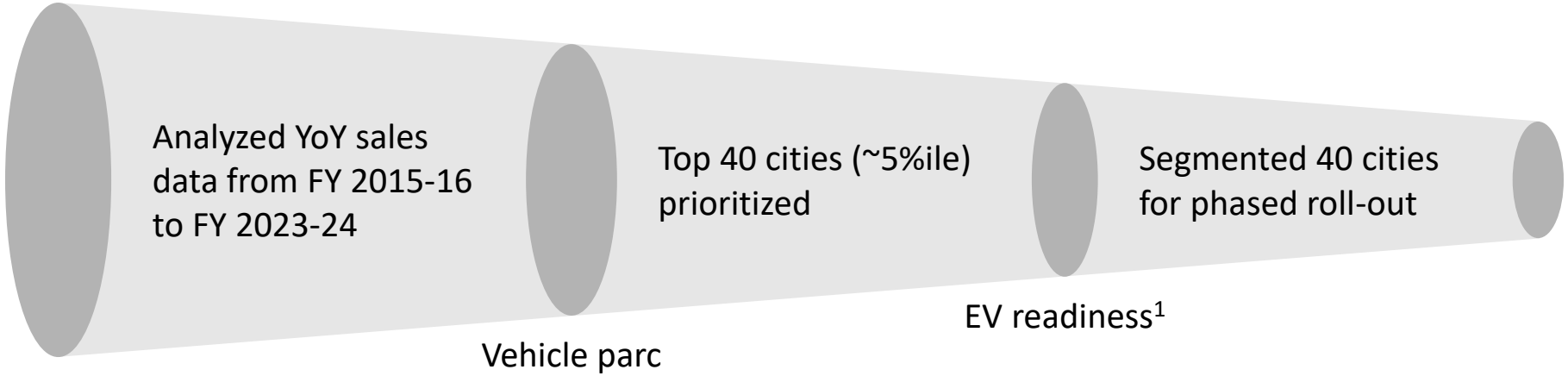
Implementation Roadmap: Driving Unit Economics & Key Challenges

Key Initiatives & Recommendations



40 cities prioritized from 700+ cities based on vehicle parc & EV readiness

Approach



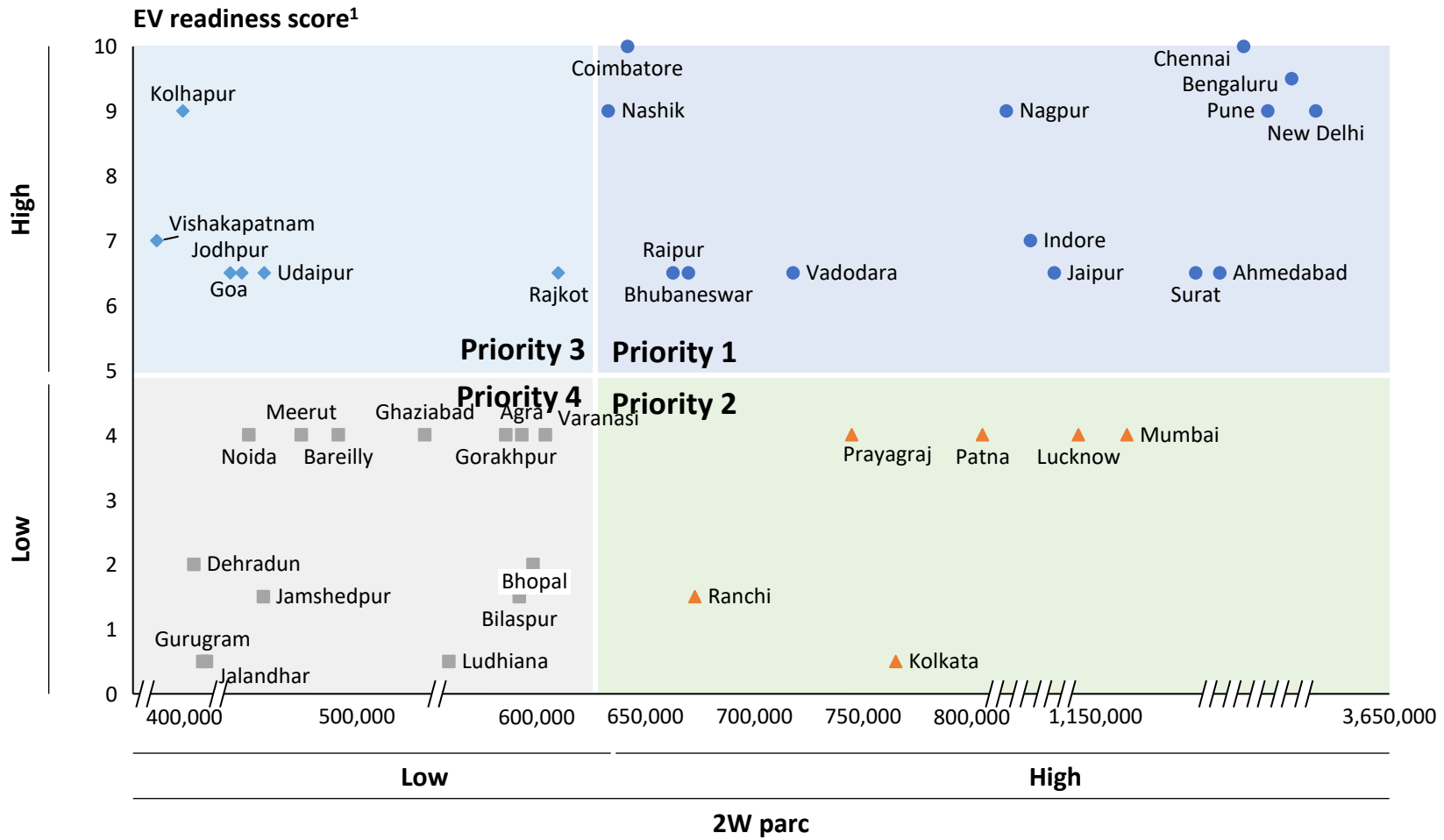
# of cities

700+	40	40
		(4 priority segments)

1. Calculated on a 10-point scale based on current EV penetration (50% weightage), current public charging availability & future scalability (40% weightage), state government incentives (10% weightage)

E2W: 40 cities prioritized which represent ~20% of the 2W vehicle parc

As of FY 2024



Key takeaways

Of the 40 cities, top 20 cities contribute to ~16% (out of 20%) of the 2W vehicle parc

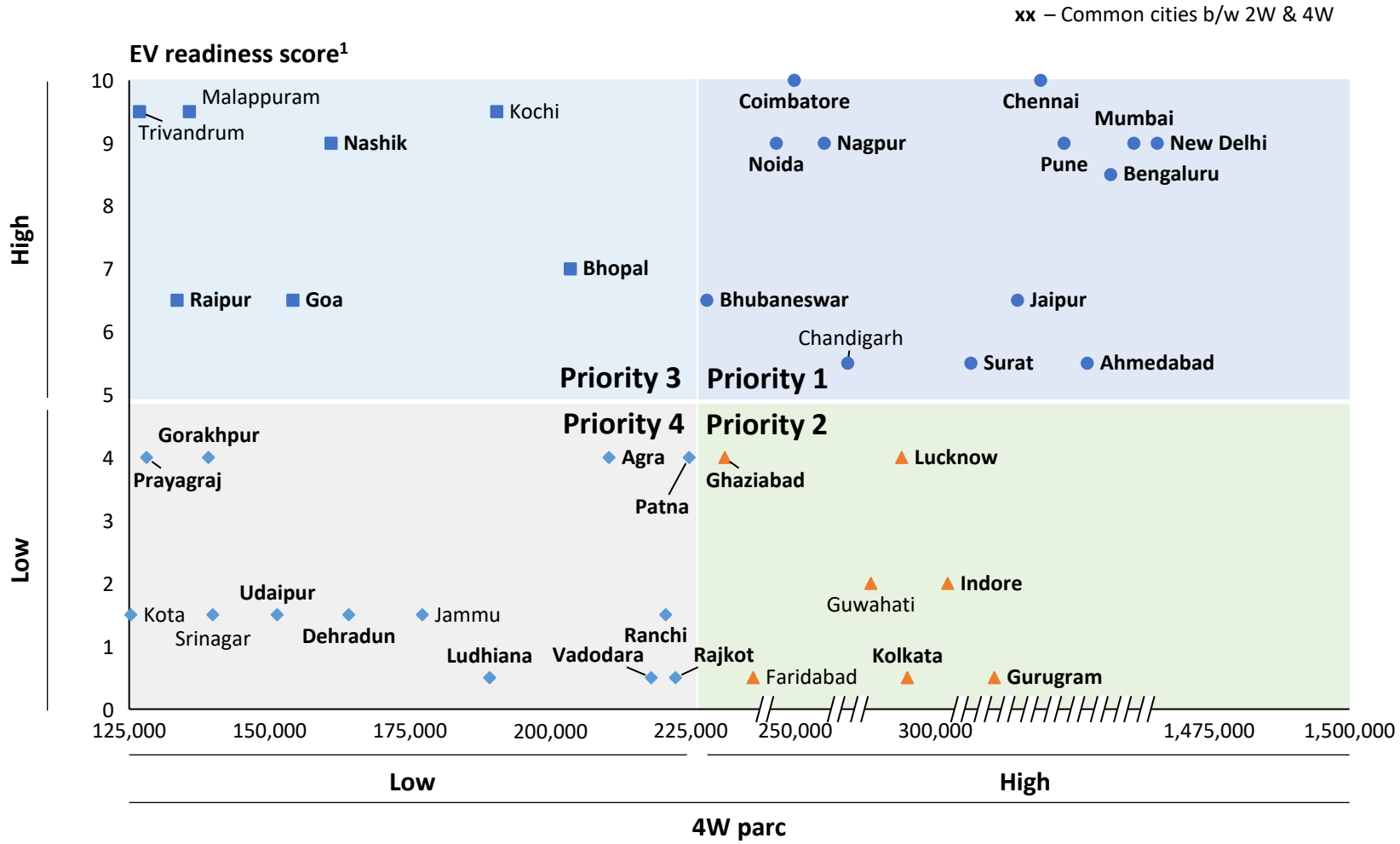
These cities are expected to have **higher EV penetration in next 3-5 years** given current EV adoption, conducive state policies for EV adoption & push for scaling up charging infrastructure

1. Calculated on a 10-point scale based on current EV penetration (50% weightage), current public charging availability & future scalability (40% weightage), state government incentives (10% weightage)
NOTE: Telangana RTO is excluded as Vahan database is not updated for the state

Source: Vahan data

E4W: 40 cities prioritized which represent ~50% of the 4W vehicle parc

As of FY 2024



Implications for charging infrastructure roadmap

31 cities (common across 2W & 4W) can be **further prioritized** for charging infrastructure scale-up

Of the ~INR 16000 Cr capex needed by 2030, **INR 8000-9000 Cr would be required in these 31 cities**

1. Calculated on a 10-point scale based on current EV penetration (50% weightage), current public charging availability & future scalability (40% weightage), state government incentives (10% weightage)
NOTE: Telangana RTO is excluded as Vahan database is not updated for the state

Source: Vahan data

States (priority cities) are providing incentives to push EV adoption and charging infra scale-up (1/3)

Not Exhaustive

State	Priority cities	State initiatives to promote EV adoption / charging infrastructure: Financial incentives	State initiatives to promote EV adoption / charging infrastructure: Other initiatives
Maharashtra	Mumbai, Pune, Nagpur, Nashik, Kolhapur	**Subsidies on EV purchase** (e.g., INR 5k/kWh up to INR 10k for 2W, 30k for 3W, 1.5L for 4W) **Capital subsidy of 25%** on equipment costs (up to ₹10 lakhs per station) for first 250 commercial public charging stations	Passed policy to encourage **reserving land for developing EV infrastructure as part of city planning**, ensuring that charging stations are integrated into urban development projects All EVs are **exempt from road tax and registration fees**, reducing the overall cost of ownership
Gujarat	Surat, Ahmedabad, Rajkot, Vadodara	**Subsidies on EV purchase** (e.g., INR 10k/kWh up to INR 20k for 2W, 50k for 3W, 1.5L for 4W)**;** total outlay of ₹870 crores, for sale of 2L vehicles between 2021-25 **25% capital subsidy on equipment/machinery** for the first 250 commercial PCS (limited up to ₹10 lakhs per station)	**Streamlined process for establishing manufacturing units and charging infrastructure** as part of the policy framework Electric vehicles are **exempt from registration fees**, making them more financially attractive
Karnataka	Bengaluru, Mysuru	Subsidy of **₹10,000 per kWh for 4W**, with a cap of ₹1.5 lakh. For electric **2W**, **subsidies are available up to ₹20,000** based on battery capacity (**under FAME EV scheme**, a central government initiative, no direct subsidy by state) **25% capital subsidy on the cost of charging equipment**, capped at ₹5,00,000 per station	Karnataka government to **establish ~2,500 EV charging stations through PPP models** (~₹35 crore investment for 100 stations in collaboration with power supply companies) **Partnerships with local electricity supply companies** (Escoms) to facilitate the installation and maintenance of charging stations **Waivers on road tax and registration fees** for electric and strong hybrid vehicles **priced under ₹25 lakh**

States (priority cities) are providing incentives to push EV adoption and charging infra scale-up (2/3)

Not Exhaustive

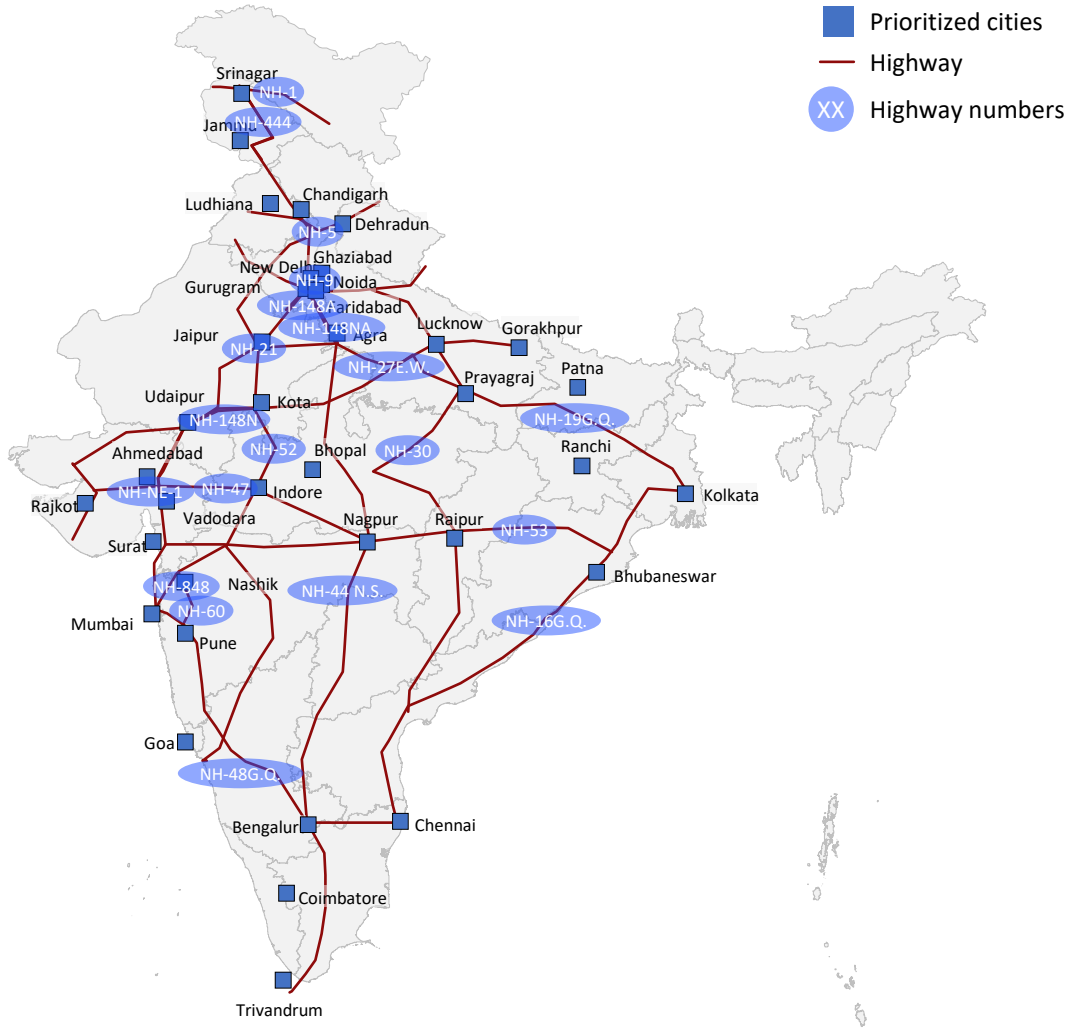
State	Priority cities	State initiatives to promote EV adoption / charging infrastructure: Financial incentives	State initiatives to promote EV adoption / charging infrastructure: Other initiatives
Kerala	Trivandrum, Kochi	**25% capital subsidy for establishing PCS,** capped at ₹10 lakh for first 100 DC fast chargers (100 V and above) and ₹30,000 for first 300 chargers below 100 V Purchase **subsidies specifically for electric 3W,** which are vital for public transport and last-mile connectivity	Kerala State Electricity Board (KSEB) has been designated as the State Nodal Agency to oversee the establishment of charging infrastructure; **aims to set up charging stations every 25 km along major highways** **Scrappage program** to allow owners to **trade in old vehicles for credits towards new EV purchases**
Tamil Nadu	Chennai, Coimbatore, Malappuram	**Direct purchase incentives** ranging from **₹5,000 to ₹10 lakh** based on vehicle type, **particularly benefiting commercial vehicles** **25% capital subsidy for establishing PCS,** capped at ₹10 lakh for fast charging stations and ₹1 lakh for slow charging stations Demand charges to be reduced by 75% for the first two years and by 50% for the subsequent two years, while energy charges to be reduced by 50% during non-peak hours (8 AM to 4 PM)	**Govt. is identifying sites for PCS** in government offices, public places, and Smart City missions, ensuring broad accessibility **Govt. plans to establish 2,500 EV charging stations by 2025**, strategically **located at intervals of 25 km on major highways** EV projects are eligible for 100% exemption on electricity tax for five years on power purchased from Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) or generated from captive sources
Delhi	New Delhi	For **electric cars,** an incentive of **₹10,000 per kWh** of battery capacity is offered for the **first 1,000 vehicles registered** Electric **2W** subsidy of INR 5k/kWh up to INR 30k; **and 3W** receive subsidy of INR 30k per vehicle, promoting widespread adoption	**100% reimbursement of the SGST collected**, which is to be reinvested into the infrastructure Auto rickshaw **permit** linked to de-registered ICE auto rickshaw can be surrendered and **exchanged for E3W at no additional cost** Govt aims to ensure charging stations are **available within 3 kilometers** of every location in developed areas

States (priority cities) are providing incentives to push EV adoption and charging infra scale-up (3/3)

Not Exhaustive

State	Priority cities	State initiatives to promote EV adoption / charging infrastructure	
		Financial incentives	**Other initiatives**
UP	Noida, Ghaziabad, Agra, Lucknow, Prayagraj, Varanasi, Gorakhpur, Bareilly, Meerut	**Buyers of electric 2W** receive a **15% subsidy** on the ex-factory price, **capped at ₹5,000**, while electric **3W** can receive up to **₹12,000** **One-time capital subsidy of 20% on eligible fixed capital investment,** capped at ₹10 lakh for the first 2,000 charging stations Capital subsidy of up to **30% on eligible fixed capital investments for manufacturing EVs** and components, capped at ₹1000 crores per project over 20 years	UP government is aiming for **100 DC public charging stations** in each of the ten model cities Buyers of EV get **three-year exemption from road tax and vehicle registration fees** **Provisions for interest-free loans** specifically aimed at **state government employees**

20 highways prioritized based on their connectivity to key priority cities & vehicular traffic



National Highways	Connecting priority cities
NH-848	Mumbai, Nashik
NH-48 G.Q.	Mumbai, Chennai, Pune, Jaipur, New Delhi, Ahmedabad, Vadodara, Udaipur
NH-44 N.S.	Bengaluru, New Delhi, Nagpur, Faridabad, Agra, Ludhiana, Jammu, Srinagar
NH-52	Jaipur, Indore, Kota
NH-30	Raipur, Lucknow, Prayagraj
NH-16 G.Q.	Chennai, Bhubaneswar, Kolkata
NH-60	Pune, Nashik
NH-21	Jaipur, Agra
NH-27 E.W.	Lucknow, Udaipur, Gorakhpur, Kota
NH-53	Raipur, Nagpur, Surat
NH-148NA	New Delhi, Faridabad, Agra
NH-47	Nagpur, Ahmedabad, Indore
NH-19 G.Q.	Kolkata, Agra, Prayagraj
NH-9	New Delhi, Ghaziabad
NH-148A	New Delhi, Gurugram
NH-NE-1	Ahmedabad, Vadodara
NH-5	Chandigarh, Ludhiana
NH-148N	Vadodara, Kota
NH-1	Jammu, Srinagar
NH-444	Jammu, Srinagar

- **20 highway stretches connecting priority cities contribute to 50%+ of the vehicular traffic[1], highway-based PCS can be prioritised given expected usage**
- **50-60 km² distance expected between PCS on highways**

1. Calculated based on toll plaza wise PCU/day (passenger car unit per day) data from NHAI
2. Basis weighted average of mid-fill options for 3 customer profiles for E4W and 2 profiles for Ebuses basis respective range anxiety distances

Source: National Highways Authority of India

Agenda



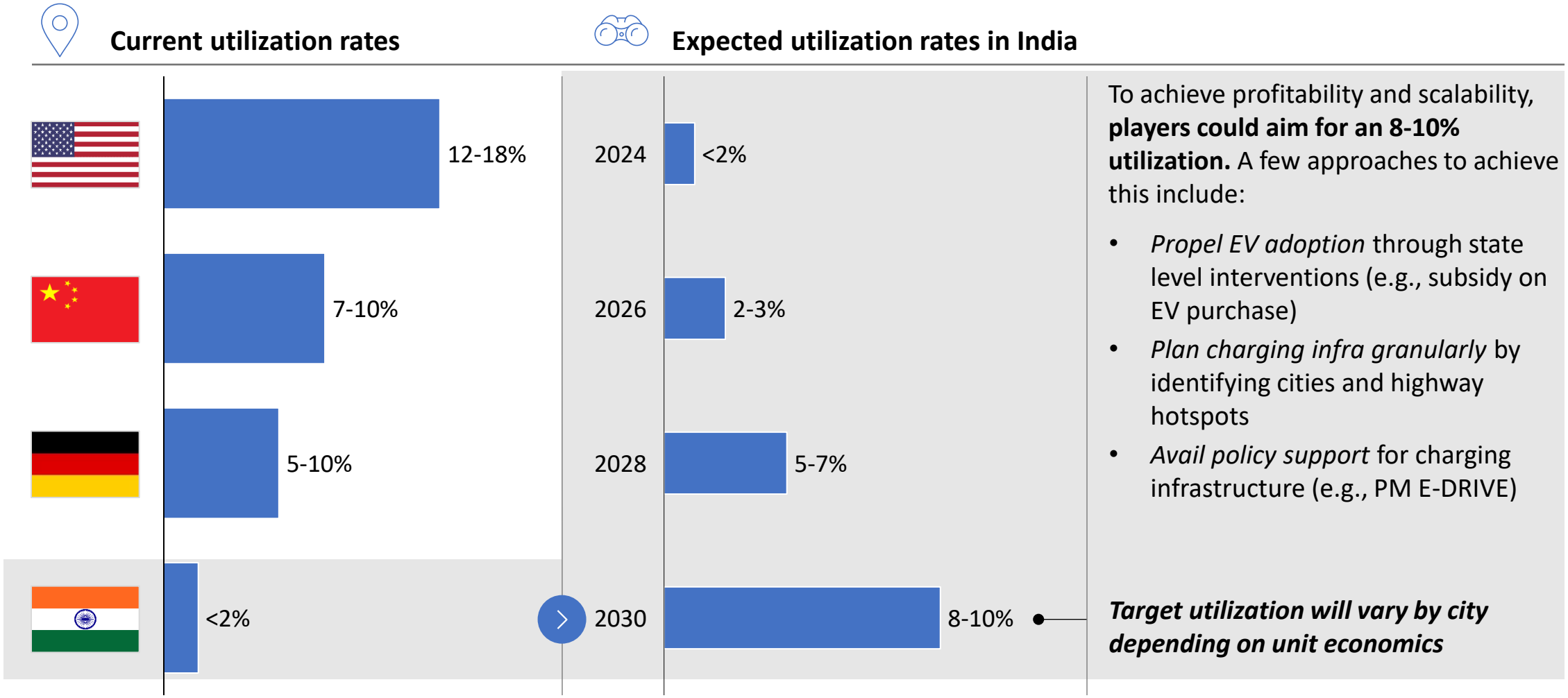
EV Penetration and Public Charging Infra Capex

Prioritizing Cities & Highways

Implementation Roadmap: Driving Unit Economics & Key Challenges

Key Initiatives & Recommendations

Financial viability for PCS in India remains low; 8-10% utilization critical to achieving economic viability



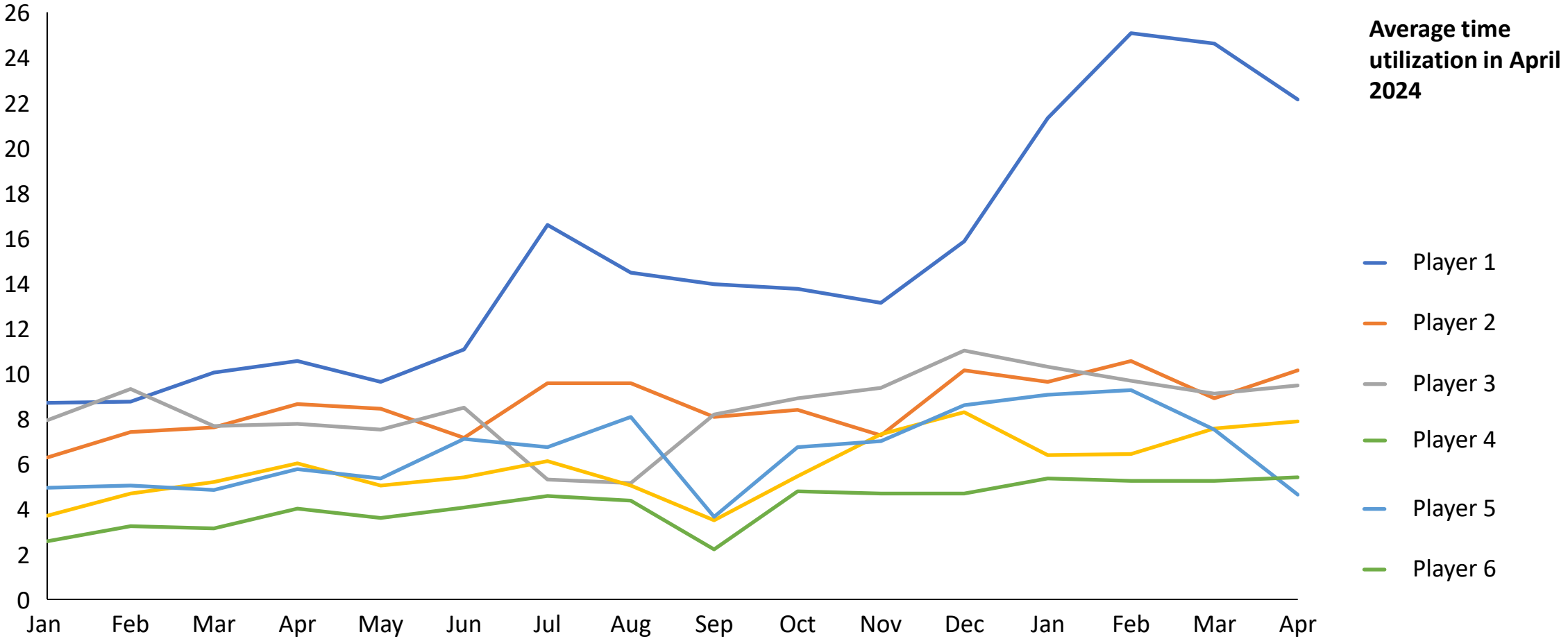
To achieve profitability and scalability, **players could aim for an 8-10% utilization.** A few approaches to achieve this include:

- *Propel EV adoption* through state level interventions (e.g., subsidy on EV purchase)
- *Plan charging infra granularly* by identifying cities and highway hotspots
- *Avail policy support* for charging infrastructure (e.g., PM E-DRIVE)

Target utilization will vary by city depending on unit economics

Source: Expert interviews

Global case example: Germany has created an economically viable public charging network with 5-10% utilization rates; >16% utilization achieved on highways



Source: Expert interviews

A three-step approach could be used for setting up and driving a city's public charging infrastructure network

Project city's EVCI demand



- **Quantify city's total expected energy demand & chargers needed** basis inputs e.g., EV parc across vehicle archetypes, average usage (km), charger capacity, utilization rates, etc.
- **Estimate city's charger density** needed to fulfill expected energy demand

Conduct Geo-spatial mapping



- **Identify 'hot-spots' to prioritize locations** for EVCI set-up (both highway & in-city); use parameters like existing & future infra, affluence level, user convenience, power supply reliability, etc. to prioritize
- **Work with local authorities for hyper-granular planning** e.g., which high vehicular traffic lanes to prioritize

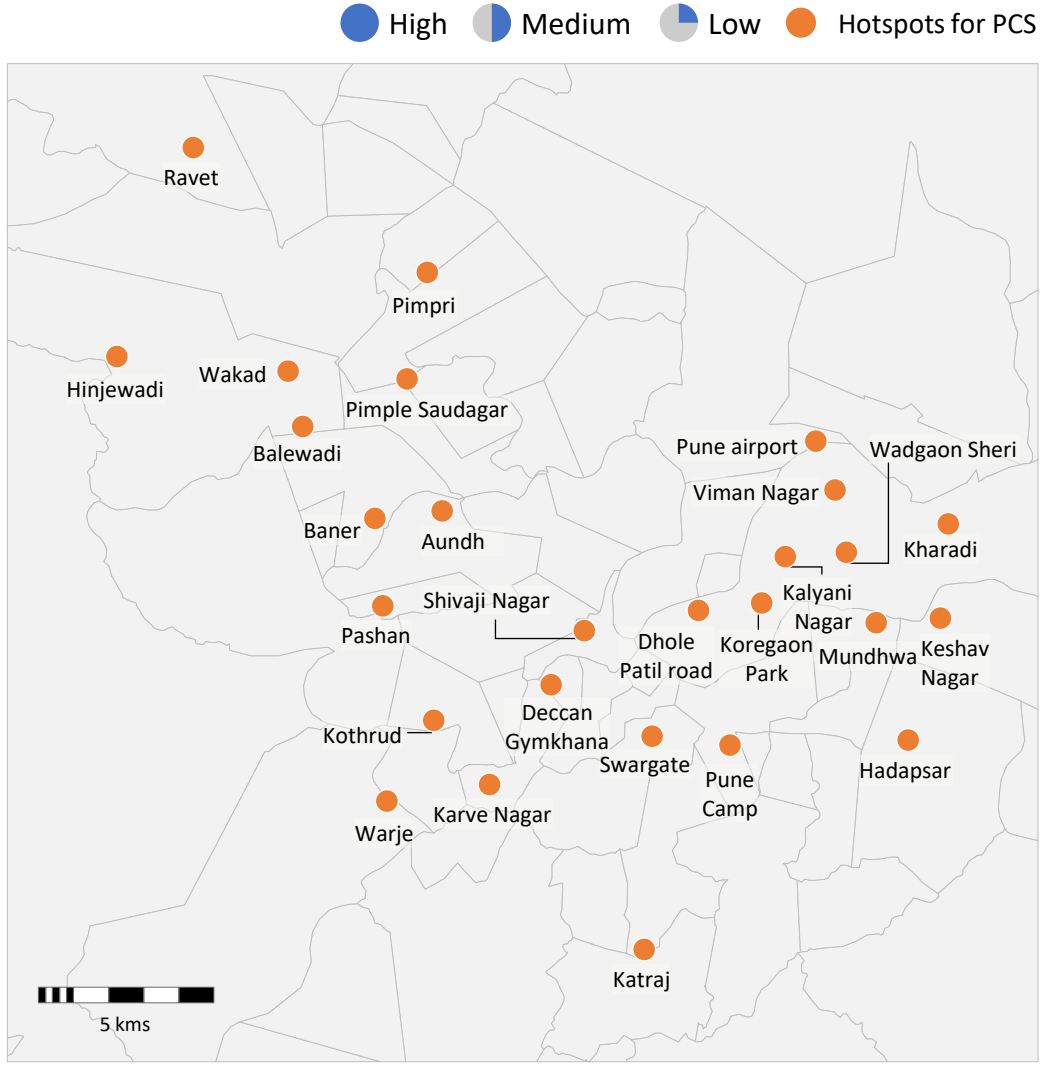
Unit economics backed network



- **Finalize PCS configuration & layout** basis archetype e.g., petrol pump PCS, social hub PCS, highway PCS
- **Drive PCS-level target utilization** to ensure positive unit economics (at PCS archetype level)

Pune deep-dive: Pune will likely need 4-5 PCS[1] per sq km by 2030; 20+ hotspots considered basis key driving factors

Factors	City	Highway
1 Demand density (vehicle parc): *EV penetration / vehicle parc in the area*	●	◑
2 Customer affluence level: *proxy for propensity to buy electric vehicles*	●	◔
3 Existing infrastructure: *as-is state of infrastructure e.g., power supply*	●	◑
4 Future scalability: *scope for scale-up including land availability, additional charger capacity*	●	●
5 Proximity to amenities *e.g., public facilities, restaurants, café, etc.*	◑	●
6 Parking availability: *dedicated parking areas in / near PCS*	●	●
7 User Convenience: *PCS location accessibility*	●	◑
8 Power supply reliability: *un-interrupted power supply*	●	●



1. Basis # of total chargers needed by vehicle archetype in 2030, 3-4 chargers per PCS, Pune area (331 sq km)

Source: CPO Consultations, expert interviews

PCS configuration will depend on the location archetype

Illustrative

Key differences	Archetype: highway	Archetype: within city – Examples	
			
		PCS at a petrol pump	**PCS near restaurant (or other high traffic area)**
Configuration	Ideal for charging 4W and buses	Ideal for charging 2/3W and 4W	Ideal for charging 2W and 4W
Land cost	Low to Medium	Medium to high	High to very high
Area required	High (since bus parking needed)	Medium (for 4W and 2/3W)	Medium (for 4W and 2W)
# vehicles charged	Medium (due to mid-fill use case)	Medium to high (optimal PCS locations are high demand hotspots)	Medium to high (optimal PCS locations are high demand hotspots)

Source: CPO consultations

Layout for an in-city PCS

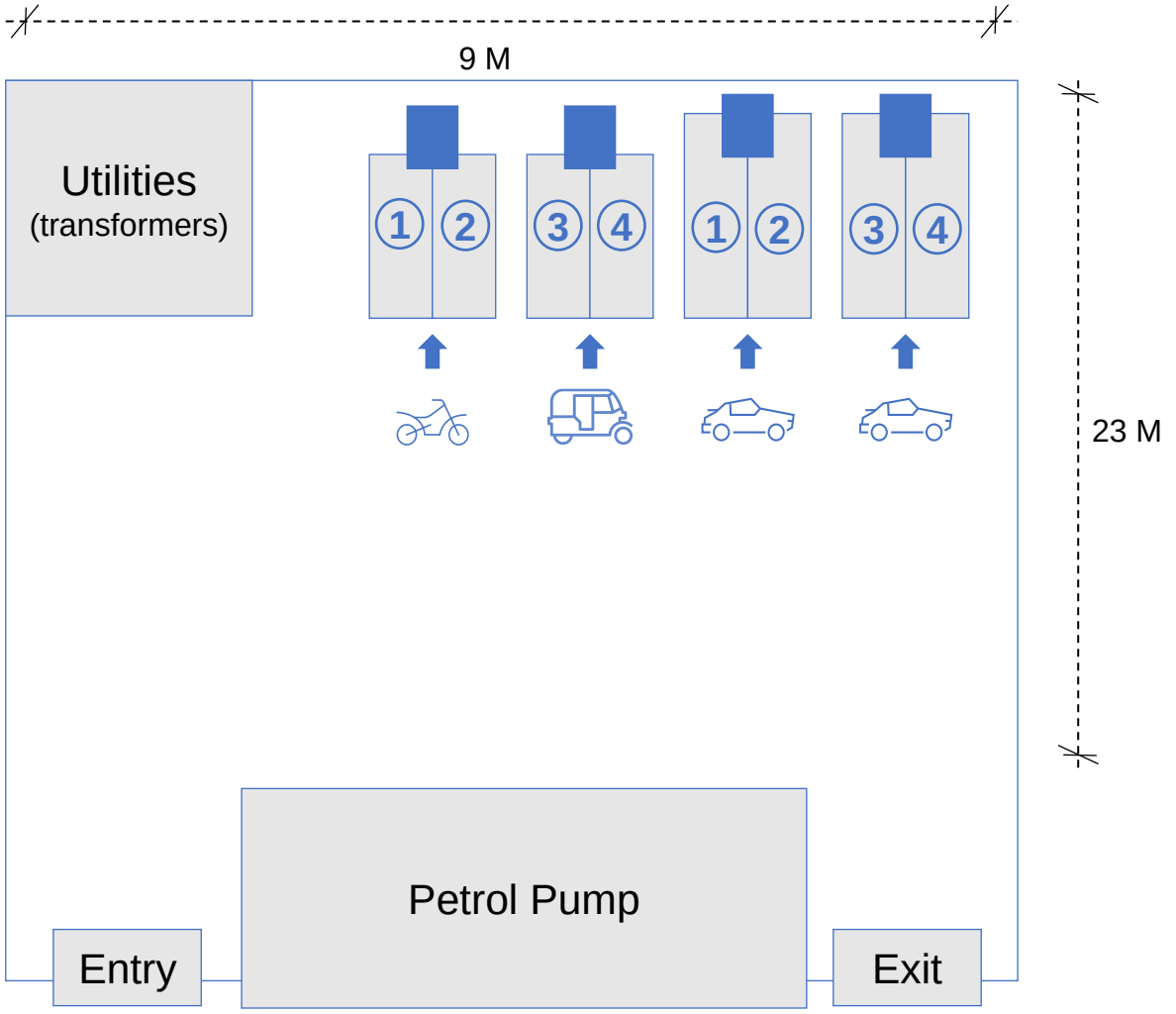
Illustrative

Area: 207 sq. m.

- Parking Facility: 82 sq. m
  - 4 Cars: 50 sq. m.
  - 4 2/3W: 32 sq. m.
- Utilities (transformers): 25 sq. m.
- Circulation Space & Open Area: ~100 sq. m.

EV Charging Specs:

- 2 x 12kW 2/3W fast chargers
- 2 x 60kW 4W/LCV fast chargers



Source: CPO consultation

Players can expect positive economics at 10-15% utilization at in-city PCS

All numbers in '000 INR per year unless stated otherwise

Illustrative **Pune example**

Parameter[1]	2025	2026	2027	2028	2029	2030
Average utilization (%)	**5%**	**6%**	**7%**	**9%**	**11%**	**14%**
Revenue						
Revenue from tariff[2]	1,109	1,366	1,684	2,075	2,557	3,153
GST @18% of revenue	200	246	303	373	460	568
Total revenue	1,309	1,612	1,987	2,448	3,018	3,720
Electricity cost	424	523	645	796	983	1,214
Gross profit	885	1,090	1,342	1,652	2,035	2,506
Land lease cost	292	307	322	339	355	373
Overheads	509	539	572	606	642	681
Fixed electricity cost	138	138	138	138	138	138
EBITDA	(54)	105	309	569	899	1,314
Depreciation	296	296	296	296	296	296
EBIT	(350)	(191)	13	273	602	1,018
GST @18% of revenue	200	246	303	373	460	568
PAT	(550)	(437)	(290)	(100)	142	450
PAT Margin (%)	(42%)	(27%)	(15%)	(4%)	5%	12%

Key assumptions

Public charging station setup:

- **2x 60 kW** e-4W/LCV chargers
- **2x 12 kW** e-2W/3W chargers

Charger capex is inclusive of 80% upstream subsidy in PM E-DRIVE scheme (applicable through FY 2026)

Tariff structure is assumed as:

- Depending on charger type, **pre-tax tariff is:**
  - 12kW charger: **~14 INR/kWh**
  - 60kW charger: **~19 INR/kWh**
- **GST** calculated as **18% of pre-tax tariff**

Other assumptions:

- **Electricity supply[3] cost** calculated as **INR 7/kWh**
- **Usable life of a charger** is assumed to be **10 years**
- **Monthly land rent is** calculated at **~INR 1350/sq. m growing at 5% annually**
- Monthly maintenance **opex assumed to be ~INR 40,000** and to grow 6% annually

Implementing latest MoP EV charging guidelines (e.g., revenue sharing for land lease) can help break even at lower utilization rates

1. All figures in '000 INR/yr unless otherwise specified
2. Calculated based on electricity demand and blended tariff across vehicle and charger type
3. Electricity cost for CPOs is based on a tow part tariff: Variable component basis usage (INR 7/kWh) and fixed component basis connection specification (INR 80/kW)

Source: Expert interviews

Layout for a PCS on highway toll plaza with wayside amenities

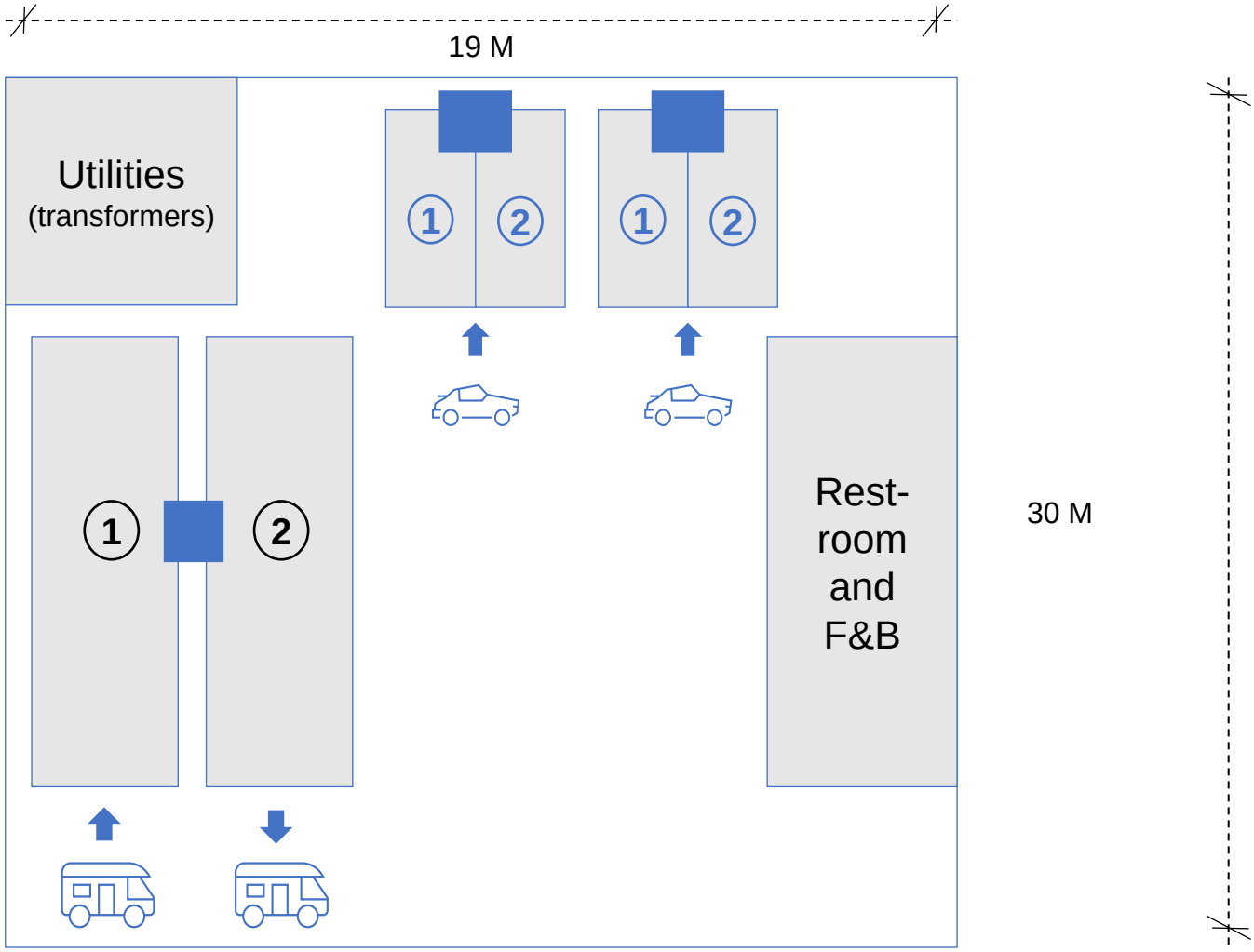
Illustrative

Area: 571 sq. m.

- Parking Facility: 146 sq. m
  - 4 Cars: 50 sq. m.
  - 2 buses: 96 sq. m.
- Restroom & Package F&B: 100 sq. m.
- Utilities: 25 sq. m.
- Circulation Space & Open Area: ~300 sq. m.

EV Charging Specs:

- 1 x 240kW Bus fast chargers
- 2 x 60kW 4W/LCV fast chargers



Source: CPO consultations

Players can expect positive economics at 6-8% utilization at a highway-based PCS

All numbers in '000 INR per year unless stated otherwise

Illustrative **Pune example**

Parameter[1]	2025	2026	2027	2028	2029	2030
Average utilization (%)	**3%**	**4%**	**5%**	**6%**	**8%**	**10%**
Revenue						
Revenue from tariff[2]	1,887	2,408	3,081	3,953	5,084	6,554
GST @18% of revenue	340	433	555	712	915	1,180
Total revenue	2,227	2,842	3,636	4,664	5,999	7,734
Electricity cost	662	842	1,075	1,375	1,764	2,269
Gross profit	1,565	1,999	2,561	3,289	4,234	5,465
Land lease cost	270	283	297	312	328	344
Overheads	827	876	929	985	1,044	1,106
Fixed electricity cost	346	346	346	346	346	346
EBITDA	123	494	989	1,646	2,517	3,668
Depreciation	512	512	512	512	512	512
EBIT	(389)	(18)	477	1,134	2,005	3,156
GST @18% of revenue	340	433	555	712	915	1,180
PAT	(729)	(451)	(78)	423	1,090	1,977
PAT Margin (%)	(33%)	(16%)	(2%)	9%	18%	26%

Key assumptions

Public charging station setup:

- **2x 60 kW** e-4W/LCV chargers
- **1x 240 kW** eBus charger

Charger capex is inclusive of 80% upstream subsidy in PM E-DRIVE scheme (applicable through FY26)

Tariff structure is assumed as:

- Depending on charger type, **pre-tax tariff is:**
  - 60kW charger: **~19 INR/kWh**
  - 240kW charger: **~ 21 INR/kWh**
- **GST** calculated as **18% of pre-tax tariff**

Other assumptions:

- **Electricity supply[3] cost** calculated as **INR 7/kWh**
- **Usable life of a charger** is assumed to be **10 years**
- **Monthly land rent is** calculated at **~INR 450/sq. m growing at 5% annually**
- Monthly maintenance **opex assumed to be ~INR 65,000** and to grow 6% annually

Implementing latest MoP EV charging guidelines (e.g., revenue sharing for land lease) and operating models like cost sharing for amenities between CPO and businesses (e.g., café chains) can help break even at lower utilization rates

1. All figures in '000 INR/yr unless otherwise specified
2. Calculated based on electricity demand and blended tariff across vehicle and charger type
3. Electricity cost for CPOs is based on a tow part tariff: Variable component basis usage (INR 7/kWh) and fixed component basis connection specification (INR 80/kW)

Source: Expert interviews

5 key challenges need to be addressed to scale up public charging infrastructure

Financial challenges Non-financial challenges

1 Limited financial viability



- GST @18%
- Low utilization rates of <2%
- High customer tariff
- High upstream infra cost

2 DISCOM/ Power related



- 2-part tariff
- High set up time for electricity connections
- Shortage of Discom approved class A contractors

3 Land related issues



- Land availability: subsidized land not typically available in high-demand charging areas

4 Operational challenges



- Lack of uninterrupted high-quality power leading to lower uptime

5 Standardization & interoperability



- Non-uniform charging standards in E2W
- Absence of Unified Energy Interface

Source: CPO Consultations, expert interviews

2. High variability in tariff across states

State/UT	Fixed Tariff (INR/kVA/month)	Variable Tariff (INR/kWh)
Kerala	290	6
Karnataka	200	4.5
Tamil Nadu	145	6.3-9.5[1]
Rajasthan	135	6
MP	100-120	5.9-6
Maharashtra	80	7.6
Gujarat	25	4
Delhi	-	4-4.5
UP	-	7.3-7.7

Key insights

- **High variability in fixed tariff (INR/kVA/month) across states**
  - States like UP, Delhi, Gujarat have no / low fixed tariff but states like Karnataka, Kerala have INR 200+ fixed tariff

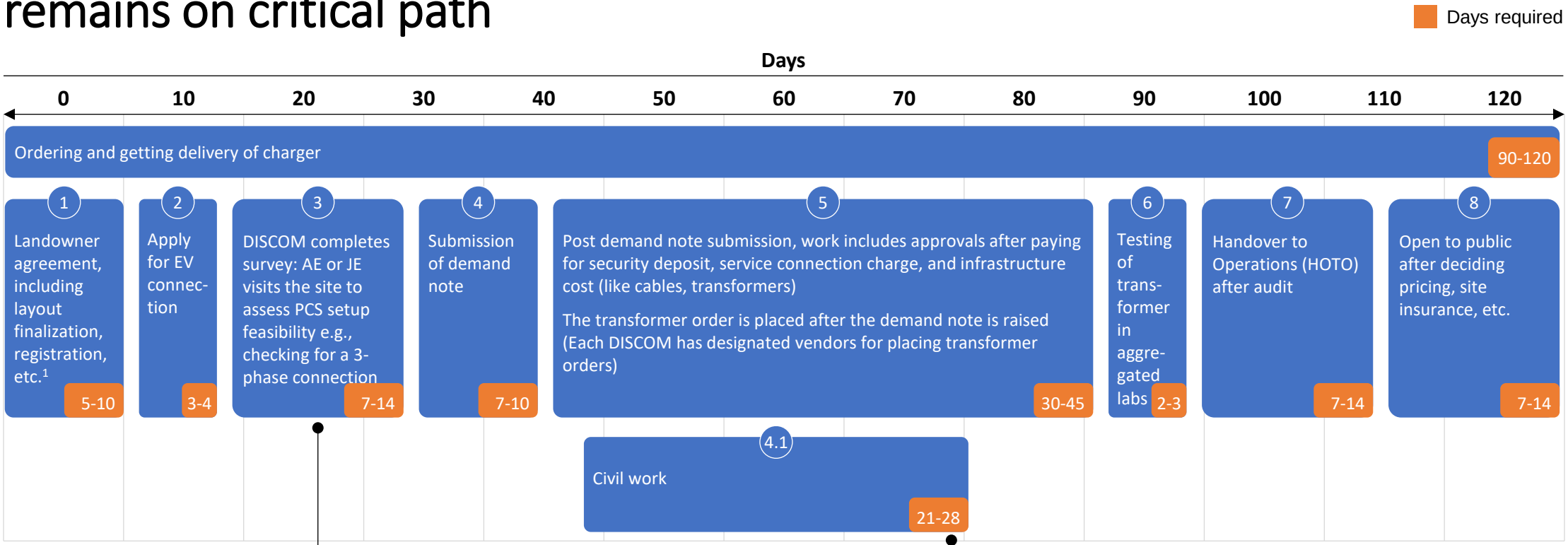
> The current cost structure, with fixed charges regardless of energy consumption, combined with low utilization at public charging stations, is making it challenging to achieve break-even

> A need to shift from a two-part tariff to a single tariff, with consistency across states

1. Varies by time of the day (INR 6.3 b/w 9 AM-4 PM, INR 7.85 between 4-6 PM and 10 PM-6 AM, INR 9.45 between 6-9 AM and 6-10 PM)

Source: e-Amrit, expert interviews

2. High variability in time taken to set up PCS; setting up transformer remains on critical path



Challenges faced	• **Lack of single window** to apply for survey • **Approving authorities are not co-located** (20-25km away) – multiple follow ups needed • High variability in transformer installation – **may take as high as 4 months**	• **Low number of DISCOM certified class A contractors per circle** (currently 1-2 vs ideally 5-6 required) creating bottleneck for installation
Potential delay (weeks)	2-3 weeks to 8-10 weeks	3-4 weeks for civil work

1. Site scouting can take additional 1-2 months

Source: CPO consultation

2,3. Ministry of Power has rolled out guidelines for public land allocation & setting up electricity connections; adherence at local level remains low

Provision of public land at promotional rates for Public Charging Stations

Government/Public entities will **offer land for installation of public chargers at subsidized rate** to CPOs
The land-owning agency receives **INR 1 per kWh** of electricity used for charging at the station as **land lease**

Provision of Low-Tension electricity connections

DISCOMs **must provide Low-Tension connections (up to 150 kW)** for charging stations if CPOs apply for these, helping CPOs save on upstream infrastructure costs
Electricity Regulatory Commissions must **pre-specify charges for such connections for better transparency**

Expedited provision of electricity connections by discoms

DISCOMs must provide electricity connections to CPOs within the following timelines[1]:

- **Metropolitan area:** 3 days
- **Other municipal area:** 7 days
- **Rural area:** 15 days
- **Rural area with hilly terrain:** 30 days

DISCOMs must **also establish an online single window clearance system** for applications

Transparency on EV charging demand by region

State Nodal Agencies (SNAs) and Municipal Commissioners will conduct **annual assessments of EV charging demand in their areas** to **ensure strategic placement of EV Charging Stations**

SNAs will publish this data to benefit CPOs

Industry perspective

- MoP guidelines should be converted into mandate for states to follow; else adherence will be minimal
- Low-demand land parcels offered at promotional rates often lack essential infrastructure, making it challenging to set up profitable PCS operations.
- Capped tariff (electricity cost + markup) limits revenue generation, further impacting profitability

1. The provision of connection can take up to 90 days if the extension of distribution mains, or commissioning of new substations is required

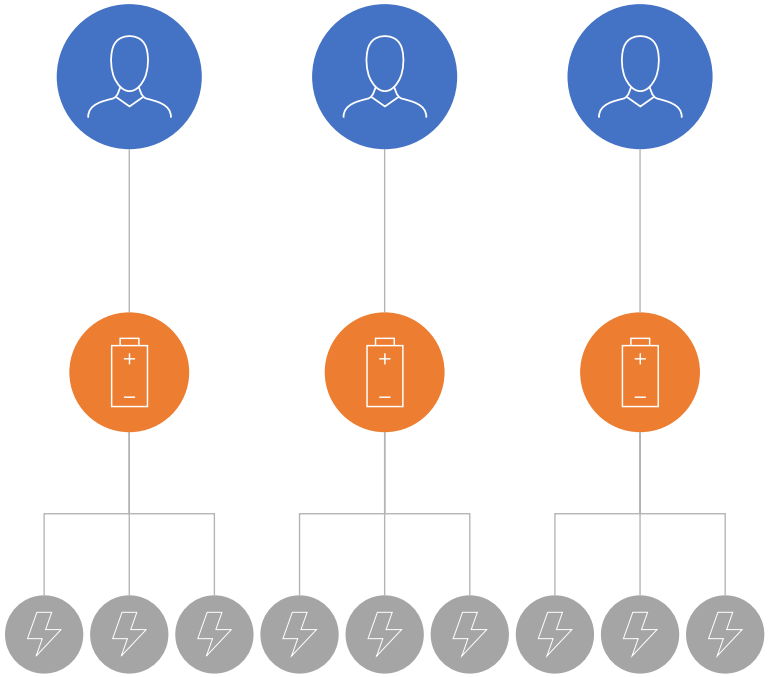
Source: Guidelines for Installation and Operation of Electric Vehicle Charging Infrastructure, Ministry of Power, Government of India (published September 17, 2024)

5. Lack of Unified Energy Interface (UEI) making EV charger discoverability difficult; interoperability can help solve the issue

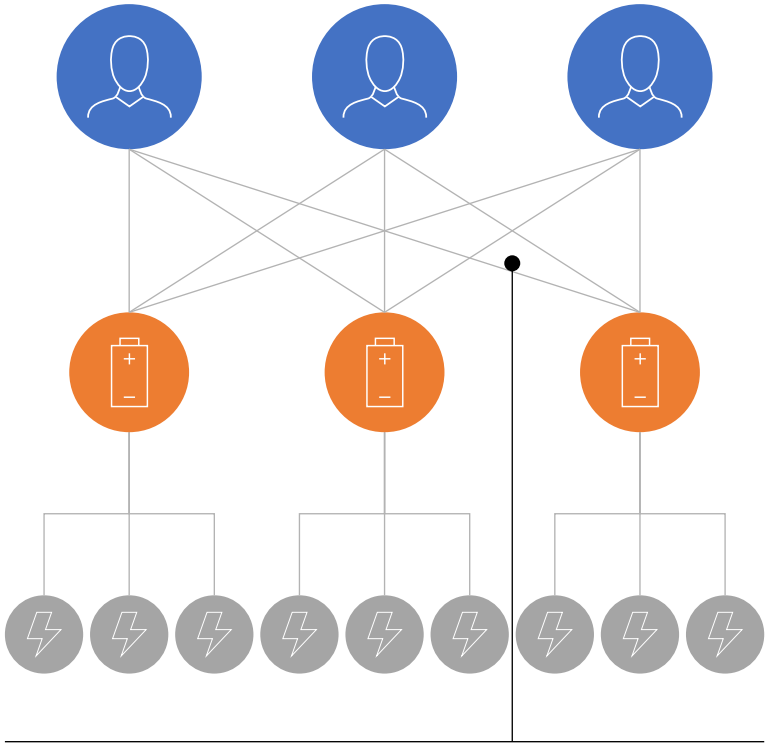
Preliminary

End EV customer | Charger aggregator | Charger

From



To



Fully inter-operable network on common protocol (e.g., Beckn protocol)

Key Insights

- Fully inter-operable network can lead to **100% discoverability** resulting in lower ‘range-anxiety’ for customers and lower ‘utilization anxiety’ for CPOs
- Only station location sharing through interoperability platforms as opposed to charging utilization data shared under OCPI – **UEI to be vendor neutral**
- **End customer can use any interface** (UPI apps, WhatsApp, Browser, EVCI aggregator app) to discover charging points similar to UPI

Agenda



EV Penetration and Public Charging Infra Capex

Prioritizing Cities & Highways

Implementation Roadmap: Driving Unit Economics & Key Challenges

Key Initiatives & Recommendations

Proposed initiatives and recommendations based on stakeholder inputs to address the challenges and establish the charging infrastructure (1/2)

Financial / non-financial | State / policy related | Industry backed

Initiative / recommendation for consideration	Applicability for vehicle type
Standardize GST rates (from 18% to 5%) for EV charging services in line with taxation across EV value chain	
Shift from 2-part tariff to single part tariff with consistent pricing across states	
State mandates to promote E3W adoption e.g., no permit to be required for buying E3W; in the interim, usage of same permit to shift from CNG 3W to E3W	
Set-up a State-level cell with representation from industry stakeholders (OEM, CPO), State & Central authorities to enable and monitor charging infrastructure roadmap implementation	
Ministry of Power guidelines for installation and operation of Electric Vehicle charging Infrastructure (Sep 2024) to be a mandate for state DISCOMs to ensure timely PCS set-up	
Single window clearance for public PCS set-up process with state DISCOMs; empanel 5-6 A-class contractors per circle to expedite civil work	
Preferential access to electricity grid to ensure uninterrupted high-quality electricity supply at all charging stations for higher uptime, especially on highways	

Source: Industry stakeholder consultation

Proposed initiatives and recommendations based on stakeholder inputs to address the challenges and establish the charging infrastructure (2/2)

Financial / non-financial | State / policy related | Industry backed

Initiative / recommendation for consideration	Applicability for vehicle type
Consistent state polices around registration waiver, road tax waiver for EV purchases – to help propel EV adoption leading to higher utilizations for PCS	
Innovative use of land mass: Municipal corporations to explore using public spaces (e.g., Metro station parking, BMC parking) for overnight charging esp. from 11PM – 4AM i.e., low parking occupancy	
Home charging: MoHUA to create a central framework for states to adopt to create fast-tracked single window clearance for charger installations across homes, RWA (both private and community charging)	
Clarity on charger protocols for E2W to promote uniformity of chargers (LECSS – type 7 vs. LEVDC – type 6) - will help CPOs in designing station architecture	
Create a single app (in addition to India digital stack) where all CPOs receiving MHI funding place their chargers with regular updates on availability to enable higher efficiency & discoverability	
Ecosystem-level data sharing: Vehicular level movement data (hotspots), PCS utilization data to be shared within ecosystem players for better charging infrastructure planning	
Innovative models to drive charging infra scale up: explore peer-to-peer charging where EV customers can use other EV customer's charger (residence) with a mark-up over normal customer tariffs	

Source: Industry stakeholder consultation







FICCI

Industry’s Voice for Policy Change