MOBILISING FINANCE FOR EVs IN INDIA

A TOOLKIT OF SOLUTIONS TO MITIGATE RISKS AND ADDRESS MARKET BARRIERS

BY NITI AAYOG AND ROCKY MOUNTAIN INSTITUTE, JANUARY 2021

ABOUT THE AUTHORS

ABOUT NITI AAYOG

The National Institution for Transforming India (NITI Aayog) was formed via a resolution of the Union Cabinet on 1 January 2015. NITI Aayog is the premier policy 'Think Tank' of the Government of India, providing both directional and policy inputs. While designing strategic and long-term policies and programmes for the Government of India, NITI Aayog also provides relevant technical advice to the Centre and States. The Government of India, in keeping with its reform agenda, constituted the NITI Aayog to replace the Planning Commission instituted in 1950. This was done in order to better serve the needs and aspirations of the people of India. An important evolutionary change from the past, NITI Aayog acts as the quintessential platform of the Government of India to bring States to act together in national interest, and thereby fosters Cooperative Federalism.

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ACKNOWLEDGMENTS

The authors would like to thank the following organisations and individuals for offering their insights and perspectives on this work:

- RMI India – Mandar Patil
- Rocky Mountain Institute – Pranav Lakhina, Radhika Lalit, Ali Rotatori
- Areon Mobility – Abhinav Singh, Aman Singh
- Autovert – Sachin Mehta
- Axis Bank – Sumit Bali
- Council on Energy, Environment and Water – Vaibhav Pratap Singh, Abhinav Soman
- CDC Group – Veronica Di Bella, Akshara Gopinath
- EVage – Sonali Bagchi, Inderveer Singh
- Micelio – Anand GCP, Vidyashankar M, Vasudevan Rajesh
- Natural Resources Defense Council – Charu Lata, Polash Mukerjee, Poonam Sandhu
- RevFin – Sameer Aggarwal
- Tata Motors – Dipanjan Banerjee, Sharan Singh
- World Bank Group – Suvranil Majumdar

SUGGESTED CITATION

NITI Aayog and Rocky Mountain Institute, *Mobilising Finance for EVs in India: A Toolkit of Solutions to Mitigate Risks and Address Market Barriers*, January 2021.

Available at NITI Aayog:
http://www.niti.gov.in/

Available at Rocky Mountain Institute:
https://rmi.org/insight/mobilizing-finance-for-evs-in-india/

Available at RMI India:
https://rmi-india.org/insight/mobilising-finance-for-evs-in-india/

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FOREWORD

On behalf of NITI Aayog and Rocky Mountain Institute, it is our pleasure to introduce this report, *Mobilising Finance for EVs in India: A Toolkit of Solutions to Mitigate Risks and Address Market Barriers*. The report identifies solutions to direct capital and financing to aid in India's EV transition.

India has signalled that the future of mobility is electric. The economics of vehicle electrification are improving, with battery pack prices decreasing from about INR75,000/kWh in 2010 to INR13,000/kWh in 2019. Despite a dip in EV sales in 2020, due to the economic effects of COVID-19, confidence in India's EV future will continue to grow as technology costs decline further, operators gain experience with EVs, and new business models prove their viability.

Yet, many well-documented barriers to EV adoption remain, ranging from technology cost to infrastructure buildout to consumer behaviour. The public and private sectors are diligently working together on solutions to each of these barriers. These solutions include:

- Production-Linked Incentive (PLI) Scheme, with an outlay of INR18,100 crore (USD2.4 billion) for the Advanced Chemistry Cell battery sector
- Faster Adoption and Manufacturing of Electric Vehicles (FAME) India Scheme, Phase II with an outlay of INR1,000 crore (USD135 million) for the deployment of charging infrastructure

The need of the hour, however, is the mobilisation of capital and finance towards EV assets and infrastructure. According to this report, the quantum of capital and finance required for India's EV future is considerable. Between 2020 and 2030, the estimated cumulative capital cost of the country's EV transition is INR19.7 lakh crore across vehicles, charging stations, and batteries. The projected size of the annual loan market for EVs is INR3.7 lakh crore in 2030.

Multistakeholder collaboration and innovative solutions are needed to access low-cost financing at this scale. Financial institutions, industry players, government bodies, and civil society must work together to ensure that the solutions outlined in the report are explored.

Innovations in finance and technology can accelerate the country's shift to shared, electric, and connected mobility. Two widely cited photos illustrate this point. In the first, dated 1900, it is very difficult to locate the first car on Fifth Avenue in New York City. In the second, dated 1913, it is more difficult to locate the horse carriage among a sea of cars on the same street.

What fuelled this rapid transition? Ford reduced the cost of a car by 62 percent in 13 years, and General Motors and DuPont invented auto loans. We are seeing similar technological and financial innovation at work today.

We would like to express our gratitude to those who generously contributed their time and expertise to this report. We look forward to working together to implement these solutions and others to support India's EV goals.

Sincerely,
Shri Amitabh Kant (CEO, NITI Aayog)
and Mr. Clay Stranger (Senior Principal, RMI)

Both photos are of New York City's Easter parade and were taken 10 years apart. Top (1900) by the National Archives and Records Administration. Bottom (1913) by the Library of Congress.

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EXECUTIVE SUMMARY

The Government of India (GoI) has made an ambitious commitment to the creation of demand for EVs through the Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (FAME) India Scheme. Additionally, the promotion of domestic manufacturing through the National Mission on Transformative Mobility and Battery Storage has supplemented the scheme. As the economics of electric vehicles (EVs) continue to improve and new business models gain acceptance, India's EV market is poised for significant growth in the coming decade.

Key barriers related to EV adoption—including technology cost, infrastructure availability, and consumer behaviour—must be overcome. Incentives that reduce the upfront cost of EVs, such as the FAME II incentive in India or federal tax rebates in the US, are a critical first-order solution to address. Although less commonly discussed, financing—in terms of the cost and quantum of capital—is another hurdle for India's electric mobility transition. End-users currently face a range of challenges. High interest and insurance rates apply to retail loans, loan-to-value ratios are low, and specialised finance options are limited.

According to our analysis of future passenger and freight vehicle sales, India's weighted-average EV sales penetration has the potential to be about 70 percent in 2030. This value is based on forecasted cost competitiveness and expert interviews.

The quantum of finance required for this EV adoption scenario is considerable. Between 2020 and 2030, the estimated cumulative capital cost of the country's EV transition will be INR19.7 lakh crore (USD266 billion)—across vehicles, electric vehicle supply equipment (EVSE), and batteries (including replacements). The estimated size of the annual EV finance market will be INR3.7 lakh crore (USD50 billion) in 2030.[1]

We have identified 10 solutions that financial institutions (FIs), the EV sector, and the government can adopt to help mobilise the capital and financing associated with India's EV transition. These include six targeted instruments and four ecosystem enablers:

TARGETED INSTRUMENTS

1. **Priority sector lending (PSL):** The Reserve Bank of India (RBI) requires 40 percent of net bank credit to be deployed towards priority sectors. Inclusion of EVs in PSL guidelines would incentivise banks to increase lending towards the sector.
2. **Interest rate subvention:** Subventions act as a subsidy on commercially offered interest rates, with the government bearing the balance through associated banks. Such schemes would substantially improve the affordability of loans. They have already been enacted in other sectors and at a state level for EVs in Delhi.
3. **Product guarantees and warranties:** Reducing the uncertainty associated with EV models will improve their bankability. Original equipment manufacturers (OEMs) can provide assurances in the form of guarantees (to FIs) and warranties (to buyers) on the performance of their products.
4. **Risk-sharing mechanism (government and multilateral-led):** Mechanisms and facilities that partly or entirely cover possible losses associated with financing EVs (due to their unclear resale value) can be capitalised at the national or multilateral level. These would distribute risk and provide FIs with an opportunity to build their trust in the sector.
5. **Risk-sharing mechanism (fleet operator-led):** Fleet operators and final-mile delivery companies can leverage their existing FI relationships to provide partial credit guarantees and utilisation guarantees to driver-partners. They could share the risk between stakeholders in case of default and enhance loan availability for delivery drivers.

6. **Secondary market development:** Industry-led buyback programmes and battery-repurposing schemes will help OEMs and the central government catalyse a secondary market for EVs. This would improve the residual value of EVs, providing FIs with an avenue for resale in case of borrower default.

ECOSYSTEM ENABLERS

- **Digital lending:** Digital sourcing, underwriting, and sanctioning can streamline EV loans by helping overcome the operational and logistical challenges of vehicle financing.
- **Business model innovation:** Piloting and commercialising new business models, combined with the flow of patient capital, can demonstrate the potential of the sector. Additionally, they would help build trust in EVs and normalise them in the market.
- **Fleet and aggregator electrification targets:** The electrification of final-mile delivery, ride-hailing, and corporate transport fleets can act as a strong market signal for stakeholders across the ecosystem, especially OEMs and FIs.
- **Open data repository for EVs:** FIs need access to data on EV specifications, real-world drive cycles, actual charging costs, and operating expenditures. This will help such institutions accurately assess risk, determine appropriate interest rates, and design effective leasing programmes.

Together, these solutions aim to mitigate risks associated with technology, policy, manufacturers, resale, utilisation, maintenance, and customers. They aim to improve the confidence of FIs in financing EVs for end-users. These solutions will likely play important roles in India's economic recovery following COVID-19 by supporting EV sales, manufacturing, and business models—all of which can boost job creation and local value addition.

Engaging Indian FIs in the electric mobility dialogue will be critical to operationalising these solutions. Convening stakeholders from the financial industry, OEMs, fleet operators, government, and others can help prioritise EV financing. Identifying actionable steps is key to working towards implementation.

In addition, FIs need help to understand EV technology and business models, and stay up to date with the policy landscape. Educational materials can help lower risk and increase confidence. Finally, innovative procurement and leasing initiatives that lead to early deployments at scale can help prove the techno-economic viability of EVs and increase supply-chain investments.

Supporting the design of effective financing solutions can help unlock the capital needed for India's EV transition. We look forward to collaborating with partners across the EV ecosystem to elevate the role of finance.

INTRODUCTION

INDIA'S ELECTRIC MOBILITY OPPORTUNITY

India has made a strong commitment to electric mobility.[1] The country's EV transition is gaining traction due to: 1) demand creation, 2) state EV policies, and 3) domestic manufacturing. Simultaneously, the market for electric mobility in India is growing, enabled by policy, compelling and improving economics, and the emergence of new business models and investment opportunities.

1. DEMAND CREATION

In 2015, the Department of Heavy Industry, Government of India, launched its flagship incentive programme, the FAME India Scheme, to accelerate EV adoption.

- FAME I supported 2.8 lakh electric and hybrid vehicles, with demand incentives totalling about INR970 crore (USD130 million)—saving nearly 7 crore litres of fuel and abating over 17.2 crore kg of CO_2.[2]
- FAME II began in April 2019, with an outlay of INR10,000 crore (USD1.4 billion). It aims to drive large-scale adoption of EVs and charging infrastructure and develop a robust domestic EV ecosystem. EVs eligible under FAME II can cumulatively save 74 lakh tonnes of carbon dioxide ($MtCO_2$) emissions over their lifetime.[3]

EXHIBIT 1: CUMULATIVE LIFETIME OIL AND NET CO_2 SAVINGS OF VEHICLES ELIGIBLE UNDER FAME II

	2W	3W	4W	BUS	TOTAL
VEHICLES	1 MN	0.5 MN	55,000	7,000	1.56 MN
OIL SAVINGS (INR '000 CRORE)	3.0	7.2	2.5	4.5	17.2
NET CO_2 EMISSIONS SAVING (MILLION METRIC TONNES)	2.6	3.2	0.1	1.5	7.4

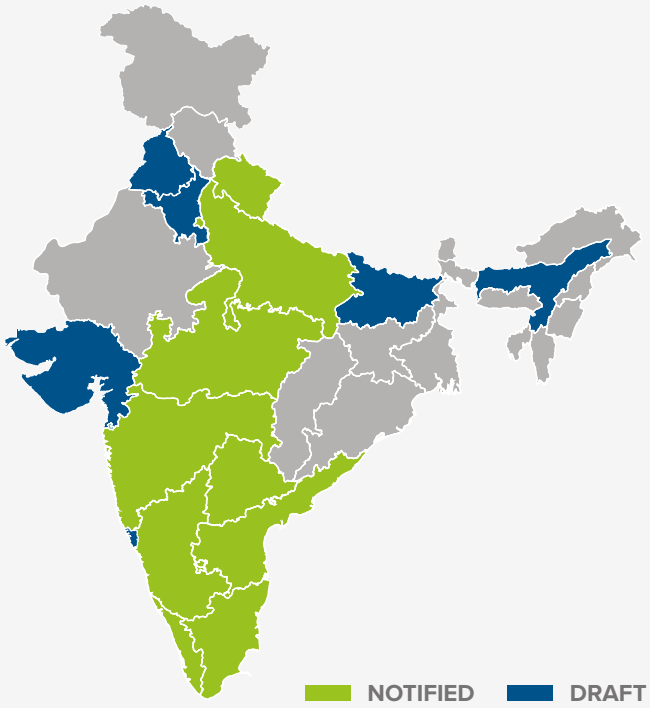
At the central level, multiple interventions are being implemented to support demand creation. For example, the Goods and Services Tax (GST) on EVs sold with batteries was reduced from 12 to 5 percent. The Ministry of Road Transport and Highways exempted EVs from permit requirements and recommended that states reduce or waive road taxes for EVs.[4] Additionally, the Ministry of Housing and Urban Affairs amended the Model Building Bye-Laws, 2016, to establish charging stations in private and commercial buildings.[5]

2. STATE EV POLICIES

At the subnational level, 10 states have notified EV policies that are being implemented, while six others are drafting their EV policies.

EXHIBIT 2: STATUS OF STATE EV POLICIES AS OF JANUARY 2021

S. NO.	STATE	DAY	MONTH	YEAR	TIME SINCE (MONTHS)
NOTIFIED					
1	KARNATAKA	25th	SEPTEMBER	2017	39
2	MAHARASHTRA	14th	FEBRUARY	2018	34
3	ANDHRA PRADESH	8th	JUNE	2018	31
4	KERALA	10th	MARCH	2019	21
5	UTTAR PRADESH	7th	AUGUST	2019	17
6	TAMIL NADU	16th	SEPTEMBER	2019	15
7	MADHYA PRADESH	1st	NOVEMBER	2019	14
8	UTTARAKHAND	2nd	DECEMBER	2019	13
9	TELANGANA	6th	AUGUST	2020	5
10	DELHI	7th	AUGUST	2020	5
DRAFT					
1	ASSAM	8th	SEPTEMBER	2018	28
2	BIHAR	14th	JUNE	2019	16
3	GUJARAT	23rd	SEPTEMBER	2019	15
4	PUNJAB	15th	NOVEMBER	2019	14
5	GOA	16th	MARCH	2020	10
6	HARYANA	11th	DECEMBER	2020	1



3. DOMESTIC MANUFACTURING

Under the FAME II guidelines, incentives are available only for EVs with a predefined level of localisation. The goal is to promote domestic component manufacturing. The industry shows promise, with OEMs introducing a range of new EV products over the past year. Several states, such as Karnataka and Maharashtra, have also made manufacturing a focal point of their state EV policies, by offering fiscal benefits to create EV clusters.

In addition, the National Mission on Transformative Mobility and Battery Storage was approved in March 2019. Its goal is to increase domestic battery manufacturing and accelerate the adoption of e-mobility. Its focus areas include creating roadmaps for Advanced Chemistry Cell (ACC) battery manufacturing, formulating phased manufacturing programmes (PMP) for batteries, developing Corporate Average Fuel Economy (CAFE) norms, and leveraging Make in India. The GoI cabinet recently approved the PLI scheme to encourage ACC manufacturing with an outlay of INR18,100 crore.

ECONOMICS OF ELECTRIFICATION

The economics of EVs are improving yearly, driven by a reduction in battery prices and improvements in vehicle efficiency. Many segments and use cases are already showing competitiveness with internal combustion engine (ICE) vehicles based on a total cost of ownership (TCO).

- **Electric two-wheelers:** Final-mile delivery is a promising use case, as significant fuel-cost reductions are possible. There exist both national (i.e., INR20,000 under FAME II) and state subsidies (e.g., INR5,000/kWh under the Delhi EV policy, plus a top-up of INR7,500/kWh for the first one lakh EVs registered in Delhi).

  However, even without incentives, at the same interest rate ICE vehicles (ICEVs) receive, electric two-wheelers for goods delivery could reach TCO parity (at about INR 2/km) with equivalent petrol models by the end of 2020.[6]

- **Electric three-wheelers:** In the ride-hailing use case, electric auto-rickshaws are close to cost parity based on TCO, especially in Tier-2 and Tier-3 cities, where shorter trip distances require smaller batteries (i.e., less than 3 kWh).[7] In the final-mile delivery use case, electric three-wheelers are already cheaper than their CNG counterparts on a TCO basis (at about INR2.5/km) in some geographies such as Delhi. This is primarily due to national and state incentives, including interest rate subvention.[8]

- **Electric four-wheelers:** It is generally not yet economical to electrify private cars. However, evidence from EV fleets, such as BluSmart, suggests that electric ride-hailing cars are already economical in cases where vehicle utilisation is between 150 and 220 km/day.[9]

- **Electric buses:** Analysis suggests that the TCO of an intra-city electric bus (e-bus) is lower than an equivalent diesel bus in a bus-to-bus comparison (at INR47/km for a 12-meter AC bus with a daily utilization of 200 km).[10] However, for fleet conversion, this may vary depending on local costs and service requirements. Studies have indicated that more than one e-bus may be required to replace one conventional bus due to range limitations of early generation electric buses. However, proper planning and charging strategies can reduce this replacement ratio.[11,12]

INVESTMENT OPPORTUNITIES

Significant venture capital has flown into the ecosystem. Indian EV start-ups have raised INR4,490 crore (USD601 million) between 2014 and 2019, highlighting the potential of EV business models.[13]

EXHIBIT 3: RECENT DEVELOPMENTS IN INDIA'S START-UP ELECTRIC MOBILITY ECOSYSTEM.[14,15,16,17]

RIDESHARE	Industry analysts expect the shared mobility market to experience rising demand. Ride-hailing and rental applications could see up to 50 and 100 percent year-on-year growth through 2025, respectively.
DELIVERIES	Electrification of freight use cases is on the rise. Flipkart became the first e-commerce marketplace to commit to 100 percent adoption of EVs by 2030, joining The Climate Group's EV100 coalition of companies.
COMMUTER SERVICES	The International Finance Corporation (IFC) invested INR60 crore (USD8 million) in Bengaluru-based Lithium Urban Technologies, an electric commuter services provider, in April 2018.
LAST-MILE CONNECTIVITY	Mitsui invested INR150 crore (USD20 million) in Delhi-based SmartE, an electric last-mile service provider, in July 2019.

BARRIERS TO EV ADOPTION

Despite improving economics and growth across the ecosystem, many well-documented barriers to EV adoption in India remain, including:

1. **Technology cost:** In a few segments, the high upfront cost of EVs is slowing adoption despite the potential for lower TCO. There is an ongoing need to further reduce the upfront cost and TCO in many use cases through various instruments.
2. **Policy implementation:** National-level policy can be complemented with added fiscal incentives at the state level. Non-fiscal incentives will also be important in developing a favourable operating environment and customer confidence for EVs.
3. **Manufacturing and supply:** Despite growing product diversity, there is still a need for greater customized product and model availability, and more fit-for-purpose models. Further, more domestic manufacturing of advanced batteries and cells, battery management systems, electric motors, motor controllers, and other components is needed. OEM capital has recently focused on the migration of ICEVs to Bharat Stage VI (BSVI) standards, while the industry is experiencing lower sales due to COVID-19. This is hampering supply-side investment in EVs.
4. **Infrastructure buildout:** The introduction of advanced batteries and longer-range vehicle modes can address customer concerns about range. Alongside these developments, electricity distribution companies (discoms), charging service providers, and other actors can focus on building robust charging infrastructure networks. Using smart technology that communicates with the electric grid will unlock additional value from demand-side management.
5. **Consumer behaviour:** Demand for more affordable EV products is expected, as consumers reduce spending in the short term due to COVID-19. This potential shift in consumer preferences may affect manufacturers' investment and production decisions.

EV FINANCE

In addition to these commonly discussed barriers, access to low-cost finance is still a formidable barrier that warrants multistakeholder attention and innovative solutions. EV sales are expected to slow in the short term due to: 1) the economic impact of COVID-19 and 2) the recent investment flow by OEMs towards BSVI standards (April 2020). Improving access to attractive financing products can be key to drive EV demand.[19]

High financing cost and uncertainty around long-term economics—including resale value—remain both real and perceived issues for FIs. There are risks associated with the nascency of the electric mobility ecosystem. They have given rise to problems such as high interest and insurance rates, low loan-to-value ratio, and limited financing options for retail customers. This may lead to unsecured borrowing from the unorganized sector at even higher rates.

Further, both the vehicle finance and EV sectors are diverse. Levels of TCO parity and incentive structures available for each segment, use case, and stakeholder are different. Private electric two-wheelers, for example, would have vastly different parameters to consider in financing compared to e-buses used for public transport. This creates the need for government, industry, and FIs to collaborate on a set of customised EV financing solutions. It also creates a role for OEM-owned financial companies to help define the market.

PURPOSE OF THIS REPORT

Mobilising Finance for EVs in India: A Toolkit of Solutions to Mitigate Risks and Address Market Barriers aims to serve the following purposes:

- **Landscape assessment:** Take stock of the structure, stakeholders, and practices in India's conventional vehicle finance ecosystem and its emerging EV finance ecosystem.
- **Barrier assessment:** Understand current barriers and risks associated with lending to EVs, and scaling up the size of the financing market and diversity of products for EVs.
- **Solution identification:** Create a toolkit of short-, medium-, and long-term solutions to help FIs, government, and other stakeholders enable low-cost EV financing.

INDIA'S VEHICLE FINANCE INDUSTRY

CONTEXT AND OVERVIEW

India's retail vehicle finance industry has evolved since the 1990s to be worth an estimated INR4.5 lakh crore (USD60 billion) today.[20,21,22] This is primarily a result of economic liberalisation and growth in the automotive market.

As of 2020, the flow of finance from the organised sector (i.e., banks and non-banking financial companies (NBFCs)) is about:

- 50 percent to four-wheeler passenger vehicles (PVs)
- 40 percent to commercial vehicles (CVs)
- 10 percent to tractors and two-wheelers

Financing penetration—i.e., the share of vehicles financed through loans by the organised sector—varies by segment and is expected to be:

- 35 to 50 percent for all two-wheelers
- 80 percent for all four-wheeler PVs
- 95 percent for new light-, medium-, and heavy-duty CVs

Financing penetration seems to be associated with economics and use cases of vehicles. Less expensive segments and use cases are seeing lower levels of financing and vice-versa. The unregulated autorickshaw segment is unique. Here, the penetration of financing by the organised sector is very low due to the high-risk nature of borrowers.

Preowned CVs are more affordable for driver-owners, who may also not be seen as bankable. This could be one of the reasons for lower penetration of financing. For all new CVs, penetration is high. Fleet operators' prefer to have loans linked to the vehicles instead of their balance sheets.

Loan tenures for different segments are generally similar (about three to four years, except for two-wheelers, which are shorter). Loan-to-value (LTV) ratios, i.e., the portion of asset value financed, vary—from 70 to 75 percent of the vehicle for two-wheelers to 80 to 90 percent for CVs. Interest rates are usually floating, rather than fixed, and vary by lender.

KEY STAKEHOLDERS

EXHIBIT 4: KEY STAKEHOLDERS IN INDIA'S VEHICLE FINANCE INDUSTRY

CATEGORY	STAKEHOLDER	DESCRIPTION	EXAMPLES
FINANCING			
BANKS	Public sector undertaking (PSU) banks	State-owned commercial FIs that provide longer tenure, lower interest loans	Bank of India, Canara Bank, State Bank of India (SBI)
	Private sector banks	Privately owned FIs that specialise in larger transactions for institutions, fleets, and vehicles in urban areas	Axis Bank, HDFC Bank, ICICI Bank, IndusInd Bank
NBFCs	Captive vehicle financiers	OEM-owned NBFCs that provide specialised and subvention-linked products to customers	Bajaj Finance, Mahindra & Mahindra Financial Services, Tata Motors Financial Services
	Non-captive vehicle financiers	Other privately owned NBFCs that provide smaller pools of finance at higher interest rates in non-metro areas	Cholamandalam Finance, IndoStar Capital, Manappuram Finance, Shriram Transport Finance
	Fintech companies	Privately owned companies that lend through technology and digital platforms	RevFin, Three Wheels United (TWU)
INSURANCE			
MOTOR INSURANCE	Insurance companies	State- or privately-owned insurance providers often allied with banks or non-captive financiers	Bharti AXA, HDFC Ergo, ICICI Lombard
	Insurance agents or brokers	Privately owned companies that aggregate and negotiate insurance offerings, often allied with captive financiers to provide specialised products at dealerships	Global-India Insurance Brokers, Hero Insurance Broking, Mahindra Insurance Brokers
OTHER DEBT/EQUITY CAPITAL			
LONG-TERM INVESTORS	Venture capital funds	Private investors that provide equity to mobility startups, early-stage ventures and fintech	Micelio Fund, Sequoia Capital
	National development banks	State-owned Indian FIs that provide equity and/or debt to mobility startups, large fleet owners, and businesses for sustainable economic development	Indian Renewable Energy Development Agency (IREDA), Small Industries Development Bank of India (SIDBI)
	Multilateral/ bilateral development banks	Publicly owned international FIs that provide equity and/or debt to banks, NBFCs, and businesses for transitioning fleets for sustainable economic development	Asian Development Bank (ADB), CDC Group, World Bank Group

BANKS AND NBFCs

Initially, NBFCs had the largest market share in the vehicle finance industry. Later, private and public banks and OEM-owned captive vehicle financiers emerged as key players. Recently established fintech companies have also found a niche in digital lending for vehicles.

Banks made up 56 percent of the market share in India in FY19, the rest being NBFCs. Both these categories specialise in lending to different customers.[23] Broadly, banks dominate the four-wheeler passenger vehicles market. Captive NBFCs are particularly active in lending for two-wheelers, while non-captive NBFCs are prominent in the commercial vehicle market.

MOTOR INSURANCE AND LONG-TERM INVESTORS

The vehicle ('motor') insurance industry is diverse and spurred by investment and support from banks, NBFCs, and OEMs. It comprises companies and brokers or agencies that act as aggregators and negotiators.

Long-term investors, such as development banks, facilitate infrastructure loans to governments, and business-level debt or equity for FIs and logistics companies. Venture capital spurs the mobility ecosystem through early-stage investment.

THE CURRENT LANDSCAPE OF EV FINANCE

VEHICLE FINANCING

Only recently have specialised EV loans been introduced. Most segments, other than e-rickshaws, lack specialised products.

E-RICKSHAW LOANS

With the rapid growth of the e-rickshaw market, FIs are offering dedicated, collateral-free loans:

- IndusInd Bank partnered with OEM Lohia Auto Industries (in March 2017). The bank offers retail vehicle finance for three-wheeler electric models across 11 Indian states. While interest rates are floating, loans are offered directly through the dealer, making the process hassle free.
- Ujjivan Small Finance Bank signed a memorandum of understanding (MoU) with OEM Green Shuttle Technology (in July 2019). It offers passenger and cargo three-wheeler loans at attractive interest rates.
- Bank of India and Punjab National Bank offer e-rickshaw financing with LTV ratios of up to 85 percent. The maximum tenure is 48 months.
- Micro Units Development and Refinance Agency (MUDRA) loans were designed to support microenterprises in India. MUDRA provides refinance support to banks, NBFCs and microfinance institutions in lending up to INR10 lakh (USD13,500). E-rickshaws are eligible for MUDRA loans.[24]

These recent initiatives require income tax returns and credit scores, which are often difficult for e-rickshaw drivers to provide. As a result, financing penetration remains low.

ELECTRIC FOUR-WHEELER LOANS

The economics of shared mobility services like ride hailing are compelling. Such services can benefit significantly from specialised financing solutions for electric cars.

SBI started the Green Car Loan, the only specialised product for electric cars, in April 2019. Highlights include:

- A discount of 20 basis points on existing car loan interest rates. As of September 23, 2020, SBI's mean interest rate for all cars was 9.52 percent, indicating that on average the SBI Green Loan would charge an interest rate closer to 9 percent.
- To reduce costs, the processing fees for the first six months of the scheme was waived.
- The maximum repayment period was increased to eight years.
- An LTV ratio as high as 90 percent is offered.

BUSINESS MODEL INNOVATION

Innovative business models and procurement schemes aim to make up for low financing penetration. Their focus is on reducing upfront costs and technological risk by leveraging leasing, battery separation, and economies of scale.

EXHIBIT 5: BENEFITS AND DRAWBACKS FOR BUSINESS MODELS USED FOR ELECTRIC VEHICLES

BUSINESS MODEL	FINANCING MECHANISM	DESCRIPTION	KEY BENEFITS	KEY DRAWBACKS	EXAMPLES	PRESENT IN INDIA (Y/N)
PURCHASE	Equity/personal funds	Fleet operators or owners buy vehicles through equity or personal funds.	• Provides greater control over assets • No dependency on other stakeholders	• High upfront cost for the owner	• Bangalore-based Lightning Logistics purchased its final-mile delivery fleet entirely through equity.	Y
	Debt/corporate loans	Fleet operators or owners buy vehicles through company-level debt or other loans.		• Reduces capacity to raise debt for operations or expansions	• In 2017, Energy Efficiency Services Ltd. (EESL) issued green bonds worth INR640 crore (USD100 million) to support its environmentally focused initiatives.[25]	Y
	Retail loans/ vehicle financing	Fleet operators or owners buy vehicles using specific vehicle loans.	• Loans are linked to vehicles rather than the balance sheet • Room to raise debt for other functions	• Subject to high interest • Low LTV ratios	• The SBI Green Car Loan programme offers financing for e-4Ws.[26]	Y
	Demand aggregation/ bulk procurement *(in between purchase and lease-all)*	A third party purchases vehicles in bulk, to leverage economies of scale. The vehicles are sold or subleased to fleet operators or drivers.	• Higher volume reduces transaction and unit costs • Diversified risk exposure is across the customer pool if the technology is underutilised	• Success is dependent on procurement volume • Requires interagency coordination	• EESL leased electric cars to ride-hailing company BluSmart. So far 300 EVs, procured in bulk from Mahindra & Mahindra and Tata Motors, have been leased.	Y
LEASE-ALL	Dry and end-to-end leases	Fleet operators or owners lease vehicles from OEMs. End-to-end contract options include repair and maintenance services.	• Spreads payments over time • Longer lease term payments comparable to ICE segments	• Require OEMs to develop financial and after-sale service capacities	• Areon Mobility is a logistics company leasing 30–40 e-2Ws to final-mile delivery companies. They aim to grow to hundreds of units. • EESL offers a dry lease model on electric sedans to State governments at INR22,500 a month for six years.[27]	Y
	Wet lease/ operating expense (OPEX)	The transit authority or fleet owner procures the EV from fleet operators and pays for service on a per-kilometre basis. The authority or owner keeps the fare revenue, handles scheduling, routing, service standards. The operator oversees operations and maintenance.	• The transit authority or owners assume revenue risk • Operators assume financial, technology, and operational risks	• Relies on institutional capacity and interagency coordination • Requires greater technical assistance	• The Department of Heavy Industry (DHI) and NITI Aayog have recommended the wet-lease model to India's State Transport Undertakings (STUs). They propose deploying 5,595 e-buses under FAME II via a Gross Cost Contract (GCC).	Y

(CONTINUED)

BUSINESS MODEL	FINANCING MECHANISM	DESCRIPTION	KEY BENEFITS	KEY DRAWBACKS	EXAMPLES	PRESENT IN INDIA (Y/N)
BATTERY SEPARATION	Battery swapping	Fleet operators give access to (owned, leased, or shared) battery swapping stations. Affiliated drivers can purchase vehicles without batteries.	• Separating the battery cost to make EVs less capital intensive for the vehicle owners • Better battery management by involving a battery provider • Improves the potential to monetise grid services such as demand response	• High upfront cost for the infrastructure provider	• Ola Electric has set up battery-swapping stations for two- and three-wheelers in Delhi in partnership with discoms BSES Yamuna and BSES Rajdhani.	Y
	Battery leasing	A utility, OEM, or third-party buys batteries and leases them to a fleet owner or operator. The vehicle is financed separately.		• Limited OEM battery offerings • Nascent legislative environment • Policies are still being formulated	• Proterra, a US e-bus manufacturer, offers a battery-leasing programme. A city procures the bus without the battery and leases the battery from Proterra through fixed-service payments. • Bengaluru-based, Autovert is an IoT-enabled leasing firm for personal mobility e-2Ws. In addition to full vehicle subscriptions, it is setting up a battery subscription facility.	Y (early stages)
	Pay-as-you-save® (PAYS®)[28]	Utilities purchase batteries and provide charging infrastructure. Bus operators repay them over time at a PAYS tariff.	• Procure the battery at minimum cost • Leveraging the utility's balance sheet, rate-basing, and cost-recovery mechanisms • Reduce cost for bus operators	• Heavily dependent on the financial health of the utility • Relies on utility's ability to pass on increased rates to offset battery costs	• Clean Energy Works has designed PAYS schemes for e-buses in the US and South America. • India can achieve the electrification of public transport with this model. • PAYS for segments such as two-wheelers can be piloted through private discoms.	N (however, it is common in efficiency financing)

GOVERNMENT INTERVENTIONS

To lower the TCO of EVs, most government initiatives have provided capital expenditure (CAPEX) and annual operating expenditure (OPEX) incentives. Prominent interventions aimed specifically at financing include:

- DHI has recommended an OPEX-based model by NITI Aayog to STUs. The model will deploy a total of 5595 e-buses under FAME II.
- The Delhi EV Policy provides an interest rate subvention of 5 percent on loans for buying e-autos and e-carriers. Delhi Finance Corporation (DFC) and its empanelled Scheduled Banks and NBFCs are developing a scheme on interest rate subvention. The Policy aims to bring more traction to this price-sensitive and financially challenging segment.
- The Kerala Finance Corporation (KFC) has created a programme to provide low-cost loans for EVs in the state.[29] Buyers pay a 20 percent down payment and avail a 3 percent point interest rate subsidy, resulting in an interest rate of 7 percent. Loans are capped at INR50 lakh and have a tenure of up to 5 years. All registered vehicle forms and both private and commercial use-cases are eligible. A credit score of 680 or higher is required, with salary slips to verify that total deductions from their salary (including the equated monthly installment of the loan) do not exceed 80 percent of their gross salary.

BARRIERS TO SCALING UP FINANCE

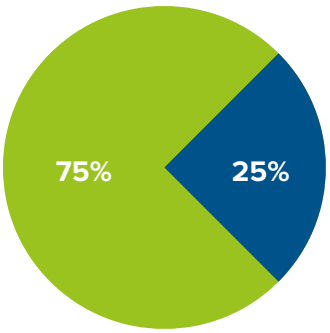
Innovations are transforming the amount and scale of financing needed, reducing costs and risks associated with EVs. However, the following examples illustrate that regardless of business model and stakeholders involved, finance remains a bottleneck:

- **E-2WS FOR FINAL-MILE DELIVERY**
  Demonstrating business model viability is a challenge for fleet operators. Many find it difficult to access equity or debt to purchase vehicles that they lease to drivers for deliveries. High daily utilisation and robust charging networks are needed for economical electrification.

- **E-3WS FOR INTERMEDIATE PUBLIC TRANSPORT**
  Due to higher capital costs, drivers require financing to purchase e-rickshaws or e-autos. However, they lack a credit history to prove their loan repayment ability. Unavailability of collateral further limits their financing options.

- **ELECTRIC BUSES FOR CITY SERVICES VIA GCC**
  Debt finance requirements and fees (see Exhibit 6) make it difficult for operators to purchase e-bus fleets. Typically operators are required to finance about 25 percent of the total capital cost as equity, representing a significant down payment for a fleet of e-buses.[30]

EXHIBIT 6: BARRIERS TO FINANCING ELECTRIC BUSES FOR CITY SERVICES VIA GCC



EQUITY

DEBT FINANCE
- Requires bank guarantee
- Requires collateral
- 0.5–1.5 percent of amount as fee

KEY CHALLENGES

HIGH INTEREST RATES

Interest rates for EV loans tend to be higher than ICE vehicles. For a privately operated electric car in Delhi, banks charge a marginally higher interest rate than a conventional vehicle.[31] However, a commercially operated electric car could be charged up to 14 to 15 percent, compared to 12 percent for a diesel car.[32]

The difference is more significant for e-2Ws, with interest rates as high as 20 percent or more.[33] This increases the equated monthly instalment (EMI) paid by vehicle owners, adding to ownership costs.

LOW LOAN-TO-VALUE RATIOS

Banks offer loans for EVs with only partial financing and a low LTV ratio to mitigate risk.[34] The low LTV ratio ensures that the financier can recover substantial costs in case of borrower default despite a potentially low resale value.

Small operators or drivers may not possess the equity to accommodate the low LTV ratio. They will be forced to seek unsecured high-interest supplementary loans from the unorganised sector. COVID-associated fear of borrower default has further lowered LTV ratios, worsening the problem.

LIMITED FINANCING OPTIONS

Most FIs in India do not offer specialised products for EVs, except for the SBI Green Car Loan scheme. In Norway, China, the UK, Australia, and other countries, most leading banks offer such products, contributing to high EV adoption rates. Operators in India are forced to choose loans with high interest rates, low LTV ratios, and shorter repayment periods.

Banks and NBFCs need collateral for EV loans in addition to the vehicle, in cases where the credit history of the borrower is unavailable or unreliable. This increases the challenges faced by aspiring EV operators and owners.

HIGH INSURANCE COSTS

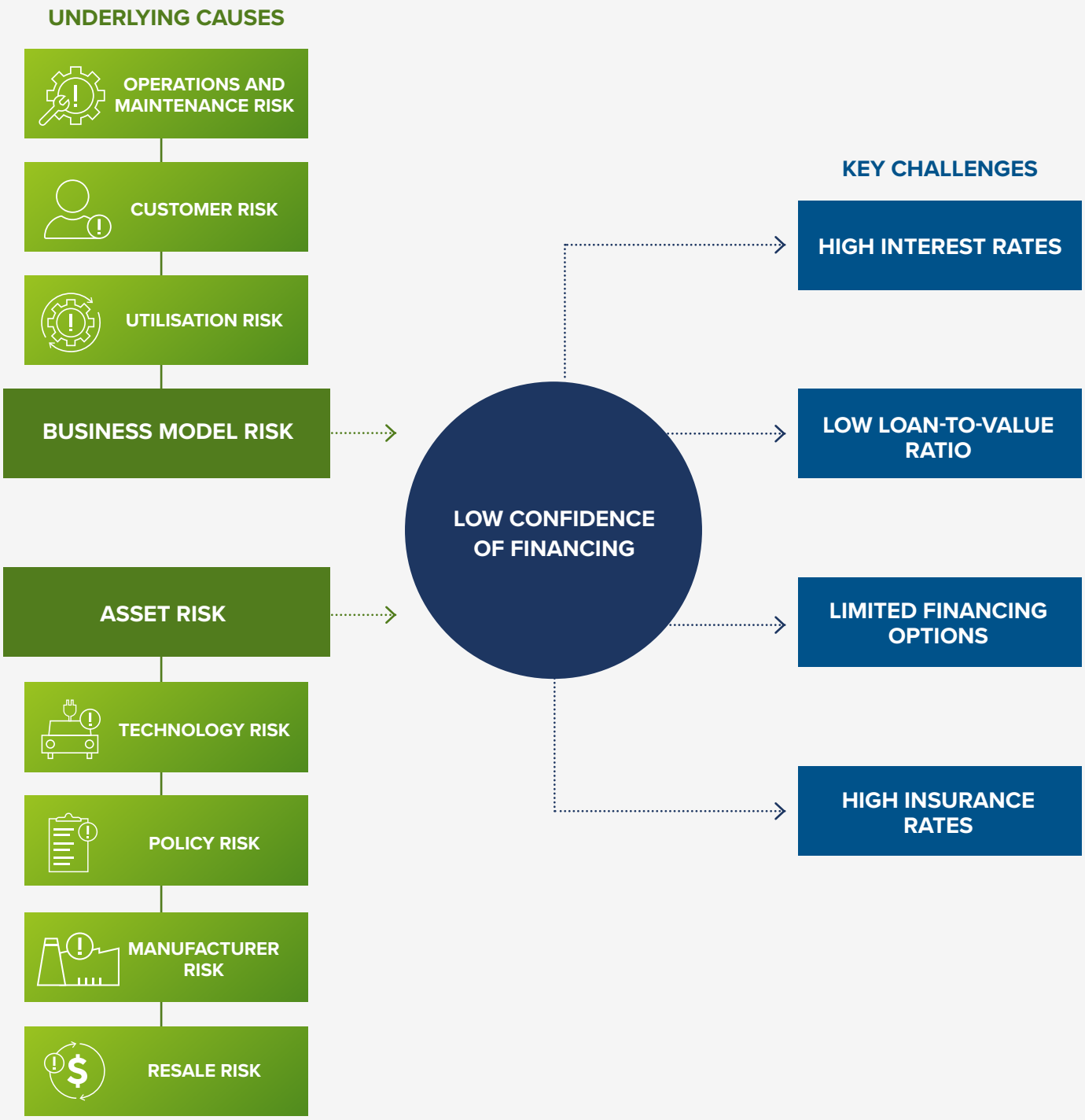
EV owners also pay higher insurance than conventional models. Since a vehicle's insurance cost is based on its CAPEX, the higher the upfront cost, the higher the insurance premiums. For example, the cost of insurance for a privately-owned, commercially registered, self-driven car in Delhi is INR0.29/km for an EV. However, for an equivalent diesel ICE vehicle, it is INR0.18/km.[35]

In some cases, insurance companies may perceive higher risks of technology failure and high costs of repair. As a result, they may ascribe higher rates due to a lack of historical performance data on EV products and business models.

UNDERLYING CAUSES

The underlying factors to the above barriers can be categorised as asset risk and business model risk (Exhibit 7). Asset risk is directly associated with the vehicle being financed. Business model risk relates to the bankability of the borrower's credit profile, expected utilisation, and operational patterns.

EXHIBIT 7: KEY CHALLENGES AND UNDERLYING CAUSES IN EV FINANCE



ASSET RISK

1. TECHNOLOGY RISK

FIs are risk averse due to the lack of reliable data on EV performance—in terms of range, asset life, maintenance requirements, load capacity, aand more—especially in the Indian context.

Insurers are reluctant to insure what may be considered unproven vehicles and components due to unknown risks associated with short- and long-term use. The lack of guarantees or warranties from manufacturers exacerbates these issues.

In the past five years, battery technology has advanced significantly, and EV technology continues to improve. Some FIs are concerned that the assets they are financing today could become obsolete in the future, similar to smartphone technology.

2. POLICY RISK

Boosting FI confidence will increase lending and other forms of financing to the EV sector. FIs are keen to see durable and effective national- and state-level policies. Clarity and certainty around policies that support vehicle segments through TCO parity will help. Lack of awareness on the details of national- and state-level policies, and challenges accessing incentives result in increased risk perception around EV financing.

The geopolitical risk to global EV supply chains could also contribute, especially in a post-COVID economy. This may trigger a 'wait and watch' approach rather than the proactive financing and investment needed.

3. MANUFACTURER RISK

While the EV market is growing, only a few EV OEMs are established and proven. Most OEMs lack historical data on product performance and service. Additionally, FIs may not have onboarded newer OEMs on formal lending procedures.

OEMs may be selling EVs at low or negative margins, due to the high capital cost of EVs, creating a risk associated with their balance sheets.[36] Cumulatively, this presents FIs with the risk of lending for an unfamiliar, untrusted asset.

4. RESALE RISK

EVs have a reduced resale value due to the nascent ecosystem and a lack of a secondary market. In some segments (e.g., e-rickshaws), although a secondary market exists, it is unstructured, and the residual value of vehicles is still unproven. Financiers are at risk if borrowers default, as the repossessed vehicle would be collateral for resale. This directly contributes to higher interest rates and low LTVs.

Other risks associated with EVs—such as major policy changes or poor technological performance—also contribute to FIs fearing even lower resale values.

BUSINESS MODEL RISK

UTILISATION RISK

EVs have a high capital cost with low operating expenses. This is different from ICE vehicles, where variable costs are high. As a result, EVs are most viable at high utilisation levels. For commercial operators, the bankability of an EV is dependent on the FI's confidence in projected cash flows. This requires the establishment of new business models in India.

For example, public charging infrastructure is still being built in most cities. For fleet operators, utilisation depends on drivers being able to use these charging stations. Charging at home is not always an option for drivers, given grid reliability and parking challenges. Such uncertainty and risk can lower FI confidence in financing fleets for this use case.

CUSTOMER RISK

Individual drivers need to opt for formal financing due to the high upfront cost of EVs. Having previously never borrowed from the organised sector, they lack credit history that guarantees their ability to pay back loans. FI criteria, such as personal and family history, place of residence, or education level may not be inclusive to first-time borrowers, increasing the risk they represent.

OPERATIONS AND MAINTENANCE RISK

Operational aspects of EV use—such as battery replacement, voltage fluctuations, or technical requirements of charging infrastructure—are yet to be understood in India. The vehicle's lifecycle may be shortened by a lack of awareness around maintenance requirements and patterns, reducing bankability. Improper maintenance due to the absence of trained mechanics is also likely to reduce an EV's resale value.

ECOSYSTEM CHALLENGES

OPERATIONAL AND LOGISTICS COSTS

The vehicle financing industry is composed of a vast number of small FIs run mostly through local branches across India. They rely on manual labour to collect documents and award loans. Many FIs, especially NBFCs, have high OPEX, on account of door-step collections and sales force payouts.

Changing products and procedures will need to penetrate to all levels and all geographies within India. However, reorientating and retraining existing employees in EV financing will present FIs with resource and time constraints.

NBFC LIQUIDITY ISSUES

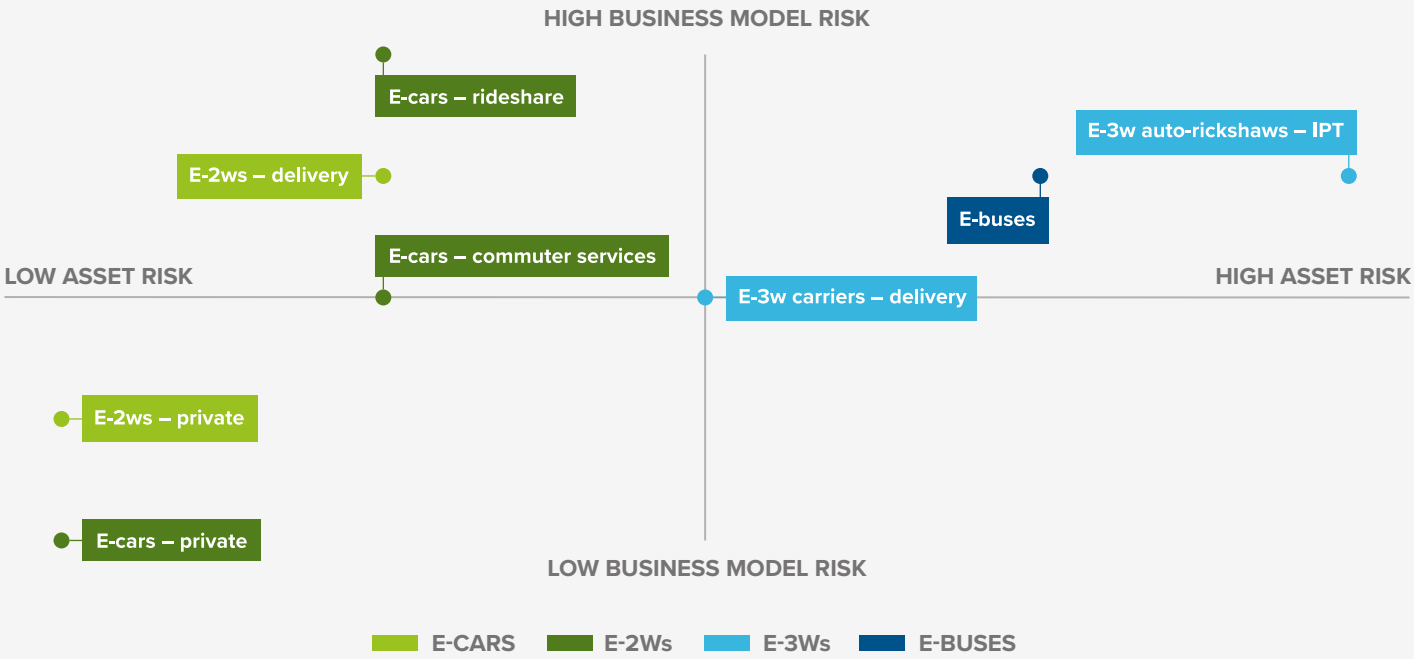
The NBFC sector has been facing a liquidity crunch since late 2018 following the bankruptcy of Infrastructure Leasing & Financial Services (IL&FS). This has tightened funding for vehicle financiers, prompting a reduction in lending and increased risk aversion in the sector.[37]

New fintech-based EV lending models such as Delhi-based RevFin and Bengaluru-based Three Wheels United (TWU) enable access for high-risk customers. Eventually, they may need access to low-cost finance from larger banks, lest they fall prey to the same problems faced by NBFCs today.

SEGMENT AND USE CASE ASSESSMENT

EV segments and use cases present different considerations. Additionally, varying degrees of asset and business model risk are associated with them (see Exhibit 8).

EXHIBIT 8: ANALYSIS OF BUSINESS MODEL RISK VS. ASSET RISK ACROSS SEGMENTS AND USE CASES



SEGMENT OR USE CASE	ASSET RISK	BUSINESS MODEL RISK
E-2Ws – private E-2Ws – delivery	E-2Ws are a simpler and more mature technology with compelling economics. They garner strong policy support and theoretically have a higher-than-average resale value due to a larger customer pool. E-2Ws have low asset risk overall. However, delivery operators have expressed concerns over reliability, resulting in higher asset risk.	Private e-2W customers are likely riskier to lend to than private e-4Ws customers. E-2W and e-3W delivery drivers with assured utilisation contracts contribute to lower business model risk.
E-3W auto-rickshaws – intermediate public transport (IPT) E-3W carriers – delivery	IPT e-3Ws may have higher technology and manufacturer risk compared to other categories, including e-3Ws for delivery. Lack of reliable performance data and technology nascency are contributing factors.	Lack of guaranteed demand and utilisation may result in high business model risk. IPT drivers are also comparatively more disaggregated, increasing the likelihood of default (nearly 30 percent). E-3Ws lack repair and maintenance networks, except in North India (Bihar, Delhi, Uttar Pradesh), adding to the high business model risk.
E-cars – rideshare E-cars – commuter services E-cars – private	E-4Ws have the lowest asset risk due to large established OEMs. However, e-4Ws used for ridesharing and commuter services have a higher asset risk. They are utilised more and therefore have lower resale value.	E-4W commuter services are likely to have a lower business model risk. Optimised routes and the ability to meet minimum utilisation help achieve TCO parity. For e-4W rideshare, the economics depends on hitting 200-plus km/day, which might not be feasible.[38] This increases the risk around utilisation and profitability.
E-buses	E-buses are likely to have higher asset risk brought on by higher cost and uncertain resale value.	E-buses benefit from a minimum guaranteed run. However, customer risk is likely to be higher because of poor credit and repayment histories.

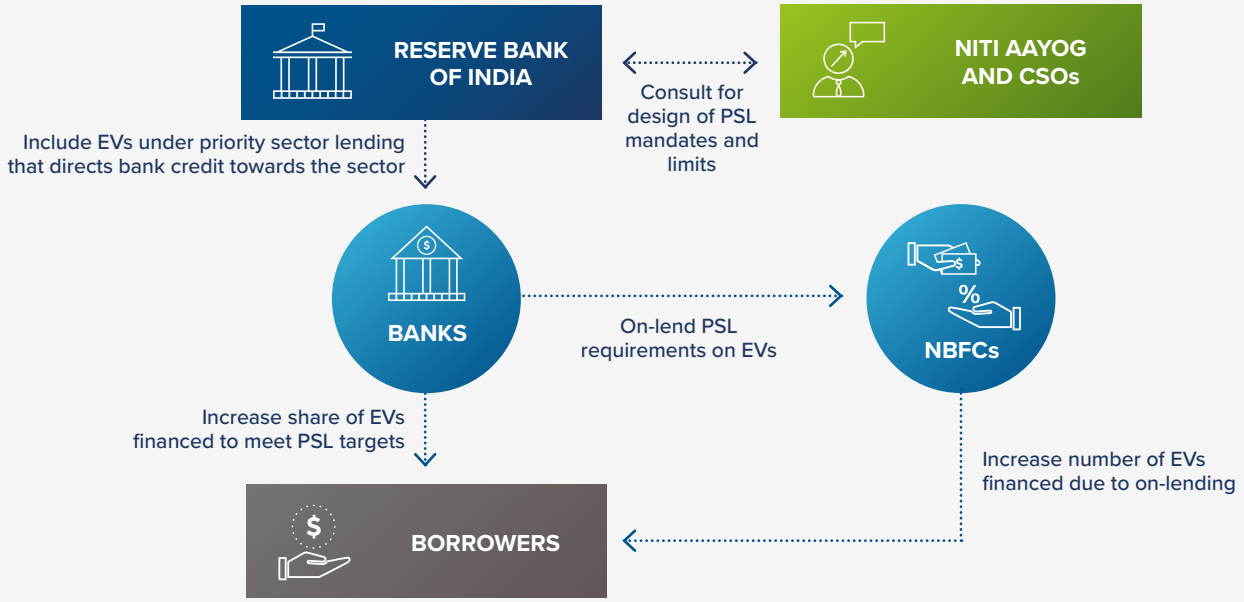
TOOLKIT OF SOLUTIONS TO MOBILISE FINANCE

TARGETED INSTRUMENTS

End-user financing for EVs can be mobilised through financial instruments that directly address challenges and reduce risks in the short, medium, or long term.

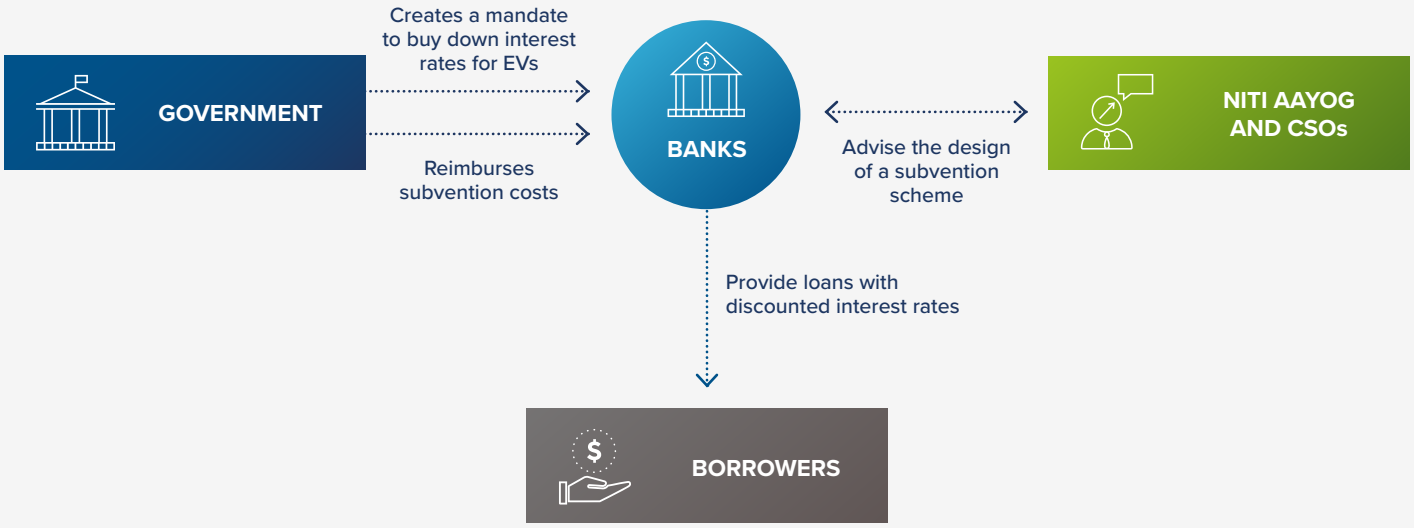
INSTRUMENT	CHALLENGES AND RISKS ADDRESSED	KEY STAKEHOLDERS	OUTCOME
SHORT TERM			
Priority sector lending	Limited financing options	Central government, FIs	Increased access to capital
Interest rate subvention	High interest rates	Central and State governments, FIs	Lowered cost of capital
MEDIUM TERM			
Product warranties and guarantees	Technology risk, manufacturer risk	OEMs, FIs	Lowered cost of capital
RISK-SHARING MECHANISMS			
Government and multilateral-led	Technology risk, manufacturer risk, utilisation risk, resale risk	Central and State governments; FIs; national, bilateral and multilateral development banks	Lowered cost of capital and increased access to capital
Fleet operator-led	Technology risk, customer risk, utilisation risk	Fleet operators, FIs	Increased access to capital
LONG TERM			
Secondary market development	Resale risk, policy risk	Central and State governments, OEMs, FIs	Lowered cost of capital

SHORT TERM
PRIORITY SECTOR LENDING



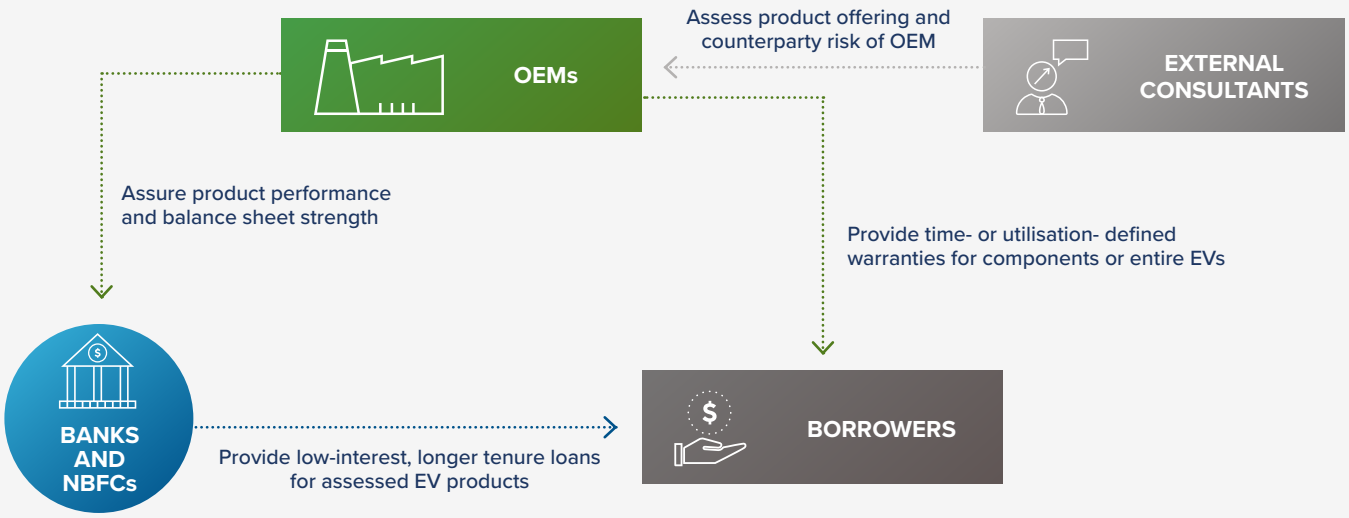
SOLUTION 1: PRIORITY SECTOR LENDING	
OVERVIEW	• The Reserve Bank of India's (RBI) Priority Sector Lending (PSL) requires that banks deploy 40 percent of net credit in sectors that align with national priorities and inclusive development. • PSL certificates are issued when banks write loans to priority sectors. Banks with surplus loans to priority sectors (i.e., above 40 percent) can sell PSL certificates to banks with a deficit of the same.
BENEFITS	• Banks would be incentivised to add EV financing to their PSL portfolios and help develop a long-term funding source for the sector. • PSL certificates will also reduce the cost of capital for early movers such as fintech companies and catalyse non-captive vehicle financiers.
STATUS	• Since 2015, the priority sector includes renewable energy based on recommendations from the Internal Working Group. Bank loans for renewable energy (up to INR30 crore) are eligible for PSL classification. The limit for individual households is INR10 lakh.[39] • Led by SBI, PSU banks in 2019 requested PSL recognition for retail lending to EVs in 2019. FICCI and NITI Aayog have also advocated for the same.[40,41]
KEY CONSIDERATIONS AND NEXT STEPS	• PSL inclusion needs to be initiated simultaneously with initiatives that focus on reducing risks associated with EVs—such as product warranties, risk-sharing mechanisms, and secondary market development. Together, they will increase the banks' confidence in offering attractive interest rates. • The benefits of the intervention can be maximised by creating an EV-specific PSL target. As with the renewable energy PSL guidelines, internal lending limits for individual owners and fleets could be introduced. These could depend on the economic life of the vehicle.

INTEREST RATE SUBVENTION



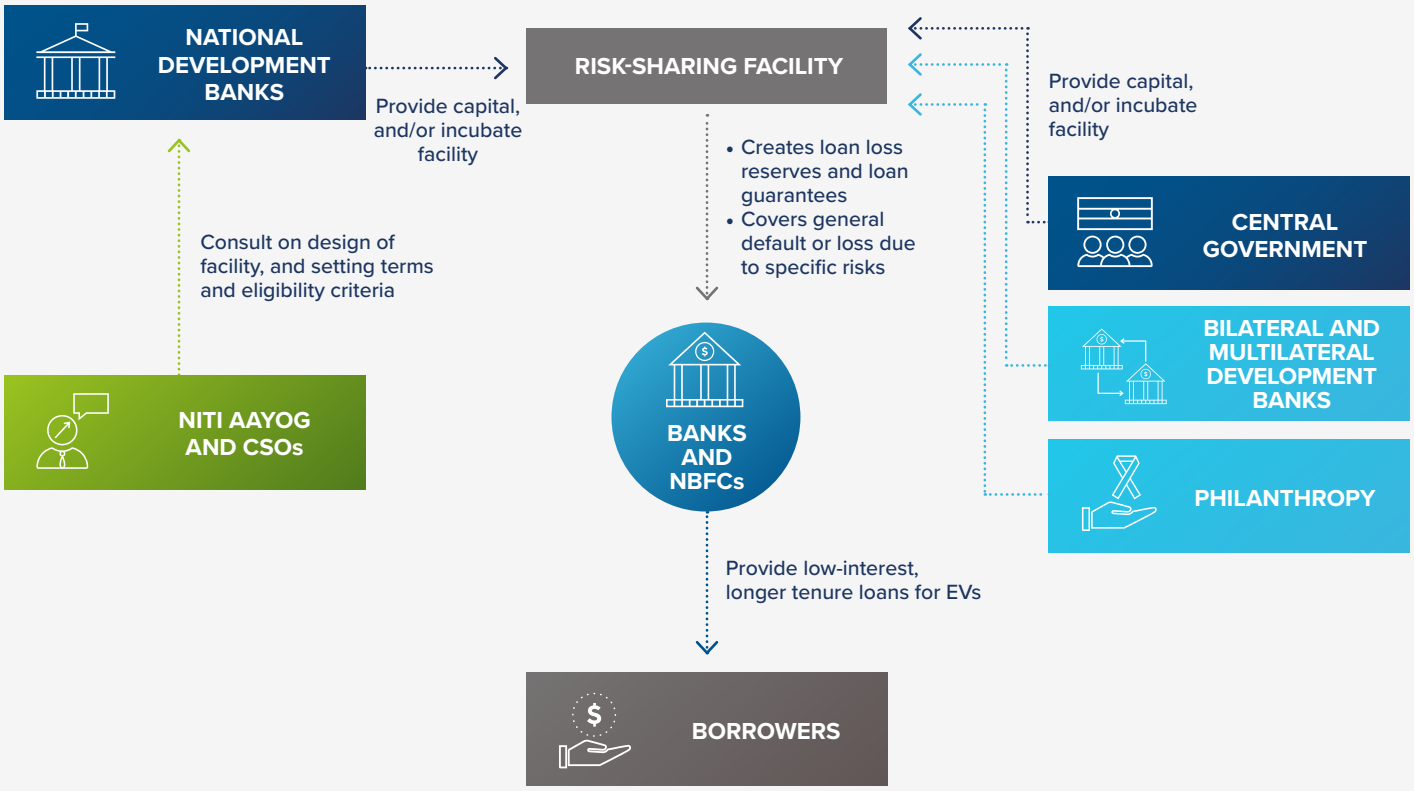
SOLUTION 2: INTEREST RATE SUBVENTION	
OVERVIEW	• Interest rate subventions or buydowns improve the affordability of loans. The government bears the balance interest rate through associated banks. • Subvention schemes function as subsidies on commercially offered interest rates. By discounting tens of basis points, they deliver significant savings on compound interest over the loan's tenure. • A popular intervention at the national level, subvention has already been implemented in the agriculture, education, handlooms, and housing sectors. At the state level, interest rate subvention is a part of the Delhi EV Policy.
BENEFITS	• Subvention schemes effectively function as subsidies on commercially offered interest rates.
STATUS	• The Delhi EV Policy's interest rate subvention scheme is in its early stages. Implemented through the DFC and other empanelled banks, the scheme buys down up to 5 percent of the interest rate on e-autos and e-carriers.
KEY CONSIDERATIONS AND NEXT STEPS	• States implementing or developing EV policies should consider interest rate subvention. • To achieve long-term impact on the sector, states can pair subvention with supporting instruments. For example, pairing it with secondary market development will help improve the confidence of FIs and reduce perceived risks.

MEDIUM TERM
PRODUCT GUARANTEES AND WARRANTIES



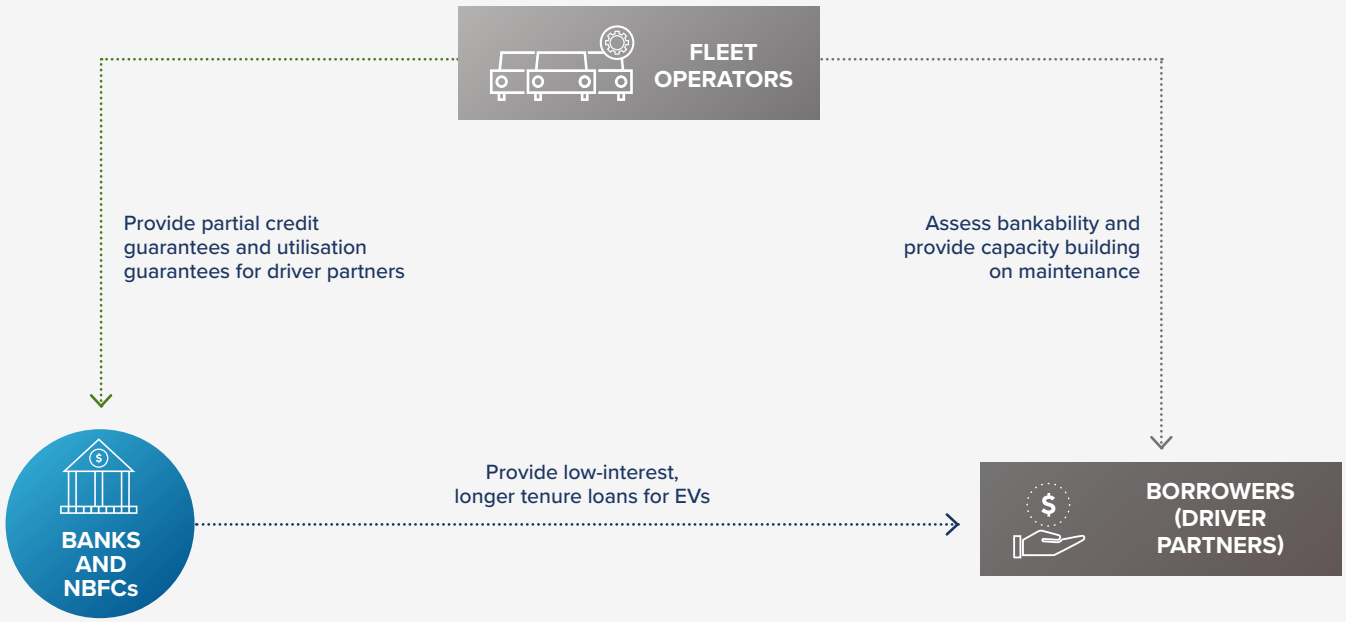
SOLUTION 3: PRODUCT GUARANTEES AND WARRANTIES	
OVERVIEW	• Product guarantees create partnerships between OEMs and FIs. OEMs assure the performance of their vehicles, while FIs create dedicated financing lines for these products. • OEMs offer product warranties to buyers. They assure the vehicle's quality, covering the costs of repairs and replacements of specific parts for a predetermined period or utilisation.
BENEFITS	• Guarantees leverage relationships between OEMs and FIs, and an OEM's balance sheet. This helps reduce technology and manufacturer risk associated with lending to EVs. • Warranties similarly enable attribution of possible product failure to the OEM rather than the borrower. They also reduce OPEX of EV owners, by covering the cost of repair and/or replacement.
STATUS	• Many e-rickshaw models have established guarantees, such as between Lohia Auto Industries (an OEM) and IndusInd Bank. • Electric cars that offer warranties include Hyundai Kona (five years, unlimited kilometres), and Tata Nexon EV (eight years or 1.6 lakh kilometres, whichever is earlier).
KEY CONSIDERATIONS AND NEXT STEPS	• The industry and FIs can consult each other on designing minimum product guarantees and warranties for various EV segments. Such minimums would increase buyer and financier confidence.

RISK-SHARING MECHANISMS (GOVERNMENT AND MULTILATERAL-LED)



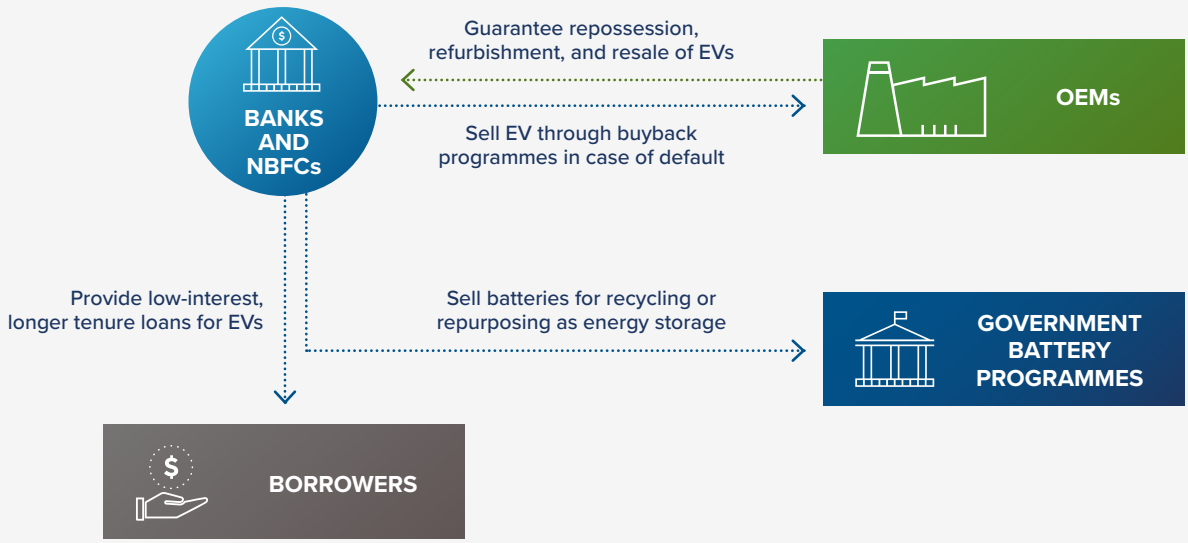
SOLUTION 4: RISK-SHARING MECHANISMS (GOVERNMENT AND MULTILATERAL-LED)	
OVERVIEW	• Risk-sharing mechanisms help expand financing by creating guarantees or facilities that partly or entirely cover loan repayment risk. The loss covered could be from general default, regardless of the cause, or due to specific risks.
BENEFITS	• The model distributes risk associated with an asset class in the short term. FIs get an opportunity to build trust in technology, manufacturers, and business models. Depending on the design of the risk-sharing facility, the model can also mitigate customer risk.
STATUS	• Andhra Pradesh's Partial Risk Guarantee Funding for Energy Efficiency scheme will help FIs (eight banks and three NBFCs) finance energy efficiency in sectors such as industries, buildings, and agriculture.[42] • The Indian Renewable Energy Development Agency (IREDA) is setting up a 'green window'. Through loan-loss reserves and loan guarantees, they seek to improve the risk-return profile of clean energy projects, including EVs.[43]
KEY CONSIDERATIONS AND NEXT STEPS	• National and multilateral development banks, and CSOs can design risk-sharing mechanisms for consideration, at the behest of GoI.

RISK-SHARING MECHANISMS (FLEET OPERATOR-LED)



SOLUTION 5: RISK-SHARING MECHANISMS (FLEET OPERATOR-LED)	
OVERVIEW	• Fleet operators (and asset-light final-mile delivery companies) can share default risk with FIs by providing partial credit guarantees for full-time driver partners. They can also offer utilisation guarantees to driver partners.
BENEFITS	• Fleet operators who understand technology and utilisation are better positioned to assess the bankability of driver partners. Additionally, fleet operator-led risk-sharing leverages the relationship between drivers and fleet operators, and the fleet operators' balance sheet to reduce customer risk proactively. • Assured vehicle use, through utilisation guarantees, will help achieve TCO parity, and further reduce risk.
STATUS	• The GCC model—developed by NITI Aayog and recommended by DHI for e-bus procurement under FAME II—has a provision in the contract known as 'minimum guaranteed run'. The provision provides operators of an e-bus service with a utilisation guarantee for a predetermined number of kilometres per day, per route, to help overcome utilisation risk.
KEY CONSIDERATIONS AND NEXT STEPS	• The employment duration of drivers should be considered when guaranteeing their EV loans.

LONG TERM
SECONDARY MARKET DEVELOPMENT



SOLUTION 6: SECONDARY MARKET DEVELOPMENT	
OVERVIEW	• EV resale value can be improved by developing and formalising a secondary market. OEMs can initiate buyback programmes, guaranteeing repossession, refurbishment, and eventual resale of vehicles. Smartphone buybacks are popular in India. Manufacturers purchase old phones at predetermined rates in exchange for new phones. Replicating this model for EV components holds merit. • Batteries are the most capital intensive component of an EV. Repurposing programmes can help develop a secondary market for batteries. They can be used for energy storage in rooftop solar or other similar renewable energy projects.
BENEFITS	• Secondary market development will assure FIs of the salvage value of EVs and help remove resale risk in case of borrower default. A separate secondary market for repurposing batteries can be created, opening up opportunities in processing and urban mining. • Prospective owners who cannot finance a new EV will benefit from the availability of a secondary market.
STATUS	• OEM Inverted Energy's buyback plan provides INR10,000 in exchange for batteries at the end of their warranty period.[44]
KEY CONSIDERATIONS AND NEXT STEPS	• Buyback programmes would require OEMs to develop after-sales and financial capacities. However, tie-ups with FIs could help overcome this hurdle. Collaborations throughout the value chain would be crucial to realising the potential of a secondary market for EVs. • OEMs can join hands to operate a branded and guaranteed second-hand EV market.

EXHIBIT 9: OTHER INTERNATIONAL CASE STUDIES ON EV FINANCE

Finance is gaining recognition as an important lever for the global EV transition. Several countries have leveraged instruments like the ones identified to support lower-cost financing and greater access to finance for EVs.

RISK-SHARING MECHANISMS

Australia's green bank, Clean Energy Finance Corporation, has established an Asset Finance program. They partner with FIs in the country to provide low-cost finance to small-scale assets, including low-emission vehicles. This has helped several banks distribute risk inherent to EVs and set up green loan schemes.

INTEREST RATE-FREE LOANS

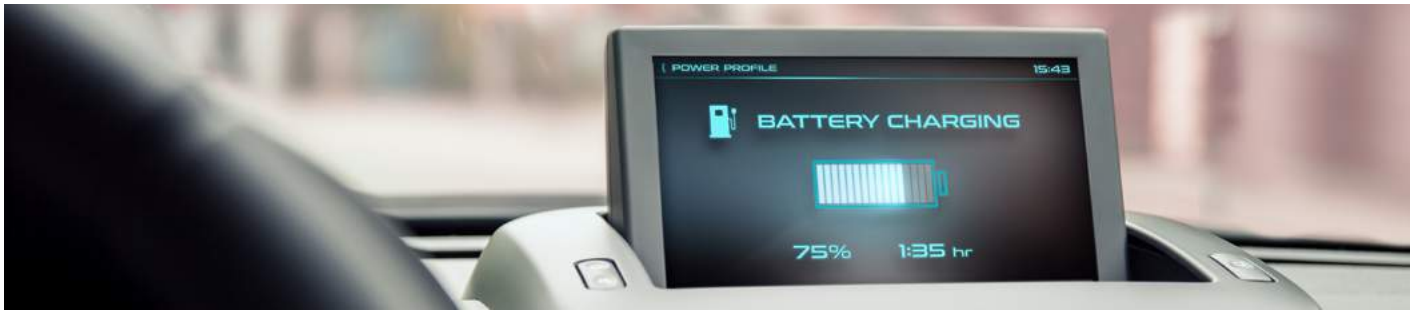
Transport Scotland, an agency of the Scottish Government, funds a facility offering interest-free loans of up to GBP28,000 for an electric car and up to GBP10,000 for an electric motorcycle or scooter. The loan has a repayment period of up to six years. Used electric vehicles are also eligible, with lower caps on loan amounts.

USE OF GREEN BONDS

Global captive vehicle finance companies Toyota Financial Services (USA) and Hyundai Capital Services (Korea) have raised green bonds using the green asset-backed security (ABS) model for EVs. These are being used to provide discounted debt financing to mobility service providers.

STATE EV AUTHORITIES

Subnational governments can establish state EV authorities to coordinate funding and financing programs. California State Bill 633 established a state EV authority responsible for developing incentives, rebates, tax credits, loan guarantees, seed funds, and matching grants to start early-stage markets. Additionally, the authority was required to lower the cost of capital and unlock private capital.



ADDITIONAL SOLUTIONS: ECOSYSTEM ENABLERS

In addition to reducing risks, alleviating operational hurdles and signalling market commitment to electric mobility could also help FIs build confidence in the EV ecosystem.

DIGITAL LENDING

Digital lending occurs when loans are sourced, underwritten, and sanctioned digitally. Technology and data analytics enhances the efficiency and efficacy of the lending process. It will provide unbiased decision-making and help overcome operational and logistical challenges associated with conventional vehicle lending in India.

In 2019, digitally executed loans accounted for 5.7 percent of all loans. Of all digitally executed loans, only 5 percent were for vehicles.[45] Digital lending is forecasted to increase to 19 percent of all bank loans and 10 percent of NBFC loans by 2024. FIs show a willingness to scale digital lending, by either developing their own capacities or through collaborations.

Digital lending has already shown promise in supporting EV deployment in India. Three Wheels United (TWU), founded in 2014, finances electric three-wheelers in Karnataka and Tamil Nadu. TWU leverages technology and partnerships with drivers, OEMs and final-mile delivery companies. They club loan collection, asset management, income generation and behavioural data.

Fintech company RevFin, incorporated in 2018 as an NBFC, finances and insures e-2Ws and e-3Ws for individual customers. They use technology to assess a borrower's bankability and make the repayment process simpler through customised tenures and the elimination of intermediaries.

Digital lending can streamline processes and reduce dependency on field personnel trainings on EV technology and policy. This can reduce costs and make EV finance accessible across geographies.

BUSINESS MODEL INNOVATION

Commercialising innovative business models at scale, through funding, experimentation, and commitment can build financing and adoption trust required for improving the penetration of EVs. For example, normalising leasing and rental models can take electric mobility mainstream and build confidence in the ecosystem.

Pilot projects can provide the proof points required to iterate electrification and charging infrastructure business models in India. Patient capital towards mobility-as-a-service and indigenous manufacturing are essential for this transition. Venture capital funding can catalyse the investment potential in electric mobility, and provide early-stage support to deploy technology and services faster.

FLEET AND AGGREGATOR ELECTRIFICATION TARGETS

Electrification of fleets is spurring EV uptake today. EV demand at scale is being built because of high utilisation of final-mile delivery and ride-hailing services, and defined corporate transport routes. They act as a market signal for new technology, improved financing, and supportive policy.

The Climate Group's EV100 coalition is an example at the forefront of fleet electrification. Together, EV100 members have committed to deploying over 20 lakh vehicles globally by 2030. They will also install charging infrastructure at more than 2,000 workplace and customer parking sites. Eight of EV100's 88 member companies are Indian.[46] By ambitiously setting out future EV purchasing requirements, such initiatives can drive mass EV roll-out.

OPEN DATA REPOSITORY FOR EVS

Robust data is a critical prerequisite to vehicle finance. FIs rely on data to design leasing programmes and determine interest rates and other financing terms. While FIs have historical data for ICE vehicles, such data is less commonly available for EVs. FIs will be better able to accurately assess risk and allocate financing for EVs using data on vehicle specifications, real-world drive cycles, actual charging costs, and other operating expenditures.

Promoting the use of open data will help expand access to such data for EVs. According to the National Informatics Centre, "A dataset is said to be open if anyone is free to use, reuse, and redistribute it. Open Data shall be machine readable, and it should also be easily accessible."[47] The Government of India hosts open data portals with datasets for many sectors.

The United Kingdom (UK) launched a National Data Repository (NDR) on petroleum-related information and samples. By providing timely and transparent data access to industry, academia, and the public, the UK facilitates disclosure, reporting, and investment.[48] Other compelling examples include the US cities of Austin and Chicago, which are global leaders in open data portals. Each host dozens of publicly available transportation-related datasets.[49]

SIZE OF THE OPPORTUNITY

According to our existing analysis of future passenger- and freight-vehicle sales, India's weighted-average EV sales penetration has the potential to be about 70 percent in 2030 across segments based. The analysis is based on forecasted cost competitiveness and expert interviews.

To understand the total capital and financing requirements for this EV adoption scenario, we estimated the cumulative capital cost of vehicles, electric vehicle supply equipment (EVSE) hardware, and batteries (including replacements) between 2020 and 2030. We also estimated the size of the loan market for EVs in 2030. The estimated cumulative capital cost of India's EV transition is INR19.7 lakh crore (USD266 billion) by 2030 (see Exhibit 10). The estimated size of the organised EV finance market is INR3.7 lakh crore (USD50 billion) in 2030 (see Exhibit 11). The customised solutions outlined in this report can help mobilise capital and financing to realise India's EV ambitions.

EXHIBIT 10: CAPITAL COST OF INDIA'S EV TRANSITION FROM 2020 TO 2030

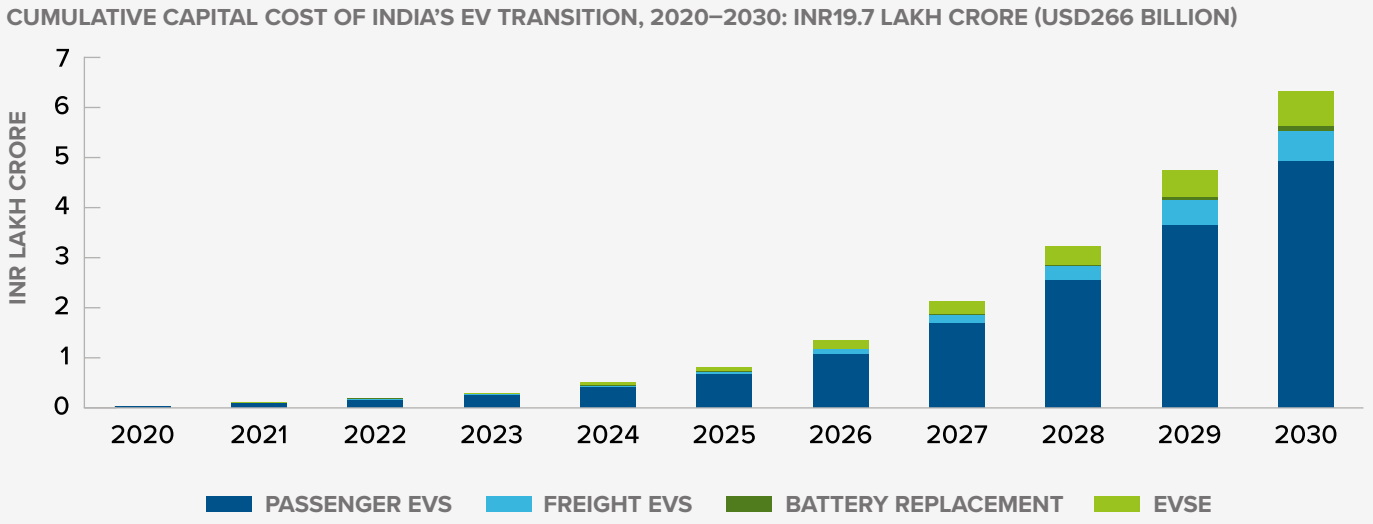
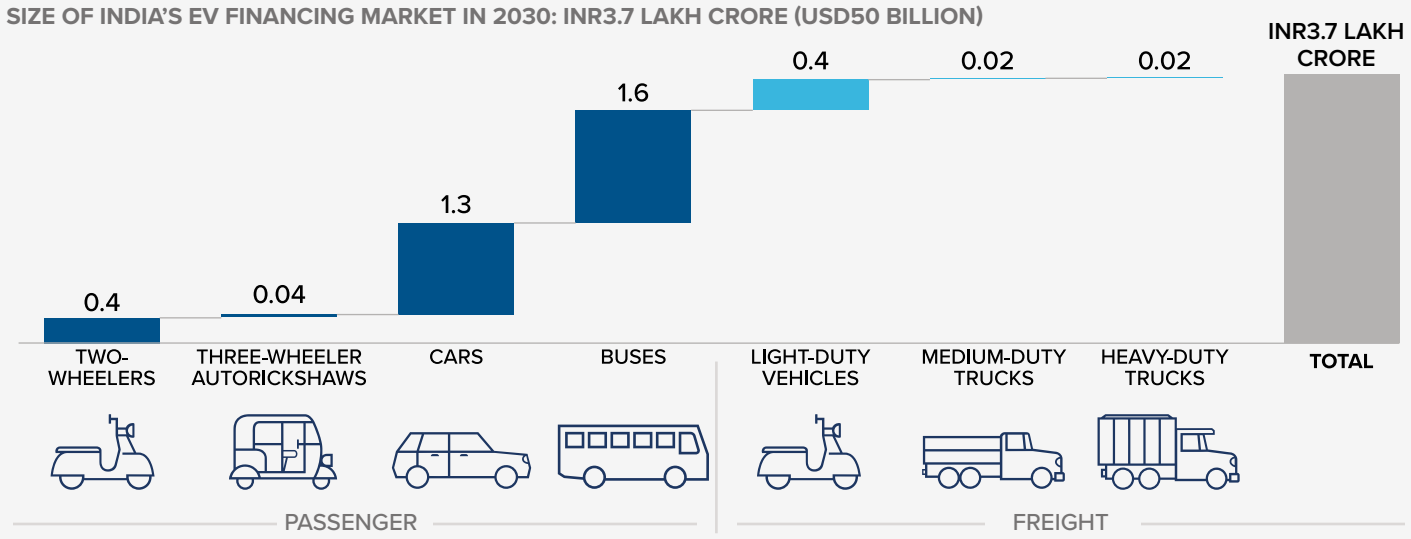


EXHIBIT 11: INDIA'S EV FINANCING MARKET IN 2030



Our existing passenger and freight transport decarbonisation models account for the best available sales data for 2020. They estimate future vehicle stock by segment and fuel type based on factors such as historical vehicle stock, annual utilisation, established relationships between GDP and demand, and projected EV sales penetration levels.

EXHIBIT 12: APPROACH TO ESTIMATING CAPITAL COST AND FINANCING MARKET SIZE OF INDIA'S EV TRANSITION

DEFINITIONS

- **Capital cost of India's EV transition:** Cumulative cost of vehicles, EVSE hardware, and batteries (including replacements) between 2020 and 2030 for specified EV sales penetration levels
- **EV finance market size:** Size of loan market for EVs (not including EVSE) in 2030

APPROACH

- Project total number of vehicles sold by segment through 2030
- Calculate number of new vehicles sold by segment per annum and apply EV sales penetration levels (see below)
- Estimate capital cost of vehicles, EVSE hardware, and batteries (including replacements) using annual EV sales and forecasted ex-showroom costs (based on current top selling EV models), cost of associated EVSE, and battery pack prices
- Estimate size of financing market using calculated capital cost and forecasted loan-to-value ratios and financing penetration levels (both based on industry interviews)

KEY ASSUMPTIONS

- Future vehicle stock for passenger and freight sectors based on our analysis
- EV sales penetration levels in 2030 by segment
- Current capital cost of EVs, EVSE, and batteries based on public data and industry interviews
- Capital cost does not account for subsidies or insurance for EVs or soft costs for EVSE
- Goods and Services Tax (GST) is included and assumed to remain constant at 18 percent for batteries and 5 percent for EVs
- Vehicle costs for all segments except buses and trucks decline until 2025, due to increases in battery density and reductions in battery costs, as per BNEF analysis, and achievement of economies of scale
- After 2025, potential cost reductions are not passed on to the end-user
- Number of chargers required for total EV stock is assumed constant throughout the period of the analysis and does not account for increasing utilisation
- EVSE hardware costs are assumed to decline as per industry estimates
- Battery replacement requirement is based on 2,000 cycles
- USD-INR conversion rate is 1USD to 74INR

PATH FORWARD

The ecosystem must design solutions to address barriers across policy, technology, economics, and behaviour to support the adoption of EVs in India. Simultaneously, reengineering vehicle finance and mobilising public and private capital will be critical.

STAKEHOLDER-SPECIFIC SOLUTIONS

Key stakeholders can help unlock the potential of EV finance in India:

- **Central and State governments:** Government can help increase access to low-cost financing at the central and state levels. At the Centre, RBI can include PSL mandates for EVs to increase finance available for them. Also, the central government or NDBs can capitalise risk-sharing facilities to provide longer-tenure, lower risk financing. Governments can create mandates to bring down the interest rate for EV buyers, at both the central and state levels, lowering the cost of financing for end-users.
- **OEMs, NBFCs, and private banks:** OEMs and FIs can help provide low-interest, longer-tenure loans. OEMs can give NBFCs and private banks confidence to create dedicated financing lines for EVs by providing product guarantees for the performance of their EV products. Similarly, OEMs can assure buyers that they will cover specific repair and/or replacement costs by giving product warranties, helping EV owners assume less risk. To further reduce risk, OEMs and FIs can work together to create a secondary market for EVs that improves their resale value.
- **Fleet operators:** Fleet operators can support the government, OEM, and FI initiatives in several ways. They can provide partial credit guarantees for full-time driver partners to share default risk with FIs. They can also offer utilisation guarantees to driver partners to help achieve TCO parity. They can also continue to improve fleet economics and further develop the market by focusing on business model innovation and setting fleet conversion targets.
- **National and multilateral development banks:** State-owned Indian development FIs and publicly owned international FIs can lower the cost of financing by capitalising risk-sharing facilities. They can also offer low-interest loans and other financing products to start-ups, fintech companies, and more.
- **Start-ups and fintech:** Venture capital funding can catalyse investment in start-ups with innovative business models and manufacturing. Fintech can make the EV transition accessible to first-time drivers without credit history and large domestic EV markets where financing penetration is low (i.e., e-2Ws and e-3Ws).

SYSTEM-LEVEL SOLUTIONS

Aligning perspectives, driving common understanding, and supporting early deployments can build FI confidence and capacity:

ELECTRIC VEHICLE FINANCE FORUM

- **Need:** FIs should be engaged in the country's EV dialogue, as they add a necessary perspective to policy frameworks and industry-led solutions.
- **Opportunity:** Create a convening platform to bring together stakeholders from the financial industry (FIs, insurers, and coalition bodies like IRDA), OEMs and fleet operators with government bodies like NITI Aayog, Ministry of Finance, and the RBI.
- **Next step:** Convene key ecosystem players to discuss the current landscape of EV financing

in the country. Identify actionable steps that the government and industry can take to achieve an EV financing market of INR3.9 lakh crore (USD52 billion) in 2030.

EDUCATIONAL MATERIALS FOR FIS

- **Need:** FIs are looking for educational materials to understand perceived risks, especially technology and business model risks, associated with lending to EV owners and operators.
- **Opportunity:** Produce and regularly update a set of reference handbooks for various vehicle segments and use cases. These books will provide bankers with the most relevant data and information on available models, technology trends and costs, national- and state-level policies, emerging business models, and more.
- **Next step:** Create one reference handbook as part of a pilot for a high priority segment and use case. A potential use case could be of two-wheelers for final delivery deliveries.

PROCUREMENT AND FINANCING INITIATIVES

- **Need:** More early deployments at scale are required to demonstrate the technological and economic viability of EVs to FIs.
- **Opportunity:** Collaborate with FIs and energy service companies (ESCOs) like EESL to design and manage procurement and leasing initiatives.
- **Next step:** Design a demand aggregation, bulk procurement, and leasing initiative for a market-ready segment and geography.

These activities and other potential opportunities will elevate finance's role in India's EV transition and establish a community for exchanging knowledge. This document intends to serve as a resource to aid and inspire further action to finance EVs supporting India's social, environmental, and public health goals.

EXHIBIT 13: POTENTIAL TO DRIVE EV FINANCE TO SCALE AT COP26

DRIVING GLOBAL IMPACT: INDIA AND EV FINANCE AT COP26

In the runup to the 26th UN Climate Change Conference of the Parties (COP26), the Government of India has been participating in the COP26 Zero Emission Vehicle Transition Council. Alongside the world's largest and most progress automotive markets, they discuss working together to accelerate the global transition to zero emission vehicles, in line with the goals of the Paris Agreement.

The future size of India's vehicle market is large and its plans for manufacturing and adoption of EV and EV components are ambitious. Other nations can benefit from India's experience designing and implementing EV policies and programmes, including current work on EV finance. NITI Aayog has been working on a series of measures to ensure banks and financial institutions offer credit at affordable rates to EV buyers, as well as greater availability of finance products customized for EVs. The six financial instruments and four ecosystem enablers outlined in this report can serve as a foundation for dialogue and solution making among member countries, global auto manufacturers, development banks, and other financiers at COP26.

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