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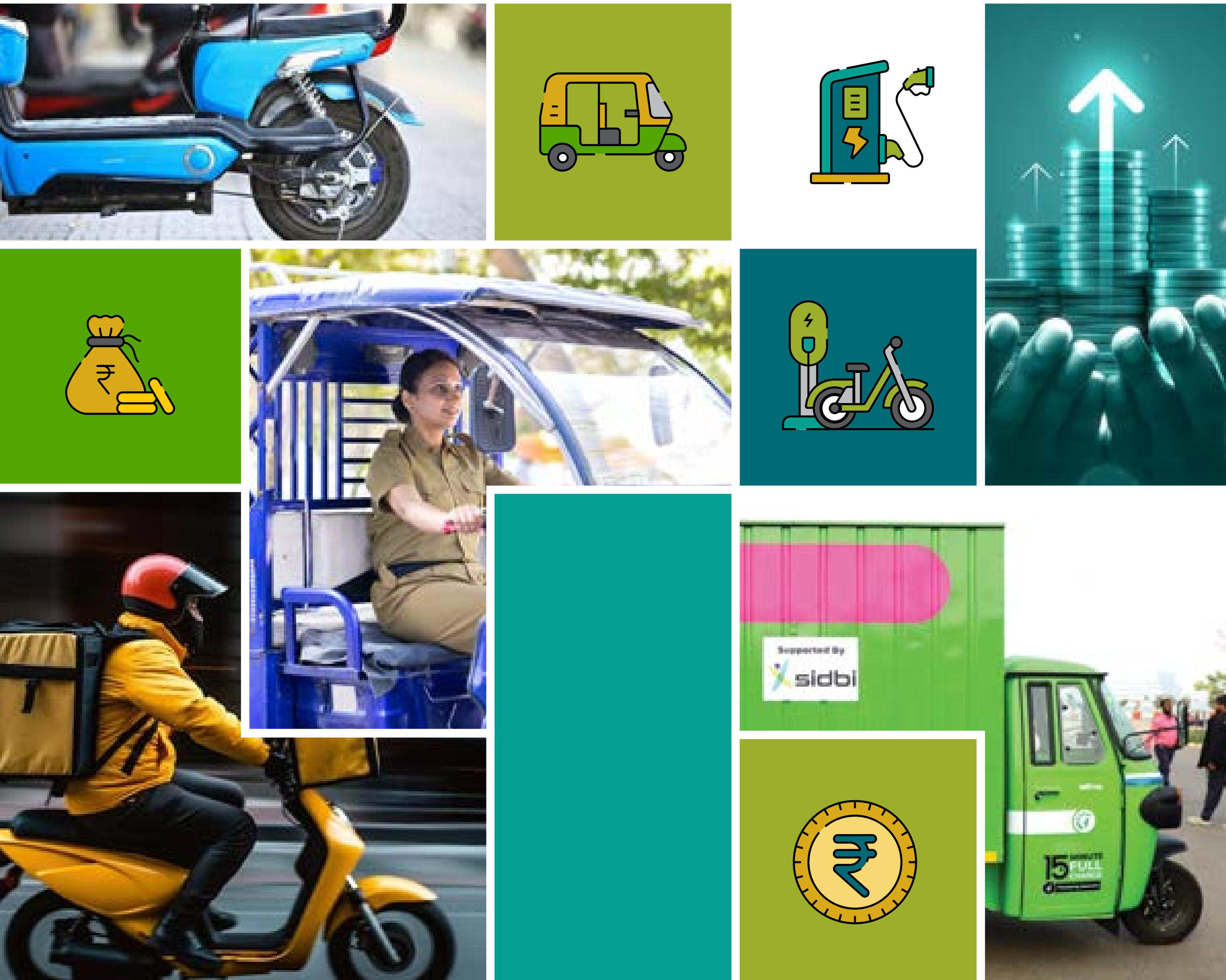
De-Risking Lending for a Brisk EV Uptake

A Practical Guide on De-Risking Measures for Electric Two- and Three-Wheelers in India

REPORT / MARCH 2024



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. 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 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 fostering Cooperative Federalism.

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The Small Industries Development Bank of India (SIDBI) is the principal financial institution set up under an Act of Parliament for promotion, financing and development of the Micro, Small and Medium Enterprise (MSME) sector and for coordination of functions of institutions engaged in similar activities. Over the years, SIDBI has been instrumental in taking up various initiatives for the development of the MSME sector through credit and more importantly, credit plus activities.

RMI

RMI is an independent nonprofit organisation, founded in 1982 as Rocky Mountain Institute, that transforms global energy systems through market-driven solutions to align with a 1.5°C future and secure a clean, prosperous, and zero-carbon future for all. We work in the world's most critical geographies and engage businesses, policymakers, communities, and NGOs to identify and scale energy system interventions that reduce greenhouse gas emissions by at least 50 percent by 2030. RMI has offices in Basalt and Boulder, Colorado; New York City; Oakland, California; Washington, D.C.; and Beijing. RMI has been supporting India's energy transition since 2016.

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List of Acronyms

AUM	Assets under management
DCO	Driver cum owners
DPD	Days past due
DRMs	De-risking measures
EL	Expected loss
EMI	Equated monthly instalment
EV	Electric vehicle
FAME	Faster Adoption and Manufacturing of Electric Vehicles Scheme
FLDG	First-loss default guarantee
ICE	Internal combustion engine
L5M	A specific category of vehicles
L5N	A specific category of vehicles
LGD	Loss given default
LMS	Loan management system
LTO	Lithium titanate oxide
LTV	Loan-to-value
MSME	Micro, small, and medium enterprise
NBFC	Non-banking financial company
NITI Aayog	National Institution for Transforming India
NMTMBS	National Mission on Transformative Mobility and Battery Storage
NPA	Nonperforming asset
NRDC India	Natural Resources Defense Council India
NTC	New to credit
OEM	Original equipment manufacturer
PAR	Portfolio at risk
PCG	Partial credit guarantee
PD	Probability of default
PMMY	Pradhan Mantri MUDRA Yojana
PFI	Participating financial institutions
RTO	Regional transport office
SEWA	Self Employed Women’s Association
SIDBI	Small Industries Development Bank of India
SLA	Service-level agreement
UPI	Unified Payments Interface

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Foreword from NITI Aayog

Electrifying transportation can be a catalytic intervention to accelerate progress towards India's five central climate goals (Panchamrit).[1] Electric vehicles (EVs) are more energy-efficient, less carbon-intensive on a life-cycle basis, have zero tailpipe emissions, and can be economical to own and operate.[2] The adoption of electric two- and three-wheelers has galvanised India's EV transition in 2023 with EVs accounting for 5% of the two-wheeler sales and 59% of the of the three-wheeler sales.[3] These compact vehicles will continue to lead India's EV transition, with projections indicating that EV models could represent up to 60% of the new two- and three-wheeler sales by 2030.[4]

Public and private actors are taking bold steps to accelerate the adoption of electric two- and three-wheelers, with the Indian government committing $1 billion to the EV transition under the Faster Adoption and Manufacturing of Electric Vehicles Scheme, Phase II (FAME II).[5] Furthermore, 26 state and union territory governments have drafted EV policies with various fiscal and non-fiscal incentives. And original equipment manufacturers (OEMs) have announced over $6 billion in investments in EV-related technologies and manufacturing plants, with 200 electric two- and three-wheeler models available in India today.[6]

> **Public and private actors are taking bold steps to accelerate the adoption of electric two- and three-wheelers, with the Indian government committing $1 billion to the EV transition under the Faster Adoption and Manufacturing of Electric Vehicles Scheme, Phase II (FAME II).**

Dynamic startups are also working to lead the charge, with the recognised EV-related startups in India increasing from 15 in 2012 to 1,883 in 2023.[7] Ecosystem actors are also dedicated to supporting EV market development to address high up-front costs, enhance quality and model diversity, and improve charging infrastructure access.

Despite this positive momentum, the key limiting factor is the lack of access to low-cost financing to mobilise capital at scale for EV adoption.

In response to the need for affordable EV financing, under the guidance of NITI Aayog, the Small Industries Development Bank of India (SIDBI) and the World Bank, supported by the Korea World Bank Partnership Facility and the Korea Economic Development Cooperation Fund (EDCF), have been discussing financing mechanisms to address financing barriers and catapult the growth of the electric two- and three-wheeler market.

Such mechanisms would strongly align with the visionary goals articulated at a discussion hosted around the fourth Energy Transition Working Group meeting under India's G20 Presidency. It was emphasized that there is a pivotal role of the Indian EV industry in driving job creation by generating approximately 5 million direct and indirect employment opportunities by the end of the coming decade.[8]

NITI Aayog is keen to support initiatives to drive EV adoption and align with the government's goal of achieving 30% of new vehicle sales as electric by 2030.

Sincerely,
Sudhendu J. Sinha
Advisor, Infrastructure Connectivity & Electric Mobility
NITI Aayog

Foreword from SIDBI

The Small Industries Development Bank of India (SIDBI) is deeply committed to supporting the transition of the micro, small, and medium enterprise (MSME) sector toward green practices, aiming to reduce CO_2 emissions and promote inclusive green development in the country. We have been conceptualising a funding cycle that encourages affordable lending in the electric vehicle (EV) market by addressing financiers' risks. The goal is to support the adoption of electric two- and three-wheelers by MSMEs on Indian roads. The envisioned financing facility would consist of a partial risk-sharing guarantee and on-lending facility for electric two- and three-wheeler loans offered to banks and nonbanking financial companies (NBFCs) in India.

"We have been conceptualising a funding cycle that encourages affordable lending in the electric vehicle (EV) market by addressing financiers' risks. The goal is to support the adoption of electric two- and three- wheelers by MSMEs on Indian roads."

SIDBI initiated the Mission 50K-EV4ECO as a programme in 2023, facilitating lending for 50,000 EVs. This includes loans for MSMEs looking to acquire EVs and establish charging infrastructure, as well as support for small emerging NBFCs that provide loans for last-mile EV adoption. Since its launch, the pilot programme has sanctioned INR 190 crore (US$22 million) of capital to NBFCs and fleet operators and aggregators, contributing to the adoption of more than 18,000 EVs.

SIDBI has undertaken several other initiatives such as the launch of a risk-sharing facility with the support of Shell Foundation, a supported pilot for greening the rural mobility in India in association with Self Employed Women's Association (SEWA) and Natural Resources Defense Council India (NRDC India), and releasing an e-book on unlocking e-mobility. We are confident that these initiatives will complement the government's National Electric Mobility Mission and EV30@30 by creating a ripple effect, reducing perceived risks of lenders, and increasing adoption of EVs across the country.

This forward-looking report, developed by SIDBI in collaboration with NITI Aayog and RMI as a knowledge partner, offers valuable insights derived from ongoing discussions on the financing facility. It particularly emphasises the role of the partial credit guarantee and the on-lending product in addressing financing barriers in the EV market.

Furthermore, the report outlines six prioritised de-risking measures (DRMs) that can effectively mitigate risks, creating tangible value for financiers. This results in reduced expected losses and more affordable lending options for borrowers. It serves as a practical guide for financiers to incorporate best practices and strengthen their EV lending portfolios. The report also provides actionable measures for original equipment manufacturers (OEMs), insurers, fleet operators, recyclers, refurbishers, and secondary sales platforms to enhance financiers' confidence in the EV market.

We extend our gratitude to the dedicated researchers, experts, and stakeholders whose contributions have made this report possible.

Sincerely,
Sivasubramanian Ramann
Chairman and Managing Director
SIDBI

SIDBI's Initiatives in the E-Mobility Sector

SIDBI has pioneered a series of innovative initiatives in e-mobility, setting new standards in the industry.

Unlocking E-Mobility Report

SIDBI's 'Unlocking E-Mobility' report, the first volume in its green e-series, is a comprehensive resource derived from consultations with over 1,000 EV stakeholders. It offers insights, expert opinions and comparative analyses between EV and ICE vehicles. Positioned as a guide for navigating India's evolving electric mobility landscape, this report serves as an invaluable knowledge-sharing tool. Learn more about the publication at: https://www.sidbi.in/green-pathways-e-series.php

50KEV4ECO

This pioneering initiative consists of two main components: direct and indirect lending. Under direct lending, SIDBI extends loans to eligible MSMEs and other players in the EV ecosystem, facilitating their transition to electric vehicles and supporting the development of charging infrastructure, including battery swapping. Concurrently, the indirect lending scheme empowers small, unrated, focused, and emerging NBFCs involved in EV financing by offering them funds as a refinance facility.

Risk Sharing Facility for Electric Vehicles (EV-RSF)

In collaboration with the Shell Foundation (SF), SIDBI is implementing the EV-RSF for electric two-wheelers, three-wheelers, and charging infrastructure. The facility operates as a second loss facility, with lending institutions (i.e., banks and NBFCs) bearing the initial 3% loss of the EV portfolio created from loans. Beyond this threshold, eligible financiers receive risk coverage of 75% for the next 10% of losses (from 3% to 13%) in the covered portfolio. With a total corpus of USD 6 million (comprising USD 3 million each from SIDBI and SF), the EV-RSF is a long-term initiative spanning seven years, demonstrating commitment to stimulating the EV financing value chain.

Pilot for 'Greening Rural Mobility'

SIDBI, along with SEWA and NRDC, has designed a demonstration pilot with electric vehicles in rural areas. A detailed financial model was developed to identify the potential viability gap funding required to bridge the price differential between electric and internal combustion engine (ICE) counterparts, facilitating the transition to electric vehicles.

E-Auto Initiative in Ayodhya

SIDBI has joined forces with the Government of Uttar Pradesh's e-mobility drive in Ayodhya, Uttar Pradesh (UP). In partnership with ETO Motors, SIDBI-supported EV services have been launched in Ayodhya, bringing green mobility and empowering women through skill development initiatives. This initiative is a beacon of hope, aiming to facilitate pollution-free commuting in Ayodhya.

Foreword from RMI

India's electric mobility market is rapidly growing, with sales exceeding 1.5 million vehicles in 2023, largely propelled by the electric two-wheelers segment.[9] This transition to electric vehicles (EVs) offers a significant chance to improve air quality and support India's target of achieving net-zero emissions by 2070,[10] and presents a market opportunity to capitalise on the annual EV finance market of approximately INR 3.7 lakh crore (US$44 billion) in 2030.[11]

While commercially utilised electric two- and three-wheelers have achieved cost competitiveness with their internal combustion engine counterparts over their life cycle, challenges for scaled adoption persist due to higher initial expenses and limited access and availability of financing for EVs. This poses obstacles for many potential purchasers, particularly micro, small, and medium enterprises (MSMEs) and individuals with limited credit history.

"...to reduce the cost of financing for the end borrowers and the EV financing ecosystem, this report, crafted with valuable input from a diverse array of industry stakeholders, offers practical insights into six de-risking measures."

Currently, there is a limited presence of commercial banks and nonbanking financial companies (NBFCs) in the EV financing sector. The few banks operating in this space have strict credit criteria and offer loans to salaried borrowers. They are risk averse to new to-credit borrowers, such as gig workers engaged in commercial last-mile deliveries and ride-hailing services. These driver cum owners constitute a key segment of borrowers in the EV ecosystem, and reducing the cost of loans for them is critical for encouraging the adoption of EVs. Although NBFCs are more active in lending to gig workers, their high cost of borrowing, restricted access to long-term funds, market fragmentation, and elevated underwriting and collection expenses result in higher interest rates than those offered by commercial banks.

Thus, to reduce the cost of financing for the end borrowers and the EV financing ecosystem, this report, crafted with valuable input from a diverse array of industry stakeholders, offers practical insights into six de-risking measures (DRMs). These measures aim to assist financiers in streamlining their operational costs, enhancing lending terms, and bolstering confidence in EVs among financiers and users. Implementing these DRMs would provide valuable insights into their efficacy for sustainable EV lending, thereby enriching the EV ecosystem.

We are grateful to NITI Aayog, the Small Industries Development Bank of India (SIDBI), the World Bank, industry experts, and the numerous stakeholders whose insights have been captured in this report. We hope that the learnings shared in this report catalyse affordable financing for the electric two- and three-wheeler market in the country.

Sincerely,
Akshima T. Ghate
Managing Director
RMI – India Program

Executive Summary

India's two- and three-wheeler market accounts for 80% of the vehicles on the road to date (March 2024), with approximately 256 million two-wheelers and 10 million three-wheelers serving as a key means for passenger mobility and goods movement.[12]

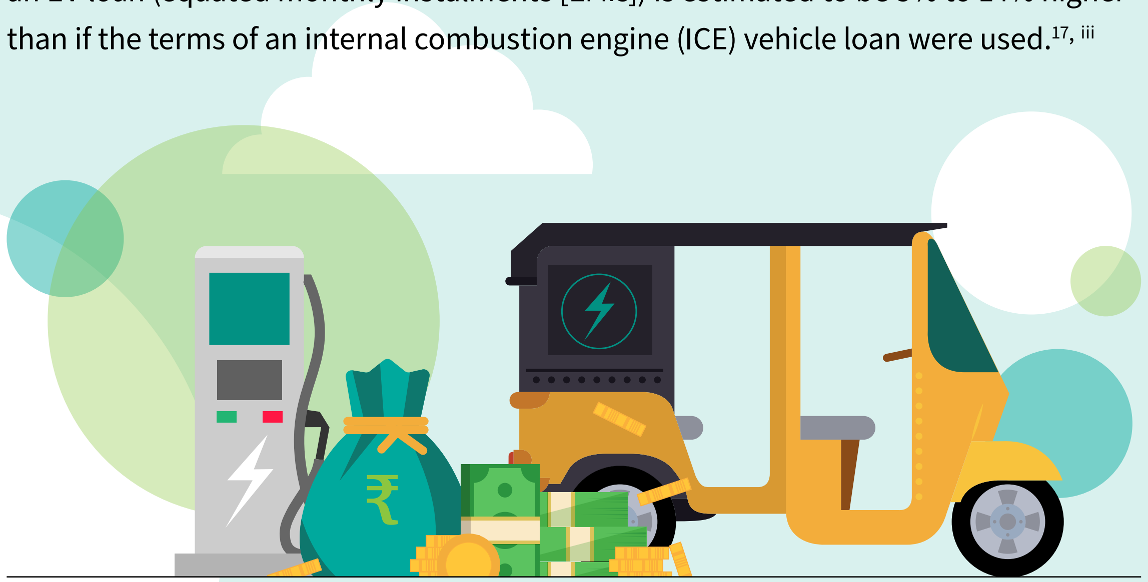
Government policies such as Faster Adoption and Manufacturing of Electric Vehicles Scheme (FAME) Phase I and II, and the Production Linked Incentive (auto and advance chemistry cell) schemes, along with state government subsidies, have made electric two- and three-wheelers competitive in terms of total cost of ownership compared with their internal combustion engine (ICE) counterparts for multiple use cases.[13] The growing electric mobility (e-mobility) startup ecosystem, with nearly INR 13,266 crore (US$1.6 billion)[i] invested in 2022, has led to new vehicle models by original equipment manufacturers (OEMs) and multiple fleet operators and charging players entering the market, leading to a surge in electric vehicles (EVs).[14] However, despite the growing adoption of EVs in India, the availability of accessible and affordable financing remains one of the major challenges for the widespread transition to e-mobility.

From the perspective of financiers, lending for ICE two- and three-wheelers is a difficult business because the borrower profile consists of many new-to-credit (NTC) customers (close to 50% for two-wheelers) who are learning to adapt to formal credit cycles and typically have a history of significant delays in payments (portfolio at risk [PAR] 31–90 days past due [DPD] stood at 4% for two-wheelers in September 2022).[15] As a result, financiers are highly dependent on building robust collection systems to avoid delayed payments and are reliant on a secondary market to recover money in case of a default. Over the years, the secondary market for ICE vehicles has been well established, providing more security to financiers to lend to this segment.

i. INR 82.93 = US$1 (as on February 21, 2024)

However, as identified in this report, in the case of electric two- and three-wheelers, financiers face higher risks emanating from (1) counterparty, (2) product, (3) operations, (4) repossession, and (5) residual risks compared with ICE vehicles. In addition to the NTC customers' high-risk borrowing profile, the EV market consists of many new startups operating as fleet operators, and these actors are yet to become profitable. There are also new-to-market EV OEMs who have yet to establish a strong hold in the market. The threat of these startups losing market share and defaulting as market players consolidate adds to the perceived business risk for financiers to lend to EV consumers. Additionally, given the nascency of the EV market, the secondary sales market for EVs is yet to develop and financiers are still identifying how to establish benchmarks to assess battery life to derive residual value for vehicles.

Consequently, EV loans often come with high interest rates, lower loan-to-value (LTV) ratios, and shorter tenures, making them less favourable for end borrowers.[16] Moreover, the number of financiers actively supporting electric two- and three-wheelers is limited, with non-banking finance companies (NBFCs being more active than commercial banks.[ii] Commercial banks are hesitant or find it difficult to lend to large pools of NTC borrowers, a major constituent of the two- and three-wheeler market, and mobility-focused startups with a limited track record of profitability. Although NBFCs are better able to service high-risk NTC borrowers, they face institutional hurdles like high borrowing costs, lack of sector experience, and a lack of financial products to underwrite the associated risks. On average, the monthly cost of an EV loan (equated monthly instalments [EMIs]) is estimated to be 5% to 14% higher than if the terms of an internal combustion engine (ICE) vehicle loan were used.[17, iii]

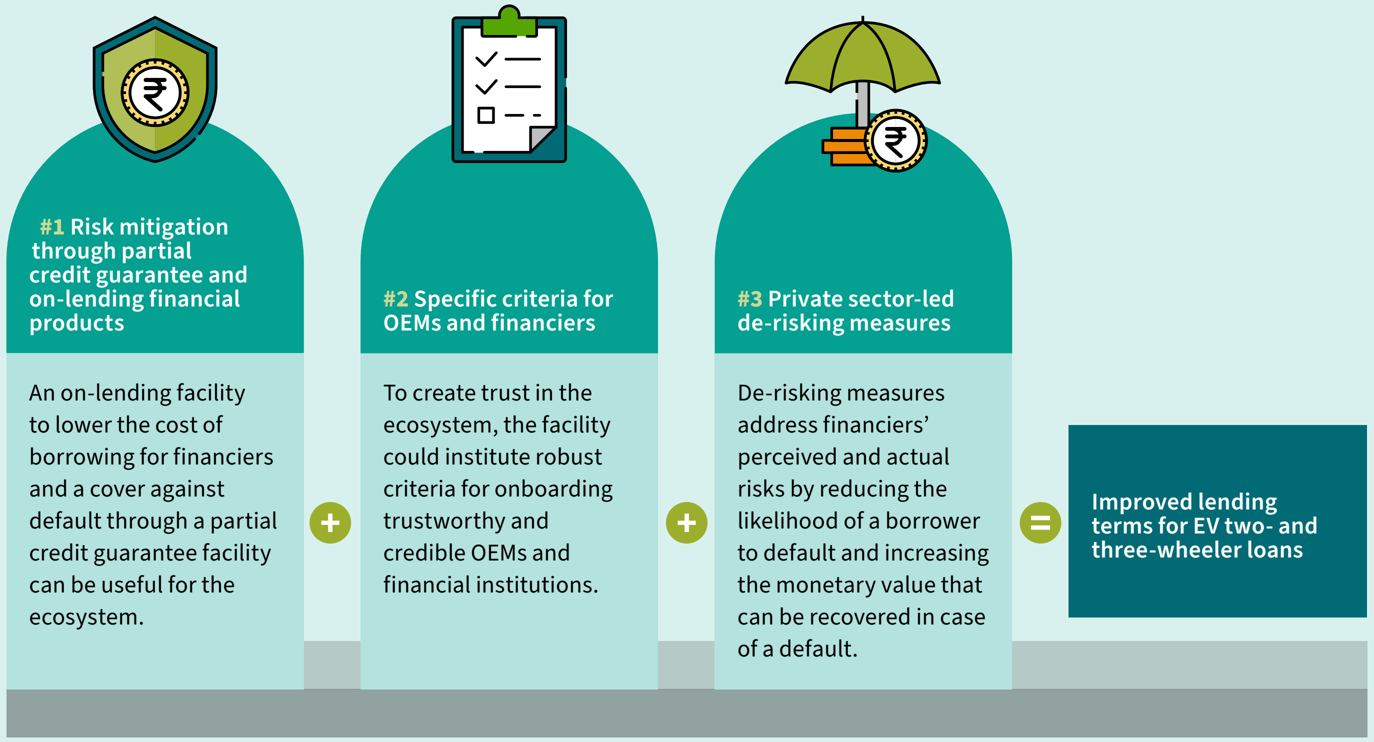


ii. NBFCs offer banking and financial services but do not qualify as banks. Most NBFCs are not deposit-taking institutions and are primarily focused on lending and investment activities.

iii. This is based on the median of the average range of the interest, tenure, LTV ratio, and average price of a particular electric versus ICE vehicle in Q2 2023. See Exhibits 8 and 9 for additional detail.

At the request of the National Institution for Transforming India (NITI Aayog) under the National Mission on Transformative Mobility and Battery Storage (NMTMBS), the Small Industries Development Bank of India (SIDBI) is addressing the challenges of EV lending. This work, supported by the World Bank, Korea–World Bank Partnership Facility (KWPF), and Korea Economic Development Cooperation Fund (EDCF), involves discussion of mechanisms to address financing barriers and catapult the growth of the electric two- and three-wheeler market through a financing facility. Based on extensive input from the EV ecosystem, the creation of such a facility could foster the transition to sustainable electric two- and three-wheelers in India. It would integrate three core pillars: (1) risk mitigation and provision of financial products intended for on-lending; (2) standardised (mandatory) eligibility criteria for onboarding OEMs and financiers; and (3) the institutionalisation of de-risking measures (DRMs). Exhibit 1 illustrates how such a facility would improve electric two- and three-wheelers lending terms.

Exhibit 1 **Improving lending terms for electric two- and three-wheeler loans**



Stakeholders involved: Financiers, OEMs, insurance companies, fleet operators, telematics providers, and startups in the EV ecosystem

The three pillars of the financing facility would collectively work to enable the proliferation of market-wide EV lending capacity by fundamentally addressing the higher costs of lending in the relatively new market segment, mitigating financial exposure to default risk, and institutionalising a series of DRMs to bring greater transparency to the EV lending ecosystem. The first pillar would include the partial credit guarantee (PCG) to provide financiers protection against potential credit losses, thereby incentivising them to lend to and improve financing terms for loans to two- and three-wheeler borrowers. In addition, the first pillar would also incorporate an on-lending facility to provide liquidity for the financiers, particularly at a lower cost of funds for NBFCs. Together, these products of the financing facility would increase the access to affordable financing for EVs among micro, small, and medium enterprises (MSMEs).

“This report describes how the DRMs would have broad market implications and could lower the cost of financing for everyday borrowers when institutionalised.”

The second pillar is focused on specific criteria required for OEMs and financiers. The financing facility would prioritise those OEMs that offer EV models that meet minimum quality, safety, and performance requirements as per applicable regulations; provide warranties of a meaningful duration, optimally to match financing tenor; and deliver strong after-sales maintenance services to minimise operational risks. The criteria for financiers would aim to select creditworthy commercial banks and NBFCs with experience and capability to manage EV lending risks, including players active in automotive or two- and three-wheeler ICE vehicle finance. This would be done to ensure the financier has sufficient experience in underwriting and managing a number of smaller MSME entities as part of a larger loan portfolio and in assessing technology, OEM providers, and operational risks, and is able to scale a lending portfolio with financing from the financing facility. These criteria would be moderated to account for the nascency of the EV financing ecosystem.

In addition, one of the qualities envisioned for the financing facility would be the emphasis on DRMs, designed to reduce the actual and perceived risks, distribute liability, cut operating costs, and build market confidence in the EV ecosystem. The financing facility would aim to incentivise the adoption of DRMs by offering lower fees and interest rates to financiers that implement the DRMs when accessing the PCG and on-lending products.

This report describes how the DRMs would have broad market implications and could lower the cost of financing for everyday borrowers when institutionalised. The audience for this report is participants in the electric two- and three-wheeler ecosystem in India with particular focus on financing institutions. The six DRMs are described in detail with supporting case studies that provide specifications on their implementation mechanics, associated best practices, implementation challenges, and financial impact for financiers and borrowers.

Exhibit 2 offers an overview of these DRMs, the risks they mitigate, and their impact on expected loss (EL). EL encapsulates the anticipated monetary loss a financier might incur while extending loans to borrowers. This metric encompasses the likelihood of borrowers defaulting on their loans, known as the probability of default (PD), and the losses borne by financiers after recovering value from repossessed vehicles and assets through secondary sales, insurance, or other means, referred to as loss given default (LGD).

Exhibit 2 DRMs and impact on risk and expected loss

DE-RISKING MEASURE	DESCRIPTION	RISKS ADDRESSED	IMPACT ON REDUCING EXPECTED LOSS (EL): PROBABILITY OF DEFAULT (PD)	IMPACT ON REDUCING EXPECTED LOSS (EL): LOSS GIVEN DEFAULT (LGD)
GENERAL				
Collection System	Financiers build a hybrid collection system to handle digital and cash payments and digital reminders, integrating it with the loan management system.	Counterparty	High Impact	No Impact
Repossession System	Financiers strengthen their vehicle repossession ability, reducing the time it takes to locate and retrieve a vehicle from a defaulted borrower.	Repossession Residual	No Impact	High Impact
Expanded Insurance Coverage	Financiers prioritise lending to vehicles with comprehensive insurance over the loan duration and incentivise borrowers to take on additional EV-specific insurance products (zero depreciation, EMI protection, extended warranty, and charging covers).	Counterparty Product Residual	High Impact	High Impact
EV-SPECIFIC				
Telematics Data	Financiers use telematics data to understand vehicle utilisation for assessing driver's income, identifying the vehicle's location in case of default, and determining battery health to establish residual value.	Counterparty Operation Repossession Residual	High Impact	Medium Impact
Secondary Sales Market	Financiers work to obtain a high residual value for repossessed EVs in the secondary market via tie-ups with EV ecosystem actors such as dealers, secondary sales platforms, third-party reselling agents, and battery recycling and refurbishing companies.	Residual	Medium Impact	High Impact
Product Quality Assurance	Financiers prioritise lending to vehicles supported by OEMs offering quality assurance through warranties (at least until the loan tenure), after-sales services, and financial guarantees in case of product failure.	Product Operation Residual	High Impact	High Impact

High Impact | Medium Impact | No Impact

Based on interviews with EV stakeholders, financiers, OEMs, and insurance companies, the following key takeaways explain how DRMs can have a lasting financial impact:

1

Increasing operational efficiencies

Specific DRMs such as those focused on digitalisation of collections and repossessions can help bring down operational costs for financiers and improve efficiencies, reducing an otherwise significant contributor to higher interest rates, making lending terms more attractive for borrowers.

2

Reducing expected loss

A key driver to reduce EL is to minimise the time it takes for a financier to repossess the assets. A strong repossession system informed by geolocation would help in reducing the time it takes to retrieve the vehicle and hence draw value from it. Maintaining product quality and establishing a strong secondary market are crucial to limit anticipated losses. A high-quality product with extended warranties and regular maintenance servicing reduces the chances of customer defaults. Furthermore, an active secondary market allows financiers to accurately assess ELs, rather than relying on worst-case assumptions. As a result, financiers can recover more value from high-quality defaulted assets through a well-functioning secondary market.

3

Promoting transparency

Telematics data can help reduce EL by providing financiers with relevant information relating changes to the credit profile of borrowers to serve as early warning indicators. This enables financiers to evaluate, on an ongoing basis, a borrower's ability to service their loans and to accordingly develop a watch list for potential defaults to inform and improve collection approaches. Additionally, telematics can support financiers with repossession of assets in case of defaults and derive optimal resale value for repossessed assets. Specifically, such telematics could provide relevant information for locating the assets through geolocation data and help lenders track the residual value of the vehicle based on battery health data.

On the whole, DRMs can reduce risk premiums, making lending terms more favourable. This includes potential interest rate and fee reductions, extended loan tenures, higher LTV ratios, and increased participation and risk underwriting by financiers in the electric two- and three-wheeler market. There is a compelling business opportunity for technology-enabled entities to cooperate with financiers to offer DRMs as services to them, as well as to other participants in the EV ecosystem, including OEMs, fleet operators, and insurance companies. These services can address common challenges faced in the EV ecosystem, such as digitising payment mechanisms, strengthening repossession systems, extracting insights from telematics data to predict battery life, and optimising the financial value of repossessed assets.

Through its on-lending and PCG facilities, and the implementation of the onboarding criteria and DRMs, the financing facility aims to reduce risks of EV lending. These would address the immediate market failures in India's EV finance space and create data and evidence for financiers to use for mass mobilisation of capital towards the EV market. The finance facility is designed to empower financiers to provide loans at affordable rates to borrowers and initiate a virtuous cycle for greater mobilisation of EV finance.

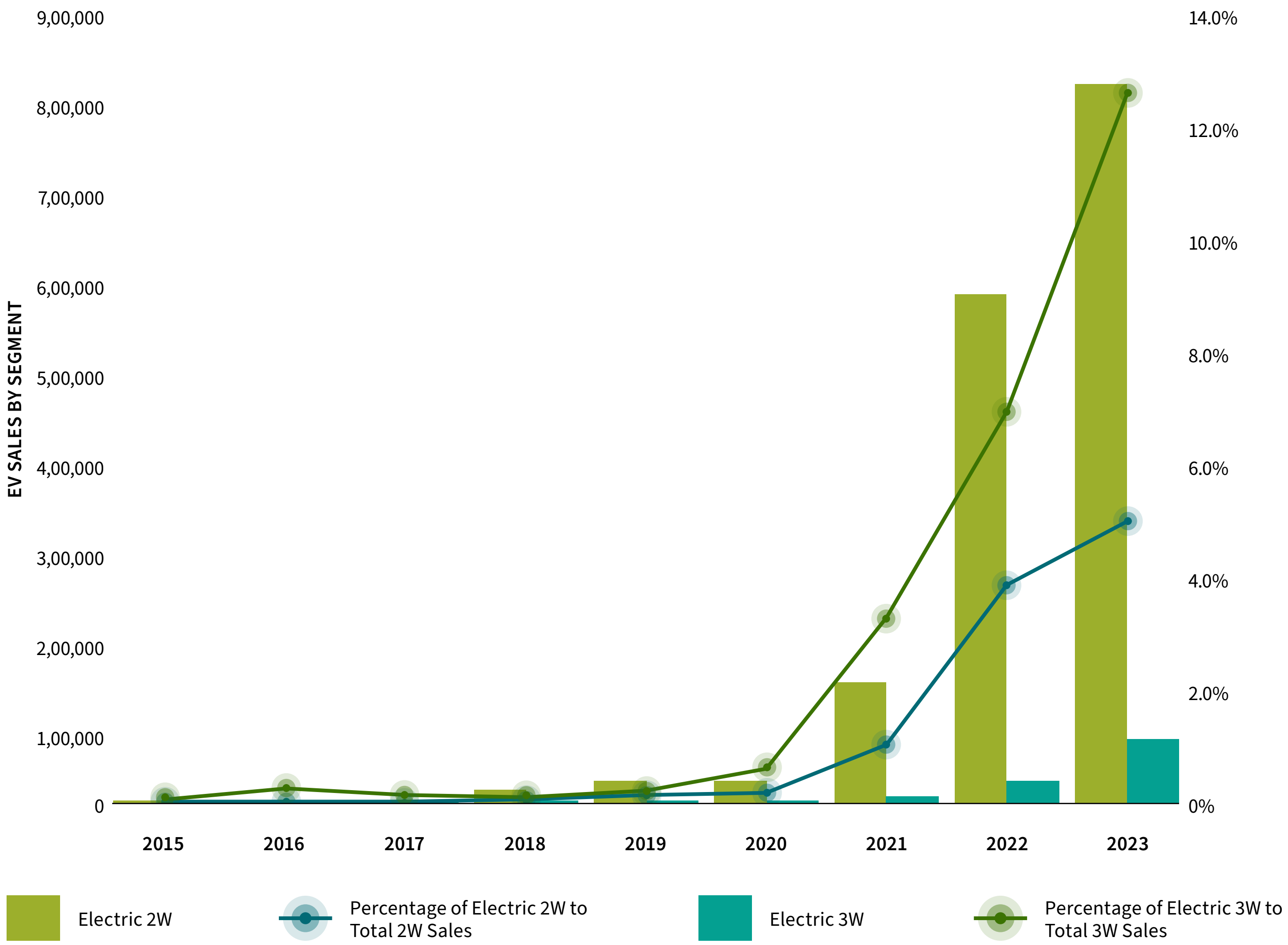
1.0 Introduction

Context

India's EV market is growing rapidly, with a near-exponential rise in EV sales over the past two years. From 2022 to 2023, electric two- and three-wheeler sales increased 41% and 200%, respectively (see Exhibit 3).[18] By 2030, in a best-case scenario, EVs could represent up to 80% of all new two- and three-wheeler sales.[19] Reductions in up-front capital cost through government subsidies such as the FAME Phase I and II policy and waiver on registration and road tax in some states, combined with subsidised electricity tariffs, have reduced the total ownership cost, which is at or near parity with ICE counterparts for many use cases.[20] Further, the introduction of reliable electric two- and three-wheeler models and an increase in charging infrastructure in the country have contributed to the growth in demand for EVs.

Despite several factors bolstering EV sales, the pace of adoption of electric two- and three-wheelers needs to increase to achieve national targets as the government progressively reduces currently available subsidies. In particular, the sales of electric two-wheelers saw a dip post-June 2023 because the FAME Phase II subsidy incentives for electric two-wheelers were reduced, but recovered in the following months to the prior monthly sales figures.[21] The level of sales penetration for electric two- and three-wheelers (goods and passenger vehicles) in 2023 was 5.3%, indicating room for significant sectoral growth.[22] A persistent bottleneck for EV adoption is the limited availability and high cost of financing for electric two- and three-wheelers when compared with ICE vehicles. As a key lever, financing must be mobilised to fully unlock the EV market.

Exhibit 3 **Historical sales of electric two- and three-wheelers**



Note: Data listed is for the calendar year. Three-wheelers include three-wheeler passenger and goods vehicles.

About the Finance Facility

NITI Aayog, as the coordinating agency for NMTMBS, conducted a series of studies with the support of the World Bank to advance e-mobility in India.[23] It has designated SIDBI as the counterpart for this programme considering the potential rapid adoption of such vehicles by MSMEs. SIDBI, with the support of the World Bank, EDCF, and KWPF, interacted with market stakeholders to conceptualise a financing facility to catalyse EV adoption.

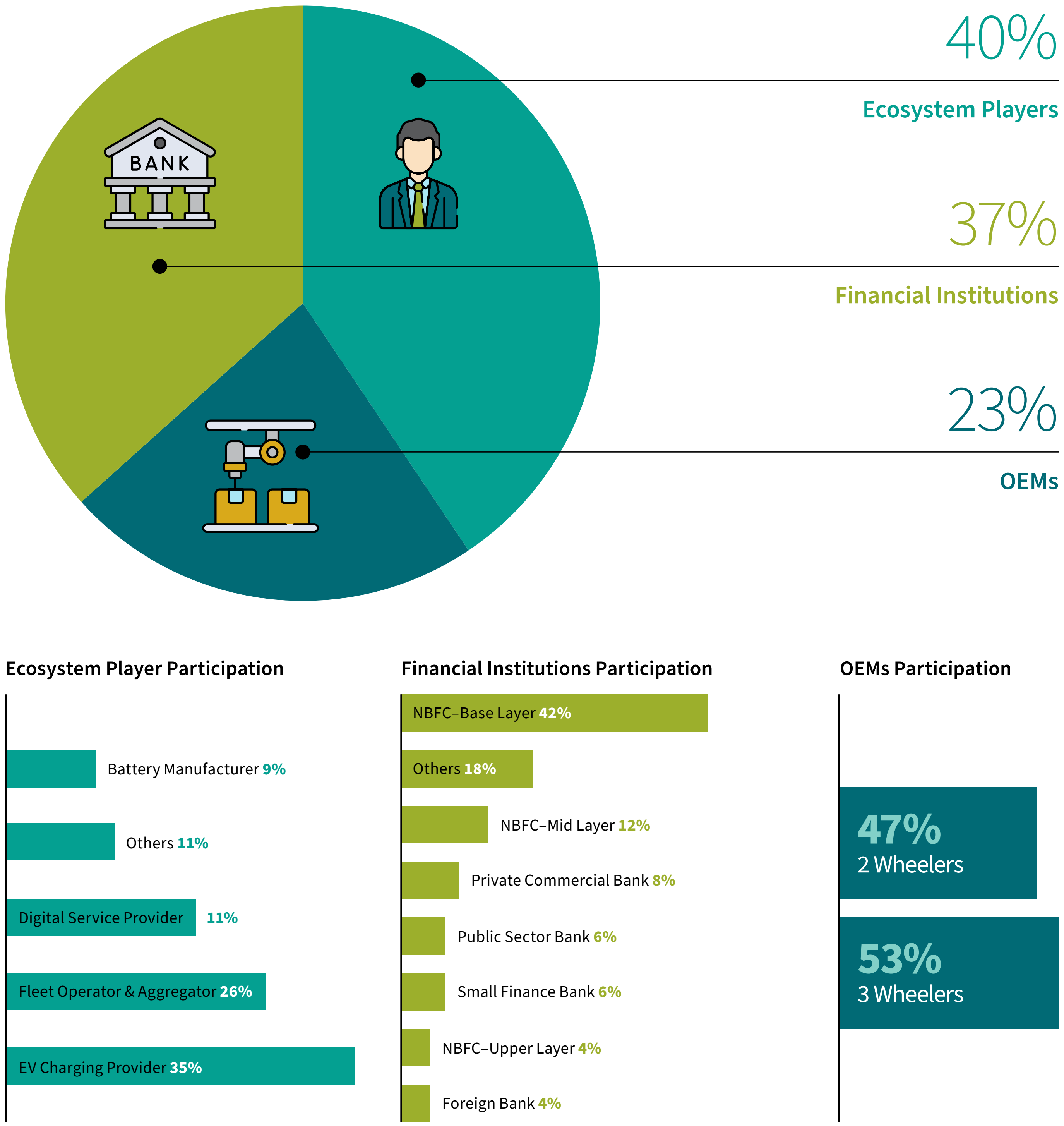
As a precursor to operationalising the facility, SIDBI has launched the Mission 50K-EV4ECO designed to spur the uptake of electric two-, three-, and four-wheelers. This mission provides direct lending to eligible MSMEs (aggregators, fleet operators, and EV leasing companies) for the purchase of EVs and development of charging infrastructure. It also provides loans to small and unrated NBFCs to offer financing in support of last-mile EV adoption.

The facility's design is informed by extensive and continuous discussions with market players including through a series of nine stakeholder consultations across major cities: Ahmedabad, Bangalore, Chennai, Delhi, Gurgaon, Hyderabad, Mumbai, Noida, and Pune. The consultation process targeted stakeholders across the EV value chain with the participation of over 200 professionals representing financial institutions, OEMs, charge point operators, battery-swapping operators, battery manufacturers, digital service providers, fleet operators, and e-commerce players (see Exhibit 4). In addition to these activities, SIDBI regularly engages in one-on-one discussions with prominent stakeholders in the EV industry to ensure the design of the facility reflects the current situation of the EV sector.

Lessons from Stakeholder Consultations

Industry consultations enabled SIDBI to identify key financiers and their lending preferences for the electric two- and three-wheeler market. These discussions also helped in understanding the risks financiers face at an institutional and asset level and the subsequent impact on lending terms for EVs.

Exhibit 4 Overview of the consultations process



Note: "Others" refers to fintech, insurance companies, and financial advisors.

Financiers and Their Lending Preferences

The primary formal sources of electric two- and three-wheeler financing are scheduled commercial banks and NBFCs, which approach EV financing based on their unique risk profiles and targeted returns. The cost of lending to the end customer is typically a function of the cost of capital for the financier, operating costs of the financier, and the risk premium charged on the loans. Factors impacting the risk premium include the credit risk of the borrower, quality of collateral to be provided and depreciated or the residual value of these assets, as well as operating and technical risks associated with the business model. These factors influence the expected credit losses and returns for the financier, which have a significant impact on the terms offered to the borrower.

> **The cost of lending to the end customer is typically a function of the cost of capital for the financier, operating costs of the financier, and the risk premium charged on the loans.**

The cost of capital for commercial banks is generally lower than that for NBFCs. This allows commercial banks to offer more attractive lending terms to segments that are traditionally considered lower risk such as salaried borrowers. On the other end, NBFCs generally have a higher cost of capital because they target riskier segments such as NTC borrowers who are not able to avail themselves of commercial bank loans and/or borrowers who are acquiring newer technologies and are hence forced to pay higher rates.[iv] The nature of the NTC borrowers further adds to the NBFCs' operating costs because extensive on-the-ground presence is often required to follow up for on-time payments from NTC customers across remote geographies. Currently, NBFCs are the most prevalent source of financing for electric two- and three-wheelers in India. Commercial banks are gradually looking to build their comfort to enter this segment.[24]

Exhibit 5 summarises insights collected from banks and NBFCs and details how these parties evaluate the perceived and real risks of the electric two- and three-wheeler market.

iv. NTC refers to borrowers with less than a 12-month bureau vintage (i.e., have not taken formal credit that is captured by a credit rating agency).

Exhibit 5 **Difference between commercial bank and NBFC lending in two- and three-wheeler market segments**

VEHICLE	FINANCIER	CUSTOMER SEGMENT SERVICED	MARKET SHARE	MARKET OPPORTUNITY FOR EVS
Two-Wheelers The majority of the two-wheeler loans come from NBFCs in the Indian market.[25] NBFC's assets under management (AUM) saw a downfall in FY22 due to COVID. Nonetheless, two-wheeler loans of NBFCs are projected to grow at 10% in FY24.[26]	Banks	Provide financing primarily to salaried employees purchasing two-wheelers with a high credit score (700+).	Private banks funded roughly 30% of the two-wheeler market in FY22.[27]	Bankers are offering specific schemes for electric two-wheelers for salaried customers, while some are identifying ways to incorporate EVs into their existing two-wheeler lending portfolios.
	NBFCs	Provide financing for non-salaried, low-income two-wheeler borrowers.	NBFCs financed over 64% of the two-wheeler market, with captive NBFC financing representing the largest proportion in FY22.[28]	NBFCs are actively transitioning to finance electric two-wheelers as they consider this segment profitable.
Three-Wheelers In the electric three-wheeler market, e-rickshaw sales are the highest, but this segment is considered the riskiest because borrowers are NTC, cash collections are prominent, and driver income is highly variable because it is dependent on revenue from low-value sales from each ride. Electric cargo three-wheelers are considered a safer segment in comparison given their ability to recoup stable revenue returns.	Banks	Bankers avoid lending to three-wheelers (e-rickshaws, auto-rickshaws) due to the high-risk profile of borrowers.	Bankers hold a limited portion of financing for three-wheeler EVs to keep credit losses limited. The preferred route to finance this segment is by extending lines of credit to NBFCs or co-lending via NBFCs. Some banks have also extended direct loans to e-rickshaws.[29]	Bankers allocating a share of funding to electric cargo three-wheelers is considered low risk because drivers have a more stable earning potential.
	NBFCs	Non-captive NBFCs lead in funding cargo delivery (L5N),[30] with low risk due to driver–fleet tie-ups. A few local NBFCs finance lead-acid battery e-rickshaws.	Not many NBFCs entered the e-rickshaw market due to highlighted concerns. Although lending to electric cargo three-wheelers is attractive, this segment is growing slowly because sales volumes are significantly smaller than those of e-rickshaws. Therefore, focusing solely on cargo loans is not optimal for NBFCs.	NBFCs forecast a good market opportunity for the electric cargo three-wheeler segment because it is less risky and is slated to increase with the demand from corporations working towards their sustainability goals.

Note: Captive NBFCs refer to NBFCs primarily started by OEMs to finance their products. However, these NBFCs are not opposed to financing products of other OEMs. Noncaptive NBFCs refer to NBFCs that do not have any specific connections with OEMs.

EV Financing Challenges

There are two types of financing challenges that impact the lending terms offered by banks and NBFCs. The first are related to the institutional setup of the financiers and the second are related to lending to the EV, the underlying asset, and the NTC borrower.

Institutional Challenges

High Cost of Borrowing: Financiers are dependent on the underlying cost of capital they can access to price their loans. Rated and unrated NBFCs in the base-layer category with assets under management (AUM) of less than INR 1,000 crore (US$120 million) highlighted that their high cost of borrowing compared with the commercial banks and larger NBFCs significantly inhibits their ability to offer low-cost loans to end consumers (see Exhibit 6).[v]

Exhibit 6 Cost of funds for financiers

	SCHEDULED COMMERCIAL BANKS	SMALL FINANCE BANKS AND NBFCS (UPPER AND MIDDLE LAYER)	RATED NBFCS	UNRATED NBFCS
Reference cost of funds	6.54%	6%–8%	10%–14%	12%–15%

Note:

- Scheduled commercial banks include both public and private sector banks.
- Small finance banks refer to banks established under the guidance of the Reserve Bank of India (RBI) to provide savings vehicles to the underserved sections of society and supply credit to small businesses and marginalised farmers ("Draft Guidelines for 'On Tap' Licensing of Small Finance Banks in the Private Sector," RBI, September 13, 2019, https://www.rbi.org.in/scripts/bs_viewcontent.aspx?Id=3764).
- NBFCs are categorised per RBI's notification ("Scale Based Regulation (SBR): A Revised Regulatory Framework for NBFCs," RBI, October 22, 2021, https://www.rbi.org.in/Scripts/NotificationUser.aspx?Id=12179&Mode=0).
- Middle-layer NBFCs are those with AUM more than INR 1,000 crore (US$120 million), and upper-layer NBFCs are determined by RBI based on a set of parameters to distinguish NBFCs that have a large risk of systematic risks to the economy.
- The top 10 NBFCs in terms of their AUM are automatically included in the upper-layer NBFCs.
- Rated NBFCs are those that have obtained a credit rating from a credit assessment firm.

Source: "Lending and Deposit Rates of Scheduled Commercial Banks — August 2023," Reserve Bank of India, August 31, 2023, https://www.rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=56296 and expert interviews in discussion with the author, January 2023.

v. AUM refers to the total market value of the investment managed by the financial institution.

Lack of Capital Safeguard Measures: The two-wheeler market has witnessed an increase in annual gross nonperforming assets (NPAs) from 7.7% to 11.8% between FY20 and FY22 partly due to COVID-19.[31] As a result, the growing NPAs warrant NBFCs and banks to be more cautious in their lending to this segment. In the past, measures such as the Pradhan Mantri MUDRA Yojana (PMMY) scheme, which offers financiers a government-backed credit guarantee on behalf of MSMEs, has helped bankers extend credit to MSME borrowers, where the NBFCs have historically seen higher losses.[32] The lack of any external measures like PMMY that can help cover defaults incurred on two- and three-wheeler loans is causing financiers to not lend to this segment or charge higher interest rates if lending.

EV-Specific Risks: Financiers face five key risks in the EV market: counterparty, product, operation, repossession, and residual. As reflected in Exhibit 7, the risks associated with EVs are significantly higher than those of their ICE counterparts.

Exhibit 7 Difference in risks between ICE vehicles and EVs from financiers' perspective

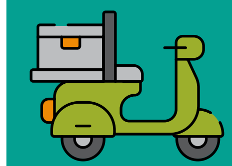
 **COUNTERPARTY** Linked with the borrower's ability to repay their loan	Most driver/owners of two- and three-wheelers come from low-income backgrounds and are new to credit with limited collateral to offer against the loan. These drivers would be joining fleet operators who are rapidly transitioning to electric vehicles due to the advantageous total cost of ownership terms across multiple use cases.	Slightly higher in EVs
	EV-focused fleet operators (especially those running electric three-wheelers), mobility, battery, and charging-focused startups are new in the market, have aggressive expansion plans, and are yet to turn profitable. ICE fleet operators are not new to the market and are familiar to financiers.	Higher in EVs
 **PRODUCT** Associated with batteries and charging technologies that are new to the market	EVs have a higher product risk as the technology is nascent and battery warranty conditions are evolving compared with ICE vehicles. Several OEMs are new to the market and have yet to establish themselves financially like ICE OEMs. There is higher theft risk associated with swappable batteries. Further, customers have often experienced a discrepancy in the actual range an EV runs versus what is promised by OEMs, hampering trust in the product.	Higher in EVs

Exhibit 7 **Difference in risks between ICE vehicles and EVs from financiers' perspective (continued)**

PRODUCT OPERATION Arises when the vehicle is not functional due to the paucity of service stations, mechanics, or charging infrastructure	EVs have fewer parts, which reduces expected maintenance costs. However, the lack of mechanics and limited after-sales services for EVs as opposed to ICE vehicles contributes to operational risks for EVs. While charging infrastructure is growing in the country and several drivers are charging their EV two- and three-wheelers at home, constraints regarding public charging access compared to the fuel stations for ICE vehicles contribute to higher operational risk.	Higher in EVs
REPOSSESSION Linked with the identification of the vehicle location and retrieval in case of default	Even though EVs can lower the repossession risk as they are equipped with a telematics device that can offer the vehicle's location in real time, specific legal protocol must be followed to retrieve the vehicle from the identified location. These protocols are time consuming and thus are unlikely to have a substantive reduction in the time taken to repossess.	Lower in EVs
	EVs face the unique risk associated with battery theft, especially of swappable batteries, unlike ICE vehicles.	Higher in EVs
RESIDUAL Risk pertaining to the difficulty in reselling a repossessed EV in case of default	EVs have high residual risk as the market for secondary sales has not been developed to the level of ICE vehicles. Rapid technology advancement in batteries would make older versions obsolete and reduce their residual value, unlike ICE vehicles which have a stable technology. Further while ICE vehicles can be easily refuelled and reused, offering a concrete value for the asset in the secondary market, the EV's value can diminish significantly if the battery goes into a deep state of discharge if not attended in time. This would require replacement with a new battery to make the asset useful again.	Higher in EVs

Higher Risk | Slightly Higher Risk | Lower Risk

Higher Loan Terms for EV Borrowers

Due to high institutional and EV-specific risks, the cost of electric two- and three-wheeler financing for end consumers remains a persistent bottleneck for EV adoption. While EV lending terms for salaried workers are relatively close to the terms offered on ICE vehicle loans, differences in lending terms are more pronounced for lower-credit borrower segments. For them, EVs are subject to higher interest rates, higher down payments (represented by low LTV ratios[vi]), and shorter tenures compared with terms on ICE vehicle loans (see Exhibits 8 and 9). Higher down payment requirements translate to EV lenders requiring more capital up front to make an EV purchase and shorter tenure on EV loans, which ultimately has resulted in higher EMI payments. Additionally, higher interest rates on EV loans lead to a larger interest payment over the course of the loan tenure. If ICE terms were applied to EV loans, the resulting EMI would be 5% to 14% lower.[33] The lower range of the interest rate for ICE vehicles reflects loans offered to the less risky segment, such as salaried customers and established corporations, and the upper end reflects the terms given to riskier segments such as NTC borrowers and small startups yet to establish profitability.

Exhibit 8 **Comparison between the lending terms for ICE vehicles and electric two- and three-wheelers**

VEHICLE		TYPE	AVERAGE MARKET PRICE (INR)	INTEREST	LTV RATIO	DOWN PAYMENT (INR)	TENURE (YEARS)	AVERAGE EMI (INR)
Two-Wheeler	High Speed	EV	1,35,000	17%–25%	75%	33,750	2.5–3	4,120
		ICE	1,00,000	12%–22%	80%–95%	10,000	3–4	2,857
Three-Wheeler	Auto-rickshaw L5M	EV	4,25,000	18%–23%	80%–85%	76,500	3–4	11,695
		ICE	3,00,000	10%–22%	85%	45,000	3–5	7,226
	Cargo L5N	EV	4,95,000	15%–22%	85%	74,250	3–4	13,683
		ICE	3,00,000	14%–20%	80%–90%	45,000	3–5	7,385
	E-rickshaw	EV	1,75,000	23%–35%	75%	43,750	1.5	9,078

Note: Interest rates refer to internal rate of return. The average market price reflects the on-road price without subsidies. Down payment and average EMIs are approximations based on the lending terms mentioned in the exhibit. E-rickshaw prices are based on the use of lead-acid batteries.

vi. LTV ratio reflects the percentage of the vehicle's value a financier is willing to finance.

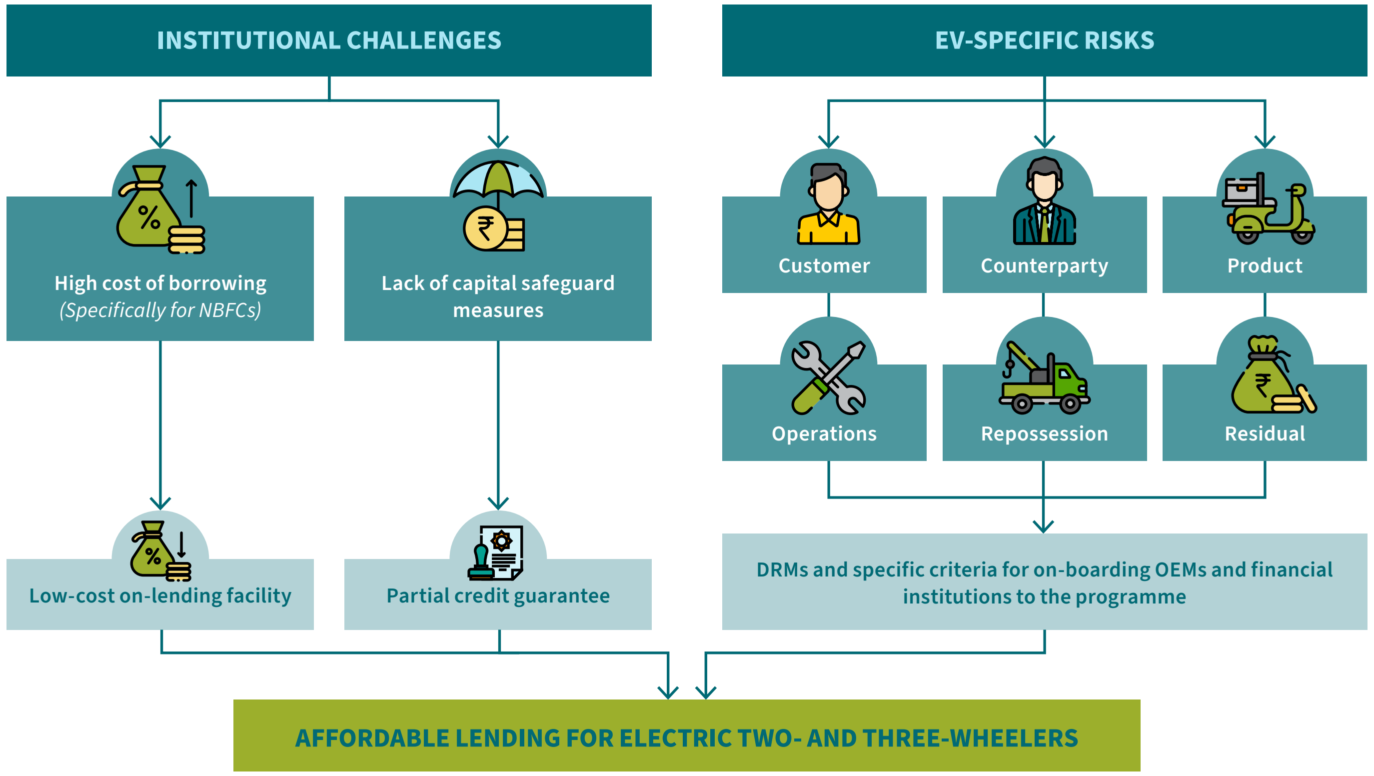
Exhibit 9 Comparison of EMI cost for electric two- and three-wheelers, applying EV terms versus ICE terms

VEHICLE		TYPE	MONTHLY INTEREST RATE	BORROWING AMOUNT (INR)	INSTALMENTS	MONTHLY EMI (INR)	MONTHLY EMI DIFFERENCE DUE TO FINANCING TERMS
Two-Wheeler	High Speed	EV Terms	1.8%	101,250	33	4,065	5%
	High Speed	ICE Terms	1.4%	121,500	42	3,858	—
Three-Wheeler	Auto-rickshaw L5M	EV Terms	1.7%	348,500	42	11,695	14%
	Auto-rickshaw L5M	ICE Terms	1.3%	361,250	48	10,238	—
	Cargo L5N	EV Terms	1.5%	420,750	42	13,683	13%
	Cargo L5N	ICE Terms	1.4%	420,750	48	12,141	—

Design Considerations and Details of the Finance Facility

Based on the insights gathered from the consultations, EV ecosystem players emphasised the need to develop products that alleviate financiers' risks, reduce lending costs, and promote measures that would build trust in the EV ecosystem (see Exhibit 10).

Exhibit 10 Information learned from the consultations



Based on the EV lending landscape and feedback from stakeholders, SIDBI has envisioned that the financing facility could offer (1) INR 1,036 crore (US$125 million) toward lower-cost loans (on-lending) to participating financial institutions (PFIs) for making EV loans, and (2) INR 1,036 crore (US$125 million) toward a PCG structured as a second-loss cover for EV loan portfolios of PFIs consisting of commercial banks and NBFCs. To avail the financing facility's products, the PFIs (commercial banks and NBFCs) would need to satisfy mandatory financier eligibility criteria. Additionally, such PFIs can use the financing facility's products to finance EVs of only those OEMs that meet certain mandatory OEM eligibility criteria. The PFIs would be encouraged to provide lending support to various participants in the EV ecosystem, including individual owners and corporate users, to promote EV use for commercial mobility. A unique value proposition of the financing facility would be its focus on DRMs that have been incorporated to mitigate EV-specific systematic lending risks, reduce operational costs, and build confidence in the EV ecosystem to facilitate increased capital flow towards EVs. To incentivise the adoption of DRMs, the financing facility will offer pricing discounts to the PFIs on the PCG as well as on-lending products.

Box 1 Insights from consultations to inform the design of the finance facility

The consultations highlighted three core areas of value to financiers that can help mitigate risks associated with lending in the EV two- and three-wheeler market:

1

Value of on-lending and PCG facilities

Financiers expressed the need for two key products: An on-lending facility and a PCG facility to address institutional risks. NBFCs, particularly small NBFCs that play a significant role in financing two- and three-wheelers, emphasised that an affordable on-lending facility would substantially benefit them by reducing their cost of borrowing. This reduction would enable them to provide more affordable loans to end consumers. Additionally, banks and larger NBFCs highlighted the importance of a PCG facility, which would assist in underwriting credit losses incurred by financiers up to a fixed percentage when lending to EV purchasers. Some financiers have already established market practices, such as first-loss default guarantees (FLDGs), with OEMs to cover losses resulting from product failures.

Consequently, a second-loss facility was identified as a valuable product to mitigate risks in the EV market. SIDBI would provide second-loss coverage once the initial credit loss is undertaken by financiers themselves (up to the programme-defined limit). The second-loss facility would also ensure that financiers avoid any moral hazard, assuming partial responsibility, and share the financial risk. The primary goal of the on-lending facility would be to reduce lending interest rates and fees. The PCG facility would enable financiers to expand their EV market coverage and offer more attractive overall lending terms. Overall, the intention of the facility is to expand the market for EV lending by drawing in more financiers to the two- and three-wheeler segments and drawing more capital from existing financiers in this segment.

2

Value of specific criteria for onboarding OEMs and financial institutions

Stakeholders also voiced the need to create trust in the ecosystem by having a process to vet and differentiate between credible OEMs and financiers keen to engage in the market. Thus, the envisioned financing facility would include mandatory eligibility criteria to onboard trustworthy financiers who have some prior experience in managing EV risks. Given the nascent EV financing market, these criteria would be tailored to reflect the market realities. The process would have a strong focus on onboarding large players active in the automotive lending sector to ensure sufficient scale for the facility. In addition, mandatory eligibility criteria for shortlisting OEMs would be included to ensure high-quality products that meet the minimum safety and performance standards as per regulations. Further, preference would be given to onboard OEMs that offer product warranties for meaningful time durations and robust after-sales services to reduce operational risks for end customers and financiers.

3

Value of DRMs

Financiers identified DRMs that lower risks, distribute liability, and build market confidence to unlock capital and attractive lending terms. The PCG and on-lending facility are examples of public sector measures, and financiers helped identify private sector measures such as contractual obligations like warranties, buyback agreements, insurance, innovative management practices, and business models that facilitate borrower underwriting and shift the financial impact of asset nonperformance to a third party. Financiers agreed that implementation of the DRMs can help reduce credit losses and operating costs and secure high residual value for EVs, enabling higher capital recovery in case of default. As detailed in the next sections, these measures carry substantial influence in galvanising capital investment in the EV market beyond the scope of the facility.

2.0

DRMs for Electric Two- and Three-Wheelers

The DRMs identified in this report focus on measures that would help reduce credit risks associated with EV lending and, subsequently, the risk premium expected by EV financiers. Financiers assess credit risk based on the EL of their lending portfolios. EL is calculated based on three elements:[vii]

- **PD:** The likelihood of borrower defaulting on a loan.
- **LGD:** The actual loss incurred by financiers after deducting the value they can derive from repossession and sale of the collateral on the defaulting loan.
- **Exposure at default:** The outstanding loan amount at the time of default.

This report identifies six DRMs based on extensive consultations with financiers and their ability to influence PD and LGD. Additionally, these DRMs were shortlisted due to their effectiveness in the near term. These were classified as follows: (1) general measures commonly adopted across all types of vehicle loans tailored to the EV sector; and (2) new measures specific to EV loans (see Exhibit 11).

Exhibit 11 DRMs shortlisted for developing deep-dive case studies

TYPE	DRM	DESCRIPTION
General Measures	**DRM 1** Collection System	Financiers build a hybrid collection system to handle digital and cash payments, send out digital payment reminders, and integrate the collection system with the loan management system.
	DRM 2 Repossession System	Financiers strengthen their vehicle repossession ability, reducing the time it takes to locate and retrieve a vehicle from a defaulted borrower.
	DRM 3 Expanded Insurance Coverage	Financiers prioritise lending for vehicles with comprehensive insurance over the loan duration and incentivise borrowers to take on additional EV-specific insurance products (zero depreciation, EMI protection, extended warranty, and charging covers).
EV-Specific Measures	**DRM 4** Telematics Data	Financiers use telematics data to understand vehicle utilisation to assess the borrower's income, identify the vehicle's location in case of default, and evaluate battery health to establish residual value.
	DRM 5 Secondary Sales Market	Financiers work to obtain a better residual value for repossessed EVs in the secondary market via tie-ups with EV ecosystem actors such as dealers, secondary sales platforms, third-party reselling agents, and battery recycling and refurbishing companies.
	DRM 6 Product Quality Assurance	Financiers prioritise lending for vehicles supported by OEMs offering quality assurance through warranties (at least until the loan tenure), after-sales services, and financial guarantees in case of product failure.

vii. EL = PD × LGD × exposure at default.

The identified DRMs seek to minimise persistent EV market risks, either directly or indirectly reducing risks. The impact of the six shortlisted DRMs in reducing the identified risks is articulated in Exhibit 12.

Exhibit 12 Impact of DRMs on reducing risk

COUNTERPARTY RISK	PRODUCT RISK	OPERATIONS RISK	REPOSSESSION RISK	RESIDUAL RISK
01 COLLECTION SYSTEM				
A well-designed collections system aligned with the borrower's income patterns would facilitate the borrower to service the loan.	–	–	–	–
02 REPOSSESSION SYSTEM				
–	–	–	An on-ground repossession team with clear protocols can reduce the time it takes to identify and retrieve a vehicle.	A repossessed asset in time is likely to get a higher residual value as the battery can avoid entering a deep state of discharge.
03 EXPANDED INSURANCE COVERAGE				
Depends on the cover taken by the borrower. For instance, EMI protection would help reduce the loss to a financer in case the borrower defaults on the loan.	Extended battery warranty insurance, offered by few insurers, can prevent the financier from facing the burden of technology failure.	–	–	Comprehensive insurance would give the financier an assurance of some level of residual value being covered in case of a theft or an accident of the vehicle. The financier has the first claim over insurance as the vehicle is hypothecated to them until the loan tenure.
04 TELEMATICS DATA				
Telematics can help the financier identify the potential income of the borrower from the driving pattern to ensure collections accordingly.	–	Telematics data can provide a sense of the battery health and whether the vehicle is being actively used. Further, battery health data can help invoke the insurance and reduce operational risk.	Geolocation can help to reduce the time it takes to identify where the vehicle is and retrieve it.	Telematics data can help understand battery health and hence evaluate the residual value of the vehicle depending on the state of the battery.

Exhibit 12 Impact of DRMs on reducing risk (continued)

COUNTERPARTY RISK	PRODUCT RISK	OPERATIONS RISK	REPOSSESSION RISK	RESIDUAL RISK
05 SECONDARY SALES MARKET				
–	–	–	–	A flourishing secondary sales market would provide comfort to financiers to gain a residual value for defaulted assets.
06 PRODUCT QUALITY ASSURANCE				
–	Warranties would transfer the risk of a technology failure to the OEM, safeguarding the financier from product risk.	Reduction in the downtime of the vehicle due to strong servicing would enable the borrower to earn a livelihood and repay the loan in time.	–	Vehicles under a warranty period would be able to get a higher residual value as the financer would have a backup to avoid product failure. Thus, long-term and comprehensive warranties are useful for reducing residual risk.

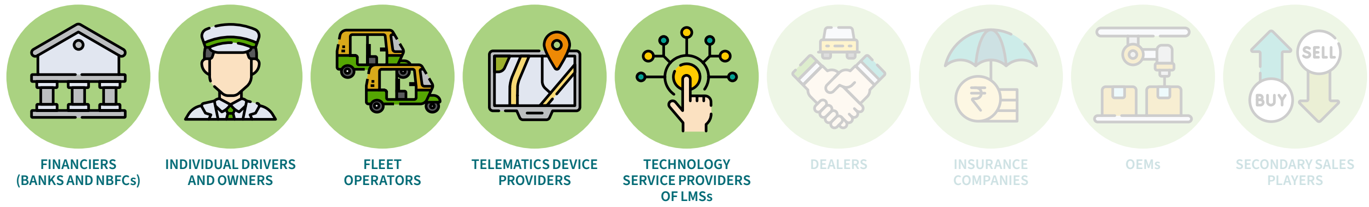
An effective DRM would enable a financier to directly reduce PD (i.e., reduce the chance of default by a borrower) and LGD (i.e., secure a high residual value for the EV in case of default), which lowers EL and, hence, risk premium.

The next sections present case studies on the six identified DRMs, highlighting the stakeholders involved, the mechanics of each measure, and associated best practices and implementational challenges.

DRM 1: Collection Systems

Financiers build a hybrid collection system to handle digital and cash payments, send out digital payment reminders, and integrate the collection system with the loan management system (LMS).

Stakeholders



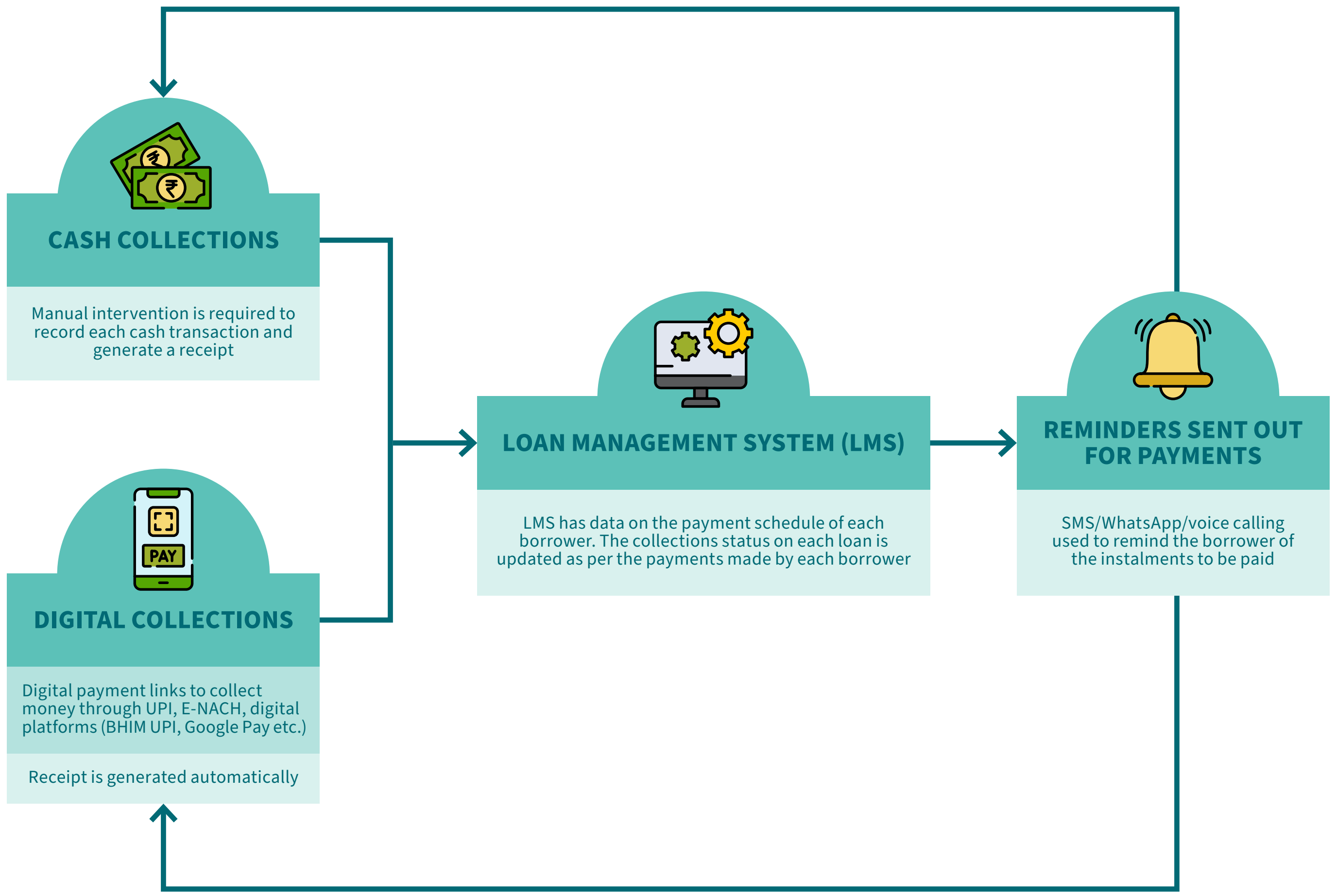
- Financiers (banks and NBFCs)
- Individual drivers and owners
- Fleet operators
- Telematics device providers
- Technology service providers of LMSs

Introduction

Financiers in the two- and three-wheeler market are heavily dependent on their collection system to ensure timely payments. The NTC customers are learning to get into the formal cycle of credit and often miss payments for multiple reasons such as lack of familiarity with the repayment system and lack of liquidity at the specific time of the month to make the payment. The two-wheeler market has approximately 50% NTC customers, and 4% of the payments are at PAR 31–90 DPD, followed by 3% of the payments at PAR 91–180 DPD as of September 2022, reflecting a significant delay for financiers.[34] Thus, financiers are focused on developing measures that can strengthen their collection system, suited to the income pattern of the borrowers. To streamline the collection system, many financiers are now going beyond the physical teams to digital means of collections. India recorded a significant boost in its digital payment architecture with the launch of the Unified Payments Interface (UPI) and access to low-cost mobile internet data. As of January 2023, 40% of all payments in India were digital, with close to 300 million individuals and 50 million merchants conducting regular digital payments even for the smallest ticket-size transactions.[35]

Building a robust collection system that allows for regular updates to the LMS, a software financiers use to automate their lending process from origination to underwriting to disbursal to repayment, is critical for banks and NBFCs to manage their loan books. However, the level of digital integration is a novel feature. In the basic form, digital collection systems allow for digital payment, which helps reduce the operating cost incurred during cash collections by financiers. A more advanced version of this system integrates the payment collection system with the LMS of the NBFC to monitor the status of repayments in real time (see Exhibit 13). This helps financiers determine the loans that are likely to turn into an NPA (i.e., no payment for more than three months), hence enabling them to initiate collections. The digital system would further enable financiers to prioritise measures for recovery amongst those borrowers who have defaulted on their first payment.

Exhibit 13 **Integration mechanics between the LMS and collection system**



Implementation

Collections are a critical aspect of any market, and financiers across the EV ecosystem adopt differing approaches to adapt to the electric two- and three-wheeler market. Digital collection systems are preferred because they streamline collections, reduce redundancy, enable traceability, and on the whole reduce operational costs for financiers because fewer staff are required for follow up for the payments. However, a fully digital system is often infeasible for the low-income borrower segment because cash payments are prevalent. NBFCs and banks also take various approaches regarding collection frequency, trailing daily and monthly collections, adopting the frequency to suit the customer segment they service, and managing their operational cost and efficiency.

Best Practices

Integrate digital payment options: Financiers have adopted various digital payment options to help borrowers choose their preferred method. By integrating the repayment schedule into the LMS, financiers enable borrowers to make payments through digital payment platforms. After the payment, the system generates digital receipts tracking all payments in a statement of account (payment summary schedule) to inform of any outstanding balances in real time. These systems can also send timely reminders to borrowers to make payments via integration with WhatsApp, SMS, and voice calls.

Encourage digital payment: Financiers use payment plans charging an additional amount for physical collection and offering a discount on digital payments to encourage digital payment behaviour. Digital payments have helped financiers reduce their transaction costs and increase their operational efficiencies by eliminating the need to hire staff that travels to collect payments.

Provide convenient cash payment options: By strategically locating collection points at places frequently visited (e.g., auto dealerships, auto stands) along routes routinely taken by borrowers, financiers can reduce potential delays in payments as well as optimise their operating (collection) costs. Strategic location is complemented by onboarding collections partners such as grocery stores and auto dealerships.

Partner with fleet operators and aggregators in collections: Some NBFCs are using telematics data to assess the daily income of the driver based on the distance driven in the case of commercial vehicles. They have tie-ups with fleet operators who can help financiers understand vehicle utilisation and income potential to assess a borrower's ability to repay the loan accurately. This helps the financier keep track of payment ability at all times and send payment reminders or links when the drivers cum owners (DCOs) have cash. Further, a useful technique to ensure timely payments is creating escrow accounts for the DCOs. A portion of the income earned per trip can be earmarked for loan repayment in an escrow account. This helps reduce the payment pressure on the driver at the end of the month and ensures on-time payment.

Tailor the frequency of collections: Daily collections are highly impactful for certain capital-constrained segments such as e-rickshaw drivers. In such instances, borrowers receive daily payment notifications. NBFCs lending to such borrowers keep a digital wallet account for the borrowers and deduct a small amount of the loan daily to ensure the borrower does not have to pay a large lump sum amount. NBFCs ideally prefer smaller, more frequent payments because this reduces the outstanding loan on the books of the financiers and allows them to recycle their capital for more lending within the ecosystem.

Implementation Challenges

Integration of digital payment options: A fully digital payment collection system for electric two- and three-wheelers would not be feasible because cash collections can range between 30% and 50%.[36] Given the prominence of India's informal sector, particularly in Tier 2 and 3 cities, cash transactions are a reality for financiers seeking to lend to a broad captive EV market.

Partnership shortcomings: As gig workers, drivers often work for several companies, and financiers find it difficult to interface with multiple companies to ascertain information about the borrower. A tie-up with just one fleet operator may not give the financier a complete picture of the driver's operations.

Collection processes that are cumbersome: Financiers are finding that increasing the collection frequency can cause undue operational burden; thus, daily collection systems are not always preferable.

Impact

A hybrid collection system is integral for all borrowers. Even though there has been a surge in digital transfers, a large portion of low-income borrowers deal in cash. Commercial fleet operators in e-commerce are more familiar with digital transactions because these platforms encourage online payments. Such online payment systems streamline collection processes and reduce the operational expenditure of such activities for NBFCs and other financing institutions.

Risks Addressed

Counterparty: A tailored collection system aligned with borrowers' revenue generation and spending patterns can help financiers manage their counterparty risk. This would allow them to monitor the potential defaulter and take corrective actions.

Financial Impact

PD: A strong collection system with timely reminders and multiple forms of payment enables a financier to reduce the number of borrowers who would default on their instalments. Additionally, the institution of a digital collection system can lower operational costs.

LGD: This DRM does not affect LGD because the role of the collection system is to ensure no default.

Examples of Companies Implementing the DRM

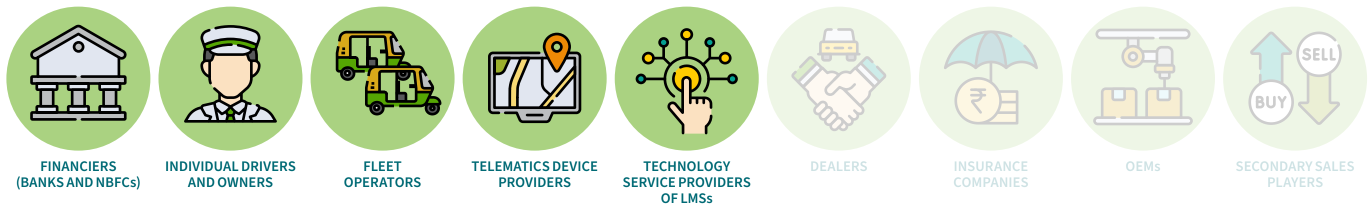
AMU Leasing is creating a hybrid collection system that is integrated with the LMS to inform timely collections.

Three Wheels United is developing an in-depth understanding of driver behaviour and vehicle usage patterns to inform the collection system. It has established ring-fenced escrow accounts for collections that give the larger NBFCs and banks lending to Three Wheels United visibility of cash flow from the loans that are administered by the startups.

DRM 2: Repossession Systems

Financiers strengthen their vehicle repossession ability, reducing the time it takes to locate and retrieve a vehicle from a defaulting borrower.

Stakeholders



- Financiers (banks and NBFCs)
- Individual drivers and owners
- Fleet operators
- Telematics device providers
- Technology service providers of LMSs

Introduction

Repossession refers to collecting the collateral (vehicle) from the borrower after a default on the loan. This is a standard practice for banks and NBFCs and deters default. As per Reserve Bank of India guidelines, financiers must follow a strict protocol concerning repossession. This includes proving that the financier has taken adequate measures to remind the borrower, filing a police complaint, and conducting repossession in a fair manner as per legal protocols. Over the years, lenders in the ICE vehicle segment have established strong systems for repossession. Financiers are following the same repossession mechanism for EV loans.

Financiers' repossession teams are usually separate and onboarded on a contractual basis. Financiers prefer not to have these teams as full-time in-house employees due to the lengthy legal proceedings and extensive workforce required for repossession. The repossession teams are paid a commission for each vehicle repossessed.

Implementation

Repossession involves a multistage process (see Exhibit 14) that begins with reminders and a formal notice. If payment does not resume even after this, the vehicle is repossessed and resold, enabling the financier to derive some residual value for the asset.

Exhibit 14 Repossession of EVs

30 DAYS PAST DUE DATE	60 DAYS PAST DUE DATE	90 DAYS PAST DUE DATE			
STEP 1 SOFT REMINDERS	STEP 2 LEGAL NOTICE	STEP 3 LOAN RECALL NOTICE	STEP 4 FIND THE VEHICLE	STEP 5 PARK REPOSSESSED VEHICLE	STEP 6 FIND VALUE IN REPOSSESSED VEHICLE
• Calling • Physical visits	• Notice suggesting legal action will be taken against defaulters sent	• Loan declared as an NPA • Police complaint filed	• Telematics used to identify the location • Immobilisation of the vehicle • Social media scanned to locate borrower • Support from fleet operator to locate the borrower	• Repossessed vehicles parked and charged at the dealership	• Sell the vehicle to a dealer or secondary sales platform • Refinance the vehicle

Best Practices

Set a cadence for payment reminders: NBFCs have established call centres to connect with borrowers who miss their payments. Additionally, on-the-ground staff is deployed to conduct physical visits to prompt repayment.

Issue a legal notice: NBFCs have identified that a formal legal notice is best sent after two monthly instalments are missed or when the account is 60 days overdue. Different financiers have slightly different protocols in place for communication because some choose to state a threat to repossess the asset within the legal notice. A timely legal notice was found to resolve 20%–30% of the default cases, resulting in the resumption of payments.[37] Many borrowers depend on the vehicle for their livelihood and do not want to lose their means of earning.

Establish loan recalls and standardisation: A standard practice followed by financiers is to issue a notice and file a police complaint. These documents are submitted in court to initiate legal proceedings for repossession.

Resell repossessed vehicles: Financiers can derive value from the repossessed asset using the following mechanisms: (1) refinancing the vehicle, wherein the original borrower usually comes to the financier with a relative to get the asset refinanced in their name; (2) reselling the vehicle in the secondary market; or (3) refurbishing the vehicle to be resold via local reselling agents or the unorganised market.

Implementation Challenges

Lengthy and onerous legal process for repossession: The legal protocols that allow financiers to repossess a vehicle cannot be bypassed and typically require one to two months to process. There is a series of legal stipulations on when and where a vehicle can be repossessed. For example, a vehicle cannot be repossessed at night and must be ascertained on public property. During this period, there is a high chance the EV's battery is not maintained well, hence downgrading the vehicle's performance.

Title change challenges when reselling a repossessed vehicle: A critical step in asset repossession and resale is to register it in the name of the new owner at the Regional Transport Office (RTO). Some financiers mentioned that they faced challenges because the RTO often insists on the physical presence of the existing owner before allowing the change in ownership. This is a bottleneck because the existing owners are defaulters and, at times, not traceable. Another challenge is that in the case of an electric auto-rickshaw, the change in ownership is only allowed five years after the vehicle's registration date.[38]

Impact

While all segments benefit from a strong repossession system, it is particularly important for electric cargo three-wheelers (L5N). The purchase price and hence the loan amount on the electric cargo three-wheeler is higher than electric two- and three-wheeler auto- and e-rickshaws, making financiers most interested in recouping value from three-wheeler cargo vehicles.

Risks Addressed

Repossession: A strong on-the-ground repossession team and clear procedural practices can reduce the repossession time.

Residual: An asset repossessed promptly is more likely to sell at a higher resale price in the secondary market, reducing the residual risk.

Financial Impact

PD: This DRM comes into force after a default and does not impact PD.

LGD: The financier should have a robust on-the-ground repossession team to locate the vehicle in case of default. This would help them sell the vehicle rapidly and reduce LGD.

Examples of Companies Implementing the DRM

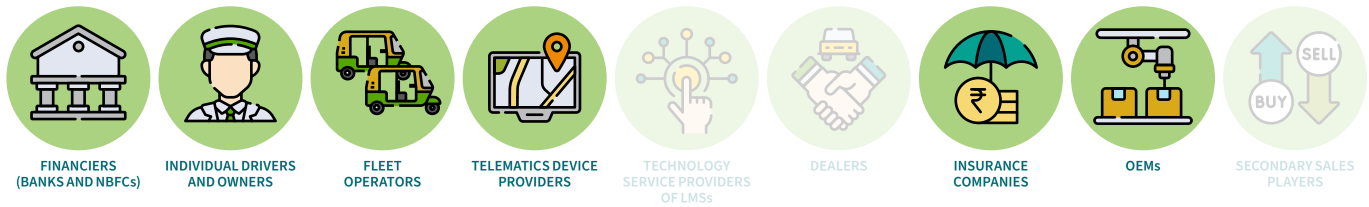
Bike Bazaar developed robust repossession and collection systems through a strong on-the-ground team of close to 600 employees.

State Bank of India has a dedicated department that deals with loan accounts turning NPAs due to default in repayment. The bank initiates all legal efforts for regularisation of the loan account or recovery of the loan. Once all efforts are exhausted, the bank takes possession of the asset and recovers the loan amount by auction.

DRM 3: Expanded Insurance Coverage

Financiers prioritise lending for vehicles with comprehensive insurance over the loan duration and incentivise borrowers to take on additional EV-specific insurance products (zero depreciation, EMI protection, extended warranty, and charging covers).

Stakeholders

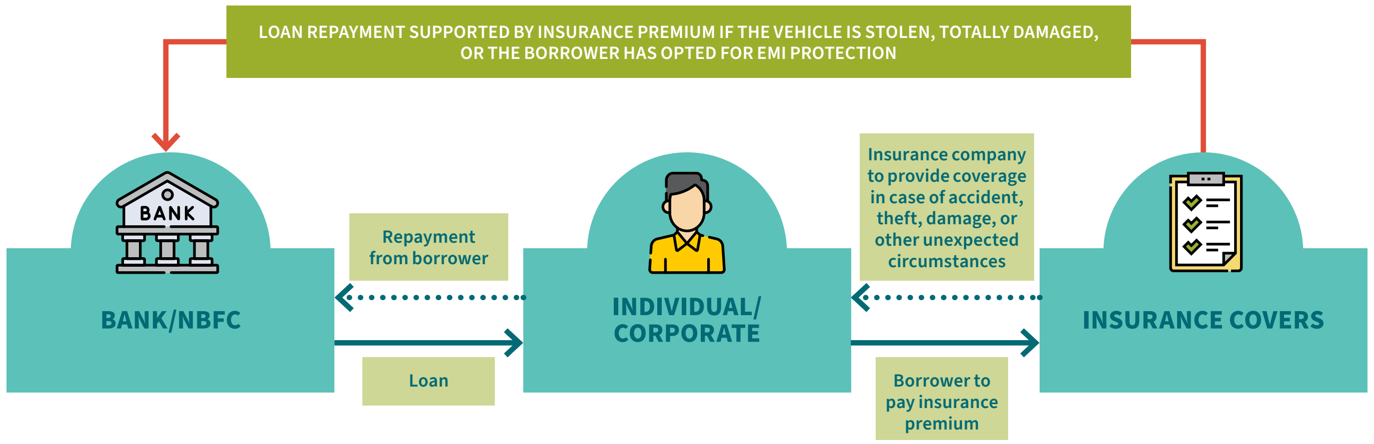


- Financiers (banks and NBFCs)
- Individual drivers and owners
- Fleet operators
- Telematics device providers
- Insurance companies
- OEMs

Introduction

Insurance serves as a financial safeguard for financiers if a vehicle is damaged or stolen. Financiers encourage borrowers to insure the vehicle for the entire loan duration because any damage to the vehicle, which acts as collateral for the loan, also affects the financier. In case of an accident or unforeseen incident that is covered by insurance, the insurance company first notifies the financier because the vehicle is hypothecated under the financier's name. The financier must give a no-objection certificate and hence the claim amount is processed to the insurance policy holder to get repairs. If the vehicle is in a state that it cannot be repaired, then the insurance company gives the claim amount to the financier to settle it against the loan amount that is remaining to be paid. Exhibit 15 demonstrates how insurance works to reduce a financier's risk.

Exhibit 15 Reducing financiers' risk through insurance



Implementation

There are three types of insurance covers:

Mandatory insurance policy and covers

Third-party insurance: Fixed amount for insurance that covers costs incurred from damages or liabilities to any third party and is mandatory as per the Indian government's guidelines.

Personal accident cover: Personal accident cover worth INR 15 lakh (US$18,000) is also mandatory and covers damages borne by the individual(s) in the vehicle in case of an accident.

The following covers are priced as a percentage of the price of the vehicle:

Recommended Insurance Policy and Covers

Comprehensive insurance: Insurance for the vehicle, in addition to the third-party insurance, in case of accident, fire, natural calamities, riots, or theft. Although comprehensive insurance is not mandatory, financiers encourage its adoption because it ensures the value of the vehicle — the collateral for the financier — remains intact.

Additional features: Borrowers can avail themselves of additional features such as zero depreciation (to retain value for specific components). Another feature is EMI protection, which safeguards borrowers against loss of income due to accident, theft of a vehicle, or any medical emergency involving the driver.

EV-Specific Insurance Covers

Charging protection: Financiers voiced the need to develop a cover that takes into account the risk associated with damage during charging or to the charger. This is not common in the market.

Cover for battery warranty extension: Insurers provide extended battery warranty coverage for specific OEM products. For instance, ACKO partnered with leading EV manufacturers such as Ola and Ather to offer an extended five-year warranty on the battery compared with the current three-year warranty offered by OEMs.[39] This is also a new offering to the market.

Best Practices

Integrate telematics data: Fintech players collaborate with insurance companies to develop pay-for-insurance-as-you-drive models based on the telematics data, underlining the vehicle's battery performance and driver usage. This helps distribute the insurance cost in small, frequent payments.

Manage cost premiums: Financiers often include the insurance cost in the EMI because many borrowers may not renew it annually. To encourage EV adoption, the insurance regulator provides a 15% discount on mandatory third-party cover compared with ICE vehicles on the premium amount.[40]

Offer zero-depreciation covers: An EV battery represents over 40% of the vehicle cost.[41] Without a zero-depreciation cover, the EV customer would only receive 50% coverage on the battery cost if an issue were to arise.[42] Insurance companies extend a zero-depreciation cover to EV batteries, covering 100% of the battery replacement cost and all other vehicle components.[43]

Provide EMI protection: This cover is extremely valuable for two- and three-wheelers used for commercial purposes because the livelihood and ability of the driver to repay the loan depend on the vehicle's ability to run.

Offer warranty extensions: Warranties offer financers confidence to provide long tenures to end customers.

Provide insurance protection for vehicle breakdown: Similar to EMI protection, insurance companies can explore offering coverage for extended repair periods due to EV mechanical failure from routine operations. This can be offered if the timeline for repair surpasses a reasonable duration.

Implementation Challenges

Price-sensitive customers opting out of insurance: The adoption rate of additional insurance covers such as EMI protection, battery insurance, and zero depreciation is very low. Electric two- and three-wheeler customers using the vehicle for their livelihood are extremely price sensitive, and even a marginal cost addition from additional covers is a significant dissuasion.

Cumbersome insurance operations: The process to file claims and the time to approve and receive the money can be cumbersome for customers, discouraging insurance adoption.

Added liability of insurance covers for batteries: Insurance companies currently offer coverage for battery damage but are hesitant to offer coverage for theft. This is because it is easy to steal batteries in battery-swapping model EVs because the batteries are designed to be removed. The market dynamics around battery theft need to be observed over time before insurance can be offered.

Covers for warranty extension: Evaluating battery pack- and cell-level data to offer extended warranty insurance is expensive for the insurance company.

Impact

Comprehensive insurance is essential for all borrower segments. Specifically, drivers associated with fleets drive for long hours and are potentially more prone to accidents than individuals buying the asset for personal use. Drivers and owners of two- and three-wheelers from low-income backgrounds would particularly benefit from specific covers such as EMI protection. The vehicle is often their only source of livelihood generation, and a fault in the EV or a medical situation could lead to default in EMI.

Risks Addressed

Counterparty: Insurance offers a safeguard for the borrower, reducing financiers' risk. When a borrower has comprehensive insurance, the insurer covers the repair cost in case of an accident or calamity. This ensures the borrower can recoup the value of their damaged asset and can enable them to repay their loan. In addition, EMI protection reduces the risk for the financier because they can get their repayment irrespective of the situation on the borrower's end.

Product: Extended warranty insurance covers reduce the technology risk faced by the financier and help them extend loan tenures.

Residual: Insurance provides residual value security because it makes the financier more certain of obtaining some monetary value for an asset when a vehicle is damaged or in an accident.

Financial Impact

PD: Under comprehensive insurance, the borrower would be eligible for a payout from the insurance company to repair their vehicle in case of damage. This would be useful to reduce PD because the borrower could make their vehicle operational again and earn income from it. Furthermore, EMI protection can significantly reduce the PD because it safeguards the borrower from situations that would make loan repayment difficult.

LGD: Comprehensive insurance can counteract LGD because it helps the financier recoup capital on the outstanding loan in case the EV is declared a total loss or stolen. EV-specific covers would further help reduce LGD. A zero-depreciation cover would increase the amount the financiers can claim from the insurance company and cover the operation risks because the financier can recover value for the vehicle irrespective of the exact condition of the vehicle. A cover for batteries and charging protection would reduce loss in such cases because the insurance company would offer compensation. Moreover, extended battery warranty cover helps reduce LGD because it ensures that the financier claims some recovery amount if the OEM's warranty is not provided.

Examples of Companies Implementing the DRM

cKers Finance formulated partnerships with leading insurance companies to ensure all vehicles financed have comprehensive coverage and additional features such as zero depreciation to ensure minimal losses.

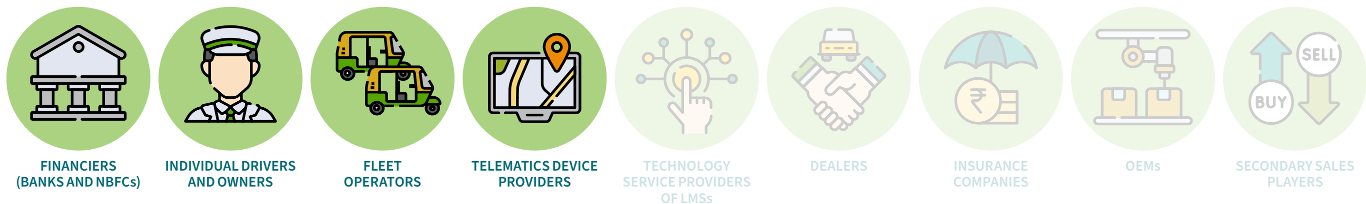
ACKO, a digital insurance company, invested in understanding the underlying EV technology of companies such as Ather and Ola to offer extended warranty insurance. It is also exploring pay-as-you-drive insurance models with fintech players.

Log9 launched the concept of differential lending terms based on the chemistry of the battery such as lithium titanate oxide (LTO), nickel manganese cobalt, and lithium iron phosphate. The company structured a curated programme to insure the credit and performance risk of the residual value of the LTO batteries. This has enabled long-term financing of EVs with LTO batteries because an assured buyback is offered by Log9 at the end of 60 or 72 months in addition to a six-year warranty with unlimited distance travelled and cycle life.

DRM 4: Telematics Data

Financiers use telematics data to understand vehicle utilisation to assess drivers' income, identify the vehicle's location in case of default, and evaluate battery health to establish residual value.

Stakeholders



- Financiers (banks and NBFCs)
- Individual drivers and owners
- Fleet operators
- Telematics device providers

Introduction

Automotive telematics is the use of telecommunications and geolocation to monitor and transmit data on vehicle operations. A device is installed to monitor vehicle movement, and data is transmitted wirelessly through an internet-enabled SIM card.

Three components are required to collect, transmit, and store data:

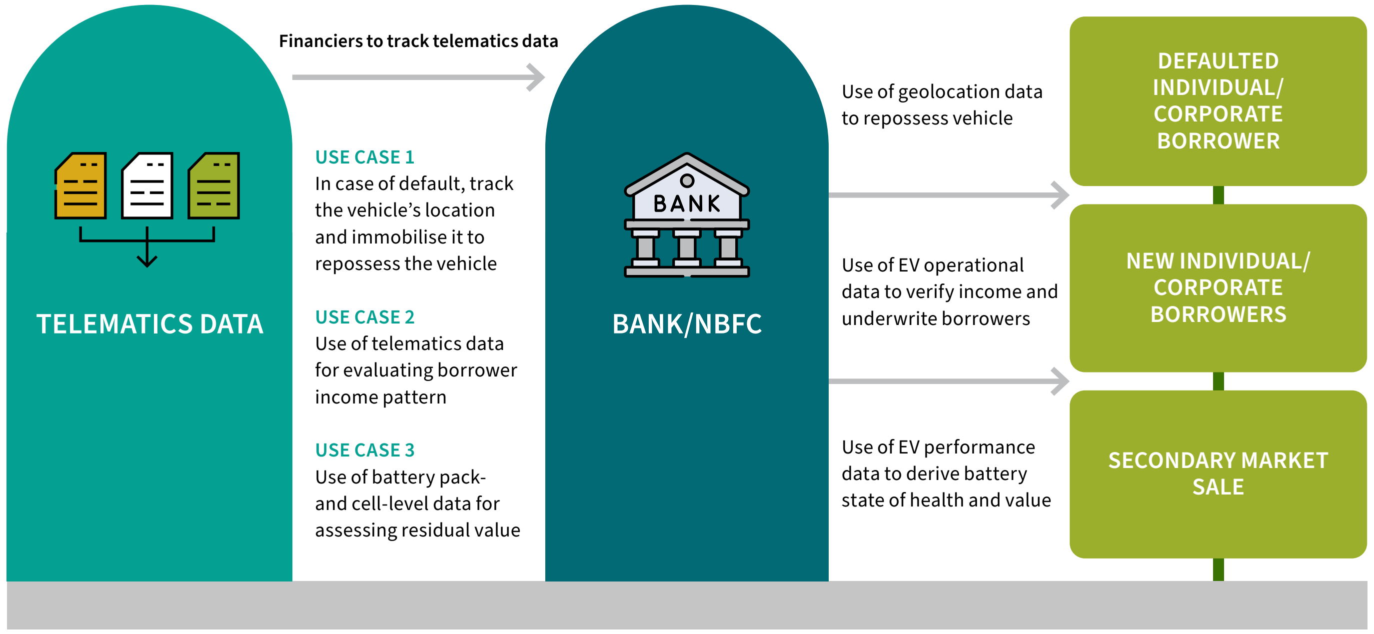
- **Telematics device:** Physical hardware installed in the vehicle. It can be installed by either the OEM or a third-party telematics firm.
- **SIM card:** A card that must be installed in the telematics device to transmit the data.
- **Cloud storage services and physical servers:** Storage for data transmitted from each vehicle to a server through cloud storage services, physical servers, or other means for parties to perform analysis.

Data can be collected on the location (GPS coordinates of the vehicle to track where it is placed at a point in time), vehicle use (data on odometer readings, speed, braking patterns), battery pack (information on how the battery pack is performing based on use and charging pattern), and cell level (data on how each cell is performing in the battery over time).

Implementation

Financiers can access telematics data in two ways. The first is paying to get data for a specific instance. Financiers can pay the OEM or telematics provider a one-time fee to access the GPS coordinates of a vehicle in case of default. This can be a one-time payment of INR 500–2,000 (US$6–$24) per vehicle.[44] The second way is to buy a monthly subscription to access data. Financiers can pay a flat fee per month per vehicle to access the vehicle's location, send reminders to pay on time, and manage the fleet.[45] There are some OEMs in the market offering telematics data for free to financiers. Financiers can use telematics to track the vehicle's location and immobilise it in case of default, monitor borrower income patterns, and assess battery pack and cell state of health (see Exhibit 16).

Exhibit 16 Primary use cases of telematics data and their mechanics



Best Practices

Using geolocation data: Data on a vehicle's location can enable a financier to keep tabs on the vehicle's safety and help them locate and repossess a vehicle in case of default. This is easy in the case of commercial vehicles associated with a fleet because the drivers are held liable for their movement with the goods and are compensated for optimally operating their EVs. Further, in case of a missed payment, the geolocation can help track the borrower for repayment to ensure the borrower does not turn into an NPA account.

Immobilising vehicles: Financiers can immobilise a vehicle via the control they have through the telematics device. Although there are no fixed protocols, financiers have suggested that extreme measures such as immobilisation are ideally dependent on whether the borrower has defaulted on payments, is unwilling to pay, and has moved the vehicle outside the geofenced area. In such situations, the financier is able to immobilise the vehicle and the borrower would need to repay their loan to continue to use the vehicle. In arrangements where the drivers take the vehicle for a daily or weekly rental, the fleet operator may immobilise the vehicle if the driver does not pay in time.

Evaluating income patterns with telematics: Emerging NBFCs and digital fintech players use telematics to track vehicles and evaluate driver income. They identify customers who do not run their vehicles and focus on resolving their issues. The collection team receives notifications from the telematics dashboard and works with drivers to identify the root cause of an asset being nonoperational. This system helps financiers manage their loans more effectively.

Collecting battery pack- and cell-level data: Emerging NBFCs and fleet aggregators and operators are keen to collect battery pack and cell data to monitor vehicle performance and battery state of health and prolong high-quality performance and battery life. They then use battery pack and cell data to notify drivers of a product failure and accordingly seek warranty claims.

Limiting the cost burden on borrowers: Contractual stipulations should be enacted to ensure that rates and the costs of using telematics data do not unduly climb over time and add a financial burden to the borrower. Additionally, data and analytical capabilities should be available to the borrowers so they can also benefit and possess more granularity on charging patterns, utilisation, and other relevant operational values to aid in preventive maintenance.

Implementation Challenges

Geolocation and privacy concerns: Tracking an EV's location in instances unrelated to default would lead to privacy concerns, especially for retail customers. Seeking consent from borrowers to collect GPS data is important to avoid privacy invasion. A number of principles should be followed: data minimisation (collecting only data that is necessary for the relevant purpose); data accuracy (correct or erase data that is not necessary or is inaccurate), use limitations (data is used only for legitimate and related purposes), data retention (retain data only for as long as necessary), informing data subjects of use and processing of data, and allowing data subjects the opportunity to correct information about them.

Immobilisation of vehicles: Financiers sometimes hesitate to take strong immobilisation action because it infringes on the owner's autonomy and privacy. OEMs also hesitate to offer such extreme measures to financiers because this area has limited legal guidance. Therefore, OEMs are exploring alternative measures to encourage timely payments, such as digital reminders and reduction in vehicle speed, if EMI is not paid timely.

Collecting battery pack- and cell-level data: Banks have mixed views on collecting battery-related data, with some considering intensive data collection less preferable than receiving a battery health overview using a diagnostic check. Additionally, OEMs are hesitant to share detailed battery information due to concerns about warranty claims. Regulations — AIS 156 rules — will require close monitoring of battery health for proper disposal.[46] Some OEMs are open to sharing battery pack health but not cell-level data. This is primarily because such granular data is cumbersome to store and share, and without sophisticated data analytics it is difficult to decipher or use such data to draw conclusions on the overall state and health of a battery holistically.

Managing cost premiums: Several large NBFCs and banks have yet to see the value of telematics play out. They are concerned about the additional cost involved in managing such data. The average cost of a telematics device, SIM card, and data plans is INR 3,000–10,000 (US$36–$120).[47] The cost to store 2–4 gigabytes of monthly data generated by such devices increases costs by INR 6–8 (US$0.07–$0.09) per month per vehicle. Setting up this entire data infrastructure requires financiers to set up cloud infrastructure, data processing capabilities, smart data pull, and warehousing mechanisms to keep costs low and data easily accessible. Additionally, data pipelines through such telematics require constant upkeep, maintenance, and monitoring, which accumulate to a significant expense.[48]

Installing third-party telematics devices: The degree to which OEMs share telematics data varies, and often there are logistical hurdles for fleet operators that use vehicles of multiple companies to track different formats and apps of telematics data. Thus, several financial institutions, fleet operators, and leasing companies outlined the need to insert their own additional telematics devices to collect vehicle data. However, an associated challenge with third-party-fitted telematics devices is that they are easier to manipulate and unplug than factory-fitted devices. Financiers mentioned they have often faced the challenge of the device being taken out of the vehicle, restricting their ability to immobilise the vehicle or collect data to make informed collection decisions.

Impact

Commercial fleet operators would benefit the most from telematics data. They could manage their fleet utilisation and track the vehicle's condition and driver's location. In addition, it is easier to gain consent to track the telematics data of fleet drivers because they willingly agree to be a part of the fleet, reducing data privacy concerns.

Risks Addressed

Counterparty: Telematics can aid in vehicle tracking, notifying the financier if a borrower is at high PD when not driving the vehicle.

Operations: Telematics can help assess operation risk by analysing the driving pattern. Battery health data can help invoke warranties to get a vehicle fixed.

Repossession: Through geolocation, telematics data can help reduce the time taken to identify the vehicle's location, making the repossession system more efficient. This would help reduce the operational costs incurred by the financier because they are able to leverage data to streamline operations.

Residual value: Telematics offer battery health data that can help develop a nuanced and clear understanding of the battery's remaining life. As a result, better knowledge of battery health can help financiers make a more informed decision on seeking a residual value.

Financial Impact

PD: Telematics data can help financiers assess a borrower's earning potential, giving the financier a better understanding of their ability to repay. This can help the financier price the loan and reduce PD. Telematics data can also help the financier activate their collection system to collect monthly instalments and avoid default.

LGD: Telematics data helps reduce LGD in the following ways:

- The use of telematics data would help reduce the time to locate the vehicle and hence create an opportunity to repossess the vehicle quickly, thereby limiting the level of depreciation between a default and resale of the repossessed vehicle. However, although locating a vehicle through telematics can aid repossession, following legal protocols may take time. Thus, the overall time saved may not be significant.

- Understanding battery health gives more clarity about a vehicle's potential performance. This will not necessarily help fetch a better residual value. The value may increase or decrease depending on the battery's health.

Examples of Companies Implementing the DRM

RevFin established an in-house rules engine to assess the telematics data received from each vehicle financed. The system is used to improve credit underwriting, support drivers in accessing warranties in case of vehicle malfunction, and inform the collections team to follow up for timely repayment.

MoEVing, a fleet aggregator, has worked towards installing third-party telematics devices in situations where the OEM does not share detailed telematics data. It is using the data to monitor the fleet, optimise operations, and keep track of battery health to ensure the vehicles are in good operating condition.

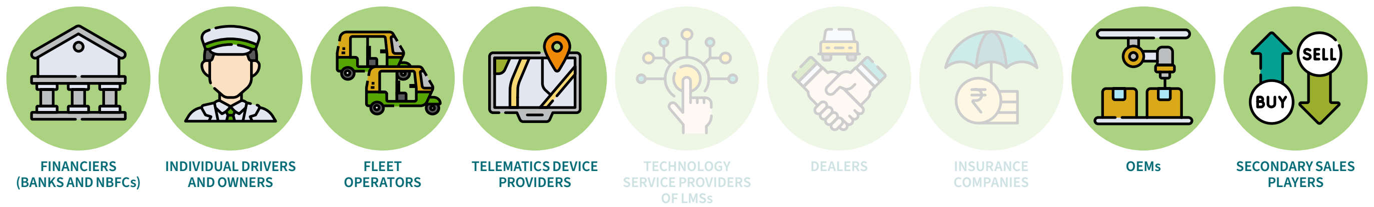
Mahindra Finance works closely with OEMs to understand the underlying technology and performance data generated from telematics to sharpen its lending models.

Euler is engaged in assessing battery health to improve product design of the vehicle. The OEM has tie-ups with financiers to offer them this data on a real-time basis to assist lending decisions.

DRM 5: Secondary Sales Market

Financiers work to obtain a better residual value for repossessed EVs in the secondary market via tie-ups with EV ecosystem actors such as dealers, secondary sales platforms, third-party reselling agents, and battery recycling and refurbishing companies.

Stakeholders

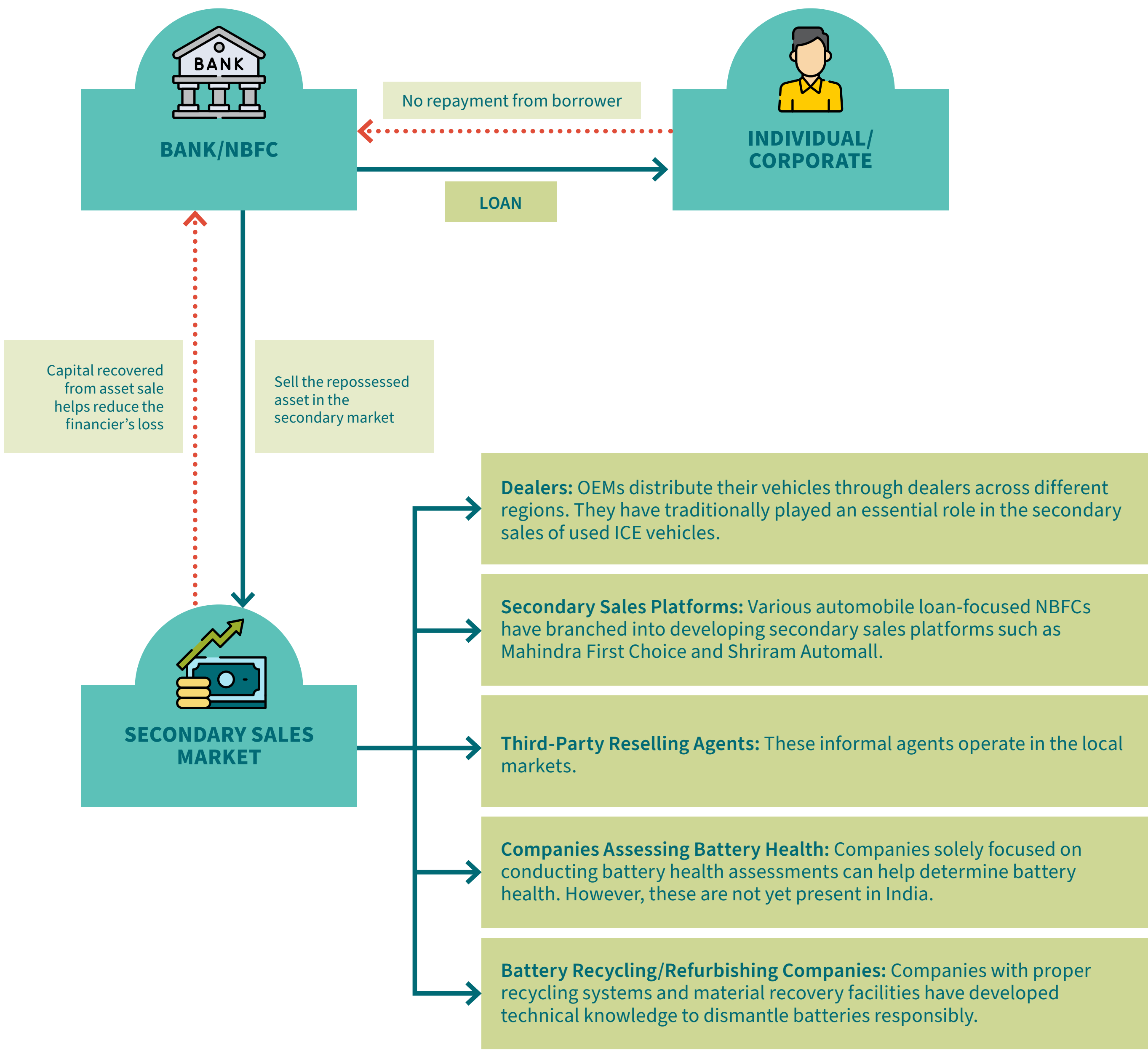


- Financiers (banks and NBFCs)
- Individual drivers and owners
- Fleet operators
- Telematics device providers
- OEMs
- Secondary sales players (dealers, recyclers, mechanics, secondary sales platforms, and battery health assessment companies)

Introduction

The development of a secondary market refers to (1) the establishment of a market for used EVs, and (2) reuse of EV batteries for mobility or stationary purposes. From a financier's perspective, the development of a secondary market is critical to pricing loans. The secondary market provides an opportunity for the financier to sell the repossessed vehicle and reduce the credit loss they would otherwise incur. Given the presence of a number of NTC borrowers, delays in payments, and historical credit losses, financiers have developed a high-risk perception of the two- and three-wheeler market. Thus, a well-established secondary sales market that provides clarity on the residual value of the vehicle is beneficial for financiers to build comfort in lending to the new asset and pricing in the risk on the loans they offer. Exhibit 17 outlines the different stakeholders involved in the secondary sales market.

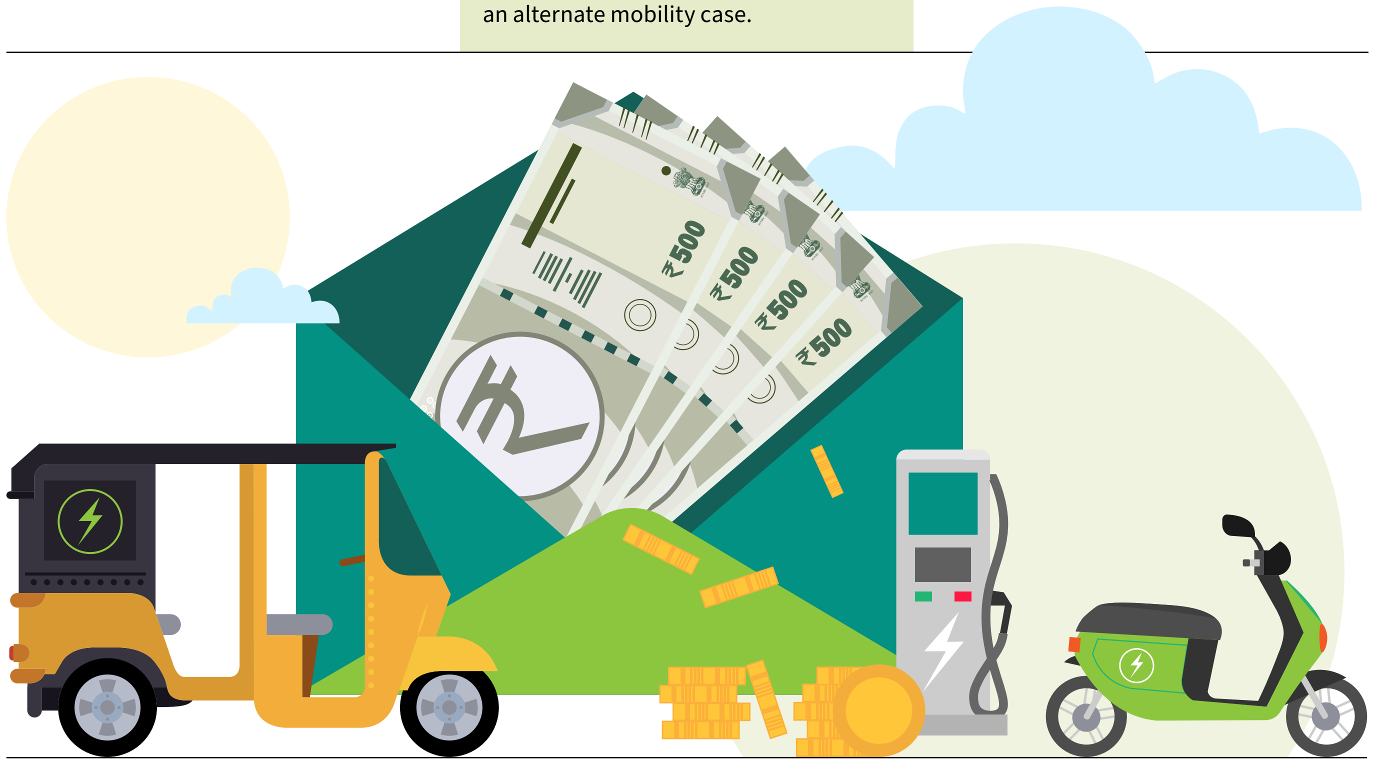
Exhibit 17 Mechanics of secondary market and role of different stakeholders



The state of the battery, overall condition, and health will be the deciding factors in determining a substantive residual value for the repossessed vehicle. Exhibit 18 underscores the options available to financiers to derive monetary value from the repossessed vehicle.

Exhibit 18 Use of electric two- and three-wheelers in a secondary market

CASE 1 Repossessed EV is in good condition and within warranty	CASE 2 Repossessed EV is not in good condition but within warranty	CASE 3 Repossessed EV is not in good condition and not within warranty
Refinance The asset is refinanced under the name relative of the original borrower for the remaining loan tenure.	**The vehicle is sold in the secondary market** The preferred option is to resell the vehicle due to uncertainty regarding its condition.	**Refurbishment** If the battery is highly degraded but still has a few cells in working condition, it can be repurposed for stationary use.
	Repairs are made to sell the vehicle Financers consider collaboration with OEMs an effective option as OEMs can repair the vehicle, which can then be re-financed. Fleet operators are a captive market for secondhand EVs, especially those working on slim margins as they value operational cost savings.	**Recycling** If the battery is highly degraded and has no working cells, then the EV, along with the battery, is sold to a recycler. The battery is recycled for its critical minerals, and the vehicle is scrapped.
	Refurbishment If an OEM cannot repair an EV, it can undergo refurbishment and then refinancing. Refurbishment turns the battery of the repossessed vehicle into a new battery pack that can be used for an alternate mobility case.	



Implementation

Several financiers mentioned that developing a secondary market can be one of the most powerful measures to build confidence to lend on more favourable terms for electric two- and three-wheelers. Technology assurance is the biggest impediment to the development of the secondary market. Without stable technology, the development of the secondary market would be extremely slow.

Best Practices

Promote vehicle refurbishment to drive vehicle and battery reuse: In case of refurbishment, the company makes a new battery pack with used cells. For instance, batteries from four-wheelers are repurposed into electric cargo three-wheeler batteries.

Develop tie-ups with dealers: Financiers typically partner with dealers to sell used EVs, with dealers taking a commission. The refurbishment cost is included in the loan extended by the financier to the new borrower. For instance, the incentive for dealers is typically 2%–3% of the outstanding loan on an electric three-wheeler.[49]

Assess battery health: Using diagnostics systems can enable EV ecosystem players to better understand the value of their secondhand vehicles because they can use this data to justify obtaining a high residual value if the battery's state of health is sound. Although companies solely focused on assessing battery health are limited, neutral third-party assessments of battery condition are required to build confidence among players.

Prioritise battery recycling: Recycling for EV batteries is progressing, with the government introducing supportive policies such as battery waste management rules; however, however, how these regulations are implemented across different states still needs to be addressed. OEMs are legally bound to ensure responsible recycling of batteries.[50] Recyclers obtain vehicles and battery packs from various clients, including insurance and battery manufacturing companies. They assess battery health and issue extended producer responsibility certificates for legal responsibility.

Implementation Challenges

Performance and safety concerns with refurbishment: The most prominent challenge with refurbishing battery cells is the safety concerns of using batteries for secondary purposes.

Lack of secondary sales platform incorporating EVs: Currently, most secondary sales platforms focus on ICE vehicles. Financiers highlighted that they are yet to derive value from such platforms for EVs. As the EV market grows, the demand to list electric two- and three-wheelers will increase on such platforms.

Need for technological advancement and scaled recycling: Battery recycling is still nascent. Many financiers mentioned that they do not have tie-ups with formal recyclers because this space comprises many informal recyclers working primarily with lead-acid batteries. Additionally, setting up formal recycling plants is expensive because costs depend on the complexity of the technology used to segregate the materials.

Non-eco-friendly practices of third-party reselling agents: Local operators are often engaged in practices that are highly toxic and not environmentally friendly for recycling lead-acid batteries.

Impact

All segments require the development of the secondary market to derive considerable residual value of the vehicles and increase market confidence.

Risks Addressed

Residual: A flourishing secondary market would make financiers confident to provide loans to the segment because they would be assured of recouping value through resale. In effect, they could offer end consumers more attractive and flexible lending terms.

Financial Impact

PD: A flourishing secondary market would indirectly impact PD. If vehicles are considered valuable by the borrower, their default incentive would be reduced. This would depend on their perception of the vehicle's value compared with the outstanding loan. Thus, the higher the residual value because of a flourishing secondary market, the lower the PD.

LGD: Strong connections with secondary market buyers of the vehicles can help financiers sell their repossessed vehicles faster to recover money and lower LGD.

Examples of Companies Implementing the DRM

Zipbolt Innovations uses artificial intelligence and machine learning to reengineer batteries from large electric cars and e-buses into modular lithium-ion batteries for e-rickshaws, e-bikes, and direct current fast charging battery energy storage systems. The company has been leasing out smart 4 kilowatt-hour repurposed battery packs to e-rickshaw drivers in the swapping segment.

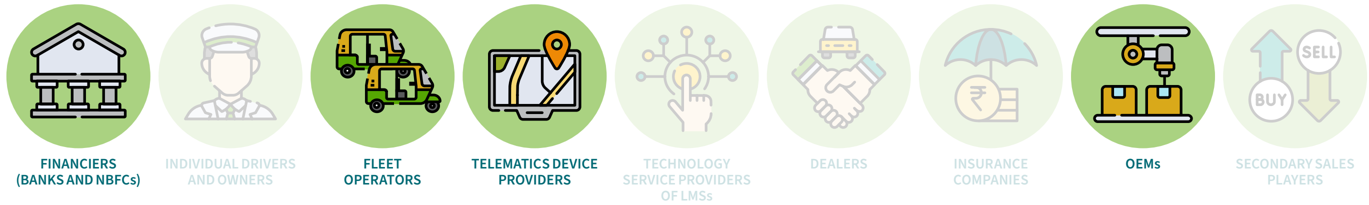
Attero established a material recovery facility to ensure proper and safe recycling of batteries.

VidyutTech is developing a data-science-powered certification system that validates the battery health of the vehicle. This can be used by financiers to build confidence in the battery performance of a secondhand vehicle.

DRM 6: Product Quality Assurance

Financiers prioritise lending for vehicles supported by OEMs offering quality assurance through warranties (at least until the loan tenure), after-sales services, and financial guarantees in case of product failure.

Stakeholders



- Financiers (banks and NBFCs)
- Fleet operators
- Telematics device providers
- OEMs

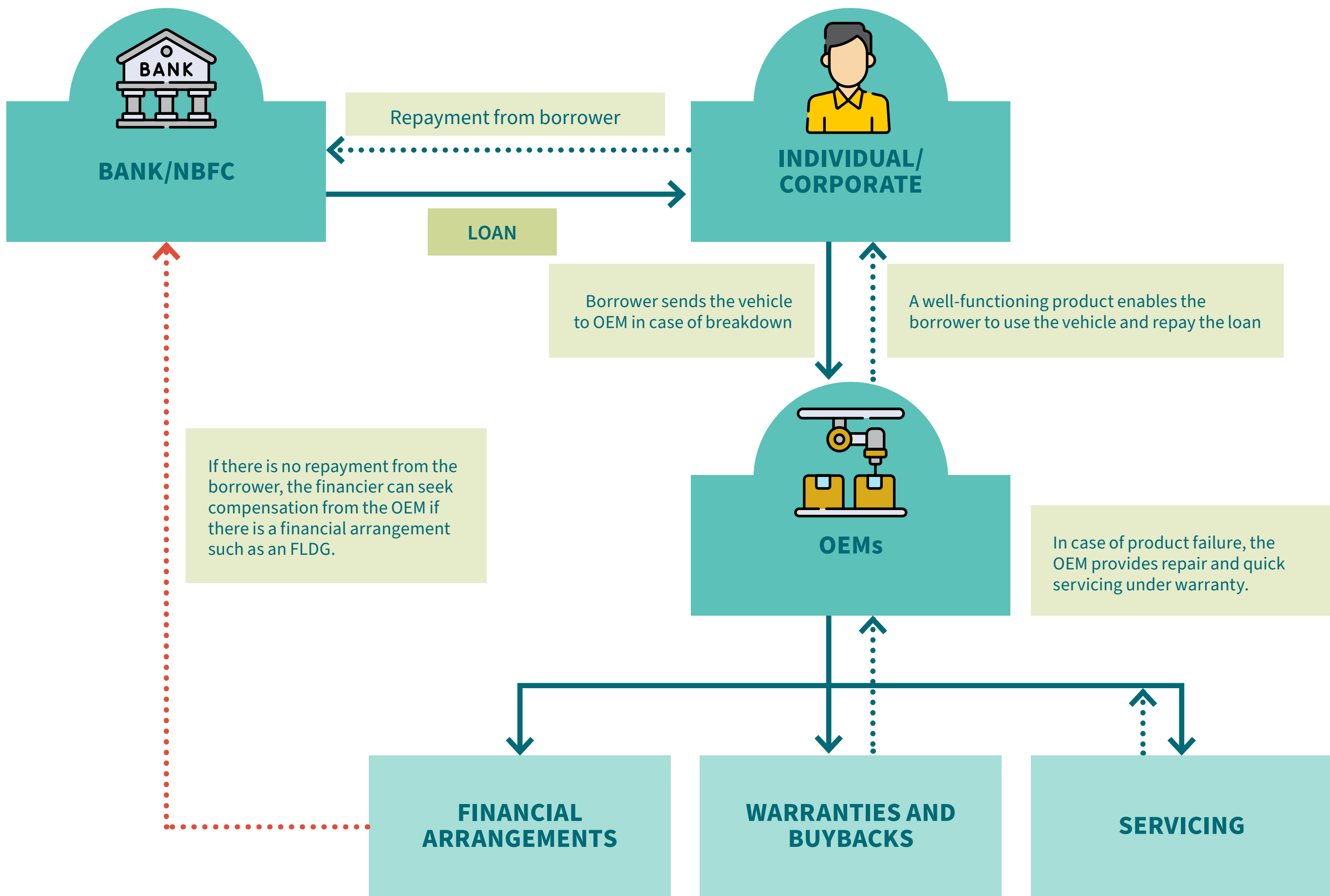
Introduction

Technology risk is one of the most significant risks financiers face concerning EVs. To avert this, OEMs provide warranties for their products to assure asset quality. These warranties can also include a performance guarantee assuring customers that the battery meets the performance criteria for a specific period. Under warranty, the OEM can choose to replace the unrepairable vehicle in the event of a severe product failure. Some OEMs also offer product buybacks but typically only when these parties are establishing themselves and their products. The OEM offers a resale value for the vehicle if it is in decent operating condition to give confidence to buyers of the EV that the product they purchase will have value in the long term if maintained well.

OEMs have developed service centres to address customers' repair and maintenance concerns. These help reduce operation risks faced by customers due to regular wear and tear of the vehicle. A quick turnaround is crucial to instil trust in the product and OEM. To further enhance customer satisfaction, OEMs offer service-level agreements (SLAs) to large corporations purchasing EVs in bulk. These SLAs assure quick repair turnaround for an additional charge, reinforcing the OEM's commitment to efficient after-sales support.

Additionally, some OEMs new to the market offer FLDGs to financiers to capture market share. An FLDG is a financial instrument wherein the OEM is willing to bear a specific portion of the loss incurred by the financier while giving loans for the OEM's product. Exhibit 19 illustrates the role OEMs play in assuring high-quality products.

Exhibit 19 **Mechanics of product quality assurance by OEMs**



Implementation

Financiers are working with OEMs to implement the following:

- **Warranties and buyback:** Use of performance guarantees or buyback policies
- **Financial agreements:** Issuance of FLDGs and contribution to risk pools
- **Servicing:** Development of after-sales service stations and SLAs with large buyers and dealers, and training of skilled maintenance technicians and service operators

Best Practices

Offer warranties: OEMs of electric two- and three-wheelers typically offer warranties of up to three years but can offer longer warranties on their batteries. Some OEMs offer warranties of up to five years for an additional cost and buybacks on faulty products. The perspective of financiers and OEMs regarding their use differs. Financiers prefer that OEMs offer buybacks, taking responsibility for their products. New OEMs are sometimes willing to offer buybacks, but they scale back as they build confidence in their product because buybacks can be perceived as low confidence in the product. Alternatively, dealers can offer buybacks on behalf of OEMs to create initial confidence in the market.

Increase the availability of vehicle servicing: Some OEMs have established strong servicing thresholds to deploy service centres within a 50-km radius of EV stores to provide a seamless after-sales customer experience.[51] OEMs have predetermined time-specific turnaround breakdowns and recommend routine servicing after driving a certain number of kilometres.

Train service personnel: OEMs train technicians at different levels to ensure comprehensive coverage in the nascent market for skilled EV mechanics. Typically, the process involves online certification courses for basic troubleshooting and regional training at service centres conducted by OEM employees. As a final step, technicians from different dealerships in a region undergo a monthly detailed vehicle teardown at the factory for repair understanding.

Implementation Challenges

Stakeholder misalignment in the development of financial agreements: OEMs object to providing FLDGs because they are largely only willing to underwrite technology risk and not credit risk. OEMs also point out that financiers may become lax in upholding credit standards with access to FLDGs. Conversely, from a financier's lens, most defaults are due to product failure, with the responsibility resting with OEMs. Financiers argue that wilful defaulters are limited because most low-income borrowers of electric two- and three-wheelers default because their vehicles malfunction. Negotiations between OEMs and financiers are prevalent in the market, and these contracts have no specific standard.

Lack of vehicle servicing: A servicing centre needs to be within the range of where a vehicle is operated or has access to charging; otherwise, there is no way to get the vehicle to the store. Additionally, OEMs noted several challenges in the product are caused by an unstable grid that impacts the vehicle while charging.

High investment to train service personnel: The servicing market is nascent and requires workforce development and investment.

Impact

All vehicle segments need extended warranties and high-quality servicing to build market confidence.

Risks Addressed

Product: Warranties transfer the risk of failure due to a breakdown or product malfunction to the OEM. This is the most useful way of ensuring the technology risk rightly remains with the OEM.

Operation: Quick service from OEMs helps reduce vehicle downtime, minimising revenue loss for the driver.

Residual: Comprehensive and long-tenure warranties can help increase the residual value because a vehicle within warranty can ascertain a higher market price in the secondary market than one with an expired warranty.

Financial Impact

PD: Well-maintained vehicles under warranty and with thorough servicing would be valuable to borrowers, making them less likely to default on the loan.

LGD: If OEMs offer extended warranties and strong after-sales service, the vehicle's condition will improve, resulting in better resale value and low LGD. FLDGs offered by OEMs can also help directly reduce losses for the financier, thus reducing LGD.

Examples of Companies Implementing the DRM

Euler provides an extended warranty of an additional two years on the product for an extra cost. It also offers SLAs to corporate clients to ensure speedy repair and maintenance of the products.

Ather offers a comprehensive warranty for five years that not only is based on the distance travelled by the vehicle but also assures battery performance. The company has tie-ups with dealers and financiers who have a physical presence in Tier 2 and 3 cities to provide customers with financing options at the point of sale of the vehicle itself.

Piaggio established detailed protocols that outline a predetermined turnaround time for fixing each type of breakdown. It has also developed a model for training technicians that includes multiple rounds of training and detailed factory visits.

Interaction between DRMs

While each of the six DRMs holds value, they work complementarily to reduce the EV market lending risk and are most effective when deployed together. Based on qualitative interviews, Exhibit 20 reflects how DRMs are interrelated.

Exhibit 20 Interconnection amongst the DRMs

COLLECTION SYSTEM (DRM 1) AND REPOSSESSION SYSTEM (DRM 2)

A strong collection system that is digitally updated will give the financier a clear picture of their portfolio at risk. This would inform which vehicles need to be repossessed and where the team needs to intervene. This system can help the financier streamline operations and reduce operational costs that are incurred while repossessing a vehicle.

PRODUCT QUALITY ASSURANCE (DRM 6) AND SECONDARY SALES MARKET (DRM 5)

Long-term warranties from OEMs will boost the secondary sales market. Customers will be more confident buying vehicles under warranty, which covers repairs and breakdowns, making EVs more appealing.

INTERCONNECTED DRMS

EXPANDED INSURANCE COVERAGE (DRM 3 AND PRODUCT QUALITY ASSURANCE (DRM 6)

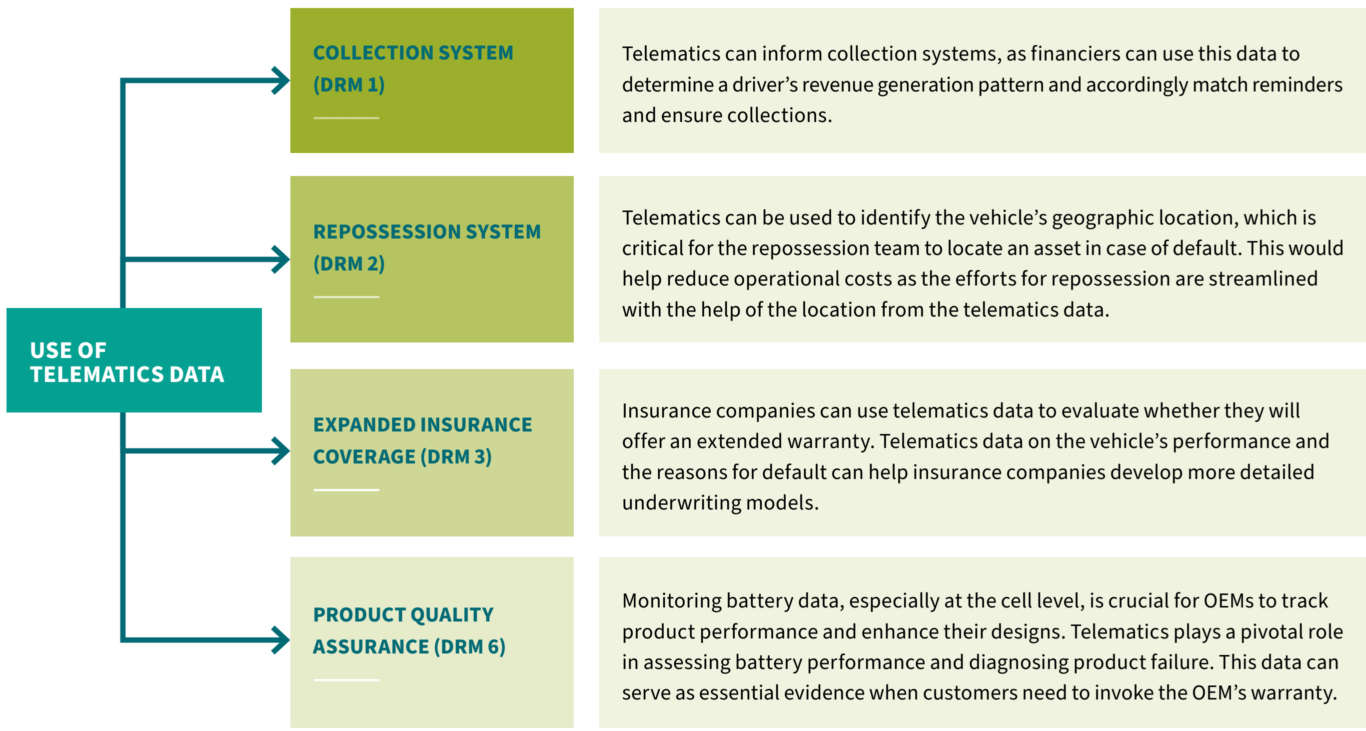
Insurance covering extended warranty reinforces OEMs' warranty and makes financiers confident to bet on the products of new and upcoming OEMs.

EXPANDED INSURANCE COVERAGE (DRM 3) AND SECONDARY SALES MARKET (DRM 5)

Insurance companies have data on vehicle performance, accidents, and repairs that can aid in pricing secondhand vehicles. They can partner with dealers, OEMs, secondary sales platforms, and financiers to offer insurance for used EVs, opening a new market segment for the insurance company and boosting secondary market sales.

The use of telematics data is the most crosscutting DRM. This data adds granularity to a vehicle's operations and location and can support the implementation of other DRMs (see Exhibit 21).

Exhibit 21 Use of telematics data across DRMs



Derived Market Impact of DRMs

Financiers identified three main impacts of DRMs:

1. **Increasing operational efficiencies:** DRMs such as a digital collection system (DRM 1) would lead to reduced operating costs. Digital payment collection options, supported with geolocation through the telematics data, would make it easier for financiers to ensure on-time payments and hence reduce the risks associated with lending to offer attractive loan terms. Thus, institutionalising DRMs in the market can help attract financiers, fostering competition that could ultimately lead to an interest rate reduction of EV loans.

2. **Reducing EL:** A strong repossession system (DRM 2) supported by geolocation of the vehicle through telematics data is critical to reducing the time it takes to retrieve a defaulted asset. This further helps ensure the battery of the vehicle does not go into a stage of deep discharge and the performance of the vehicle is not hampered. Product quality assurance (DRM 6) and secondary sales market (DRM 5) are important in maintaining EL at or below the market threshold.[viii] The assurance of quality through the institution of buyback agreements, service agreements, and financial tools such as FLDGs boosts consumer and financier confidence and lowers EL. Additionally, a well-functioning secondary market can help financiers price LGD more realistically rather than taking the worst-case scenario as the default. Financiers further highlighted how several other DRMs assist in minimising losses. These include DRM 3 on insurance to shift the risk of extreme situations away from financiers, and DRM 2 on swift repossession to facilitate quick sale in the secondary market. Financiers also mentioned that measures beyond the identified DRMs, such as FLDGs from multilateral development banks and coverage from reinsurance companies,[ix] can help reduce extreme EL.[x]

3. **Promoting transparency:** Telematics data (DRM 4) is the most crosscutting DRM, enabling significant visibility into an opaque and nascent market and reducing the gap between perceived and actual risks. Financiers proposed that telematics can significantly contribute to decreasing LGD by identifying the vehicle's location and evaluating the battery's condition for resale in the secondary market. Additionally, telematics would help reduce PD by enabling financiers to monitor vehicle movements, assess drivers' income potential, and send timely collection reminders to reduce the likelihood of default.

Exhibit 22 outlines the impact the six DRMs can have on PD and EL, influencing the risk premium and hence improving the lending terms for the end electric two- and three-wheeler borrowers.

viii. As per market research, EL of less than 3% is an acceptable threshold.

ix. Reinsurance companies are institutions that offer insurance to primary insurance companies to manage their financial risks.

x. As per market research, EL of more than 10% occurs in situations of extreme macroeconomic instability.

Exhibit 22 Impact of DRMs on reducing EL

	IMPACT ON PROBABILITY OF DEFAULT
1 Collection System	• A strong collections system with timely reminders and multiple forms of payment enables a financier to reduce the number of borrowers who would bounce on their instalment.
2 Repossession System	• This measure comes into force after a default has happened. It does not impact the PD.
3 Expanded Insurance Coverage	• If a person has opted for additional covers like EMI protection (to protect from loss of income due to damage/theft to the vehicle or self), then that helps the borrower pay off their loan's EMI and avoid PD. • Insurance for a breakdown of the vehicle would help reduce PD, as the borrower can use this to repay the loan.
4 Telematics Data	• Telematics data would help the financiers assess the likely income of the borrower, which can help the financiers better understand the borrower's ability to repay. Accordingly, this can help the financier to price the loan and reduce PD. • The data can also help the financier activate their collections system to collect the monthly instalments and avoid bounces in payment.
5 Secondary Sales Market	• A flourishing secondary market would have an indirect impact on the PD. If vehicles are seen as valuable by the borrower, then their incentive to default would be reduced. This would depend on their perception of the vehicle's value compared with the outstanding loan. Thus, the higher the residual value because of a flourishing secondary market, the lower the PD.
6 Product Quality Assurance	• Well-maintained vehicles under warranty and through servicing would be valuable to the borrower. They would be less likely to default on the loan.

Higher Impact   Medium Impact   No Impact

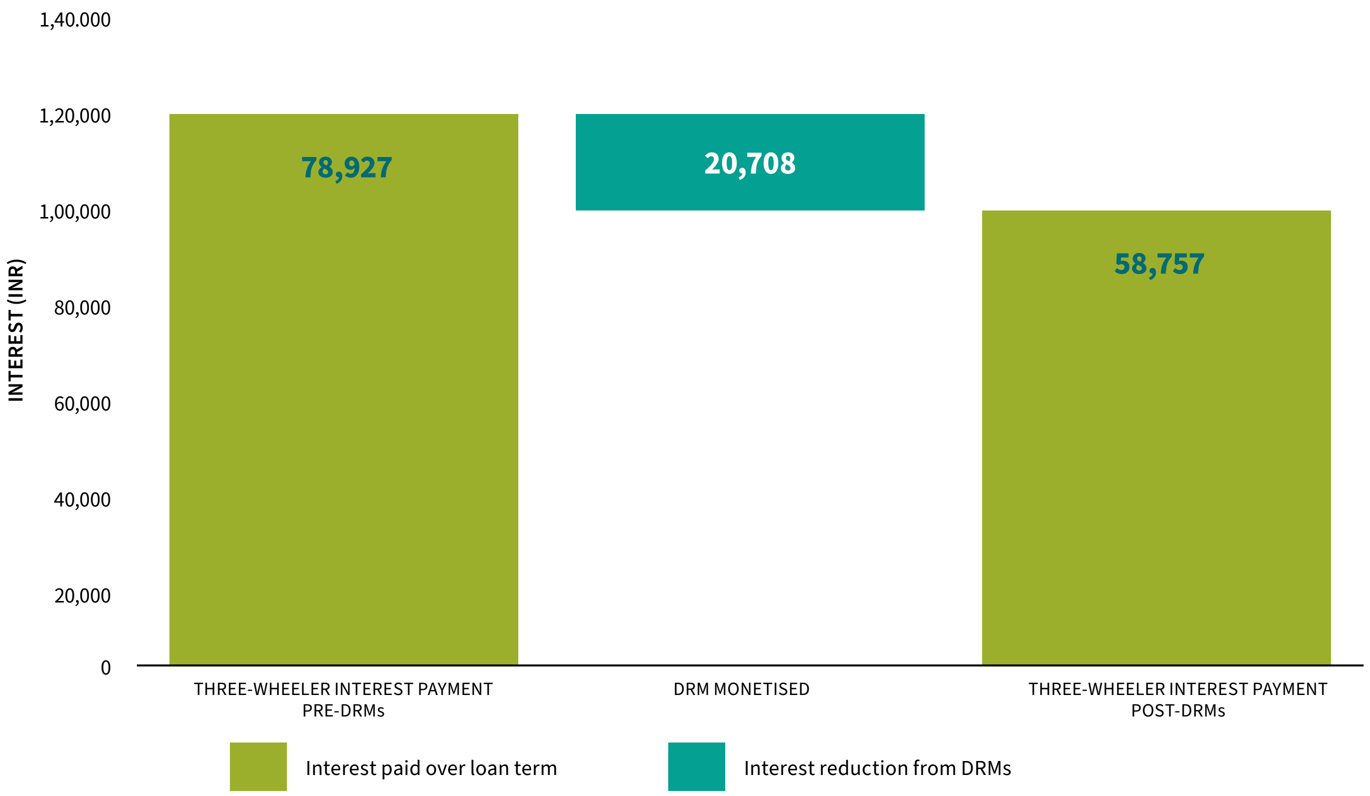
Exhibit 22 Impact of DRMs on reducing EL (continued)

	IMPACT ON LOSS GIVEN DEFAULT
1 Collection System	• The role of the collections system is to ensure no default. It does not help get a better residual value for the defaulted asset.
2 Repossession System	• A financier must have a strong on-ground repossession team as it helps to locate the vehicle in case of default.
3 Expanded Insurance Coverage	• Comprehensive insurance cover helps to recover the loss a financier would make on the asset in case of damage to the vehicle in an accident. • Zero depreciation cover helps to increase the amount the financiers can claim from the insurance company. It would also help cover the risks of the operation as the financier can recover value for the vehicle irrespective of the exact condition of the vehicle. • Battery and charging and self-started fire protection would reduce the loss in such cases as the insurance company would offer compensation that can be used to reduce losses. • Extended warranty cover would help reduce LGD. This would ensure that the financier can claim some recovery amount if the OEM's warranty is not given.
4 Telematics Data	• Understanding battery health would give more clarity about the potential performance of the vehicle. This would not necessarily help fetch a better residual value. The value may increase or decrease depending on the battery's health. • Locating a vehicle through telematics can help with repossession, but following legal protocols may take extra time, so overall time saved may not be large.
5 Secondary Sales Market	• Strong connections with secondary market buyers of the vehicles can help financiers sell off their repossessed vehicles faster to recover money.
6 Product Quality Assurance	• If OEMs offer extended warranties and strong after-sales service, the vehicle's condition would improve, resulting in better resale value and lower LGD. • FLDGs offered from OEMs would help directly reduce losses for the financier, reducing LGD.

Higher Impact   Medium Impact   No Impact

DRMs can reduce EV interest rates in some cases. Cargo vehicle borrowers, such as startups in the MSME category with investor support, have a stronger credit profile than most electric two-wheeler borrowers (primarily NTC). DRMs enhance asset protection for financiers, enabling actual adjustments in the lending terms for borrowers. Based on market interviews, DRMs can bring down the risk premium in the electric three-wheeler commercial segment, enabling a potential 200–300 basis points reduction.[52] Exhibit 23 outlines how this can lead to cost savings for the borrower through low overall interest payments. Scaled market-wide, this could lead to cumulative savings of INR 2,200 crore (US$267 million) for electric cargo three-wheeler borrowers,[xi] assuming EV sales in this segment can reach 60% or 300,000 vehicles in 2030.[53]

Exhibit 23 **Financial impact of DRMs on the electric cargo three-wheeler segment resulting from a 200–300 basis point reduction**



Note: The interest payment is calculated over three years, with an 85% LTV ratio held constant in the pre- and post-DRM scenarios. Other than the interest rate, all lending terms were held constant to isolate how interest rates improve with the implementation of DRMs. The graphic represents an average three-wheeler that costs INR 4,50,000 (US$5,429) (ex-showroom price post-goods and services tax without subsidies included). The interest rate pre- and post-DRM scenario is 15 % versus 12.5%, based on data collected from market interviews.

xi. Savings from 2024 to 2030.

Although some NBFCs anticipate no direct impact on interest rates, DRMs can instil confidence in financiers to take on additional risks. These include expanding operations in new regions, offering higher LTV ratios to alleviate up-front payment burdens for EV borrowers, reducing processing fees, and extending loan tenures. For example, a long warranty period could enable financiers to provide long-term loans.

Promoting De-Risking as a Service

Through extensive consultations with key stakeholders in the EV ecosystem, there is potential to connect startups and organisations offering DRMs as services to financiers and the wider EV ecosystem. These companies can build business models around addressing financiers' pain points, such as digitalising payment collection systems, analysing telematics data, and enhancing the resale value of repossessed vehicles. This allows financiers to focus on underwriting borrowers and expanding their lending portfolio. These companies could aid in promoting EV lending, and be focused on the following offerings:

1. **Offering collections and repossession services:** Companies offering digitalisation services for collection systems, including online payment gateways, WhatsApp and text message reminders, and real-time loan performance updates, can assist financiers in transitioning to digital systems. Additionally, financiers can consider collaborating with specialised repossession service companies to streamline the often-complex legal processes associated with repossessions. These companies are typically engaged by banks and large financial institutions to handle end-to-end repossession and asset resale in default cases, with the primary responsibility for ensuring legal compliance resting on the repossession company, alleviating the financier's burden.

2. **Providing analysis on telematics data for different stakeholders:** Technology startups can provide financiers and OEMs with customised dashboards that utilise telematics data to display driver income potential, vehicle location, and battery health, enabling financiers to make portfolio management decisions. Emerging OEMs that are still developing their telematics systems, particularly in monitoring battery health, can benefit from start-ups that offer software and systems for

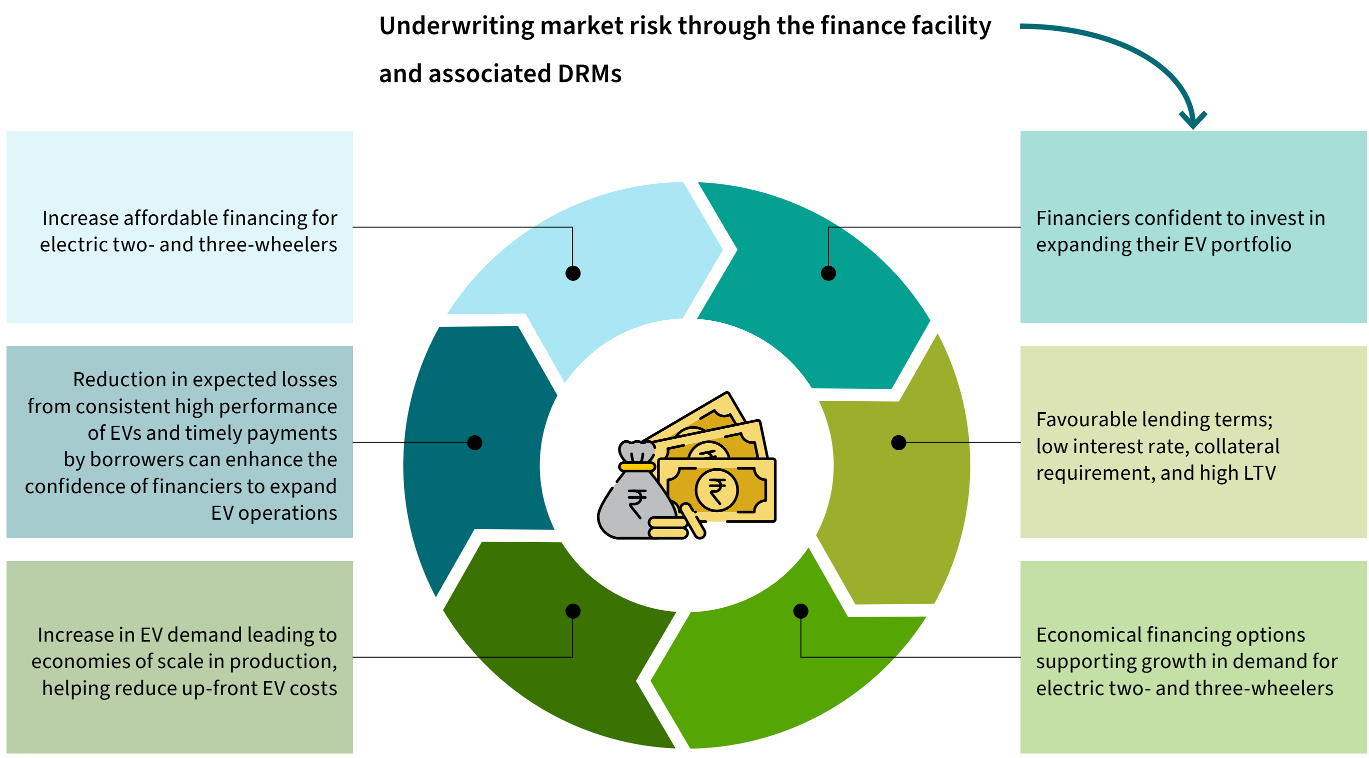
data management. Startups can also act as neutral third-party entities, providing battery assessment reports to market players to facilitate the sale of used vehicles.

3 **Enhancing resale value of repossessed vehicles:** Organisations can offer services that would build trust in the secondary sales of used vehicles. This could include companies playing the role of an intermediary assessing the value that can be derived from the repossessed vehicle based on the condition of the battery. They can have multiple tie-ups including recyclers or refurbishers who can either provide value by extracting the mineral content of the battery or reusing the battery for mobility or stationary purposes. They can also explore partnerships with fleet operators who might be interested in purchasing secondhand vehicles that are cheaper than new ones.

3.0 The Way Forward

DRMs, in conjunction with the PCG and on-lending facilities considered under the financing facility, can kickstart a positive cycle of affordable lending for electric two- and three-wheelers by mitigating financiers' risks. This promotes lending under favourable conditions, stimulating considerable demand for EVs. As up-front costs decrease due to economies of scale and financiers bring down losses, their confidence to lend at attractive rates grows, fostering a self-reinforcing cycle of low-cost lending for EV adoption (see Exhibit 24).

Exhibit 24 **Virtuous cycle of lending through DRMs**



The implementation of DRMs requires multistakeholder collaboration. We summarise below how the identified DRMs can be implemented cost-effectively to deliver lasting value.

Financiers

- **Collections and repossession enhancement:** Implementing a hybrid collection system and effective on-the-ground repossession procedures are crucial; telematics and digital systems support in automating collections and repossession.
- **Collaboration:** The implementation of telematics data, comprehensive insurance, and quality assurance mechanisms requires close collaboration with EV ecosystem actors.

Insurance Companies

- **Comprehensive insurance:** Access to comprehensive insurance helps distribute the financial risk from financiers to insurance companies. Educating consumers about the significance of EV insurance is vital for building market awareness.
- **Telematics-driven customisation:** Telematics data enables tailored insurance policies by assessing vehicle performance. Specific coverage options such as battery insurance, loss of income due to vehicle damage, extended warranties, and fire damage can bolster the EV market.

OEMs

- **Extended warranties:** OEMs offering warranties can mitigate product risk for financiers because their expertise in vehicle quality directly influences technology and product risk. These warranties, based on real-world Indian driving conditions, can instil confidence in and enable financiers to extend loan durations. This would also aid in building the confidence of players in the secondary market to purchase secondhand vehicles.
- **Telematics data:** OEMs can enhance trust by transparently sharing telematics data, providing insights into vehicle and battery performance. Collaborating with telematics analysis firms and financiers to share data reduces information asymmetry.

- **After-sales support:** In the fledgling EV market, OEMs play a key role in establishing dependable after-sales services, collaborating with dealers to train mechanics and create a reliable EV maintenance service ecosystem.

- **Support secondary sales:** OEMs offering resale value on their products that are in decent operational condition would support secondary sales of used vehicles. Further, given they understand the value of the vehicle, they are well placed to open EV-specific secondary sales platforms.

Technology-Focused Startups

- **Battery state of health diagnostics:** The development of battery assessment tools and platforms will support the secondary market, enabling market actors to derive considerable value and confidence from used electric two- and three-wheelers.

- **Data analytics:** Telematics data is only useful when actionable insights can be derived; technology firms play a key role in providing these analytical capabilities, enabling financiers and fleet operators to distil insights on vehicle operations and performance to evaluate EV risk.

Fleet Operators

- **Partnership with financiers:** Fleet operators act as an ecosystem enabler and can partner with financiers and OEMs to assess customer and operational risk with their local presence and deep understanding of drivers. This helps financiers in refining credit underwriting models by informing lending decisions for drivers and owners of vehicles.

- **Promote redeployment of vehicles:** Fleet operators can also play a critical role in promoting the secondary sales market by using secondhand vehicles in working condition for shorter-distance operations.

- **OEM tie-up:** OEMs can also collaborate with fleet operators to offer servicing and maintenance solutions.

Financiers can alter three key aspects of a loan: interest rate, LTV ratio, and tenor. Typically, lending terms are a function of the borrowing cost (rate at which the lender acquires funds), operating costs (fixed staffing and operational expenses), and risk premium (quantifying the risk associated with EL while lending to a specific borrower segment and asset). Thus, with lower borrowing costs through the on-lending facility, coverage of losses through the PCG facility, and implementation of DRMs to lower risk premiums, a holistic effort can lead to more preferential interest rates, LTV ratio, and tenor for EV borrowers. Collaboration among stakeholders in the EV ecosystem will become increasingly vital to enhance the appeal and affordability of EVs.

DRMs are a critical component of the envisioned financing facility and could enable an acceleration in electric two- and three-wheeler financing. By systematically evaluating the performance and implementation of such DRMs, financing facilities can look to design DRMs to cater to data symmetry concerns and to better distribute liability. By complementing EV financing mechanisms with DRMs, financial institutions can be assured that they will have better access to information to evaluate lending risks. The finance facility will also extend the lending capacity of existing financial institutions in the EV lending ecosystem because the on-lending facility will help address the high cost of capital of NBFCs. The PCG structure would support asset-based lending and enable more MSMEs to obtain finance, all while enabling financial institutions to better manage risks.

Finally, the standardisation of DRMs lowers credit losses and operating costs in the business. The envisioned financing facility could fundamentally address the high cost of lending, backstop default risk, and institutionalise a series of DRMs to bring greater transparency to the EV lending ecosystem. These practices work to reduce EV lending risks, driving down the cost premium on EV finance for everyday borrowers. By implementing DRMs and iterating on their structure, market actors and financers can better manage EV lending risks to help scale EV financing.

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