ISSUE BRIEF FEBRUARY 2021

STAKEHOLDER DRIVEN SOLUTIONS FOR FINANCING ELECTRIC MOBILITY

Perspectives from Indian States

Executive Summary

The electric mobility market in India is growing at a rapid clip yet financing is lacking. A thriving, clean electricity-based transportation sector in India can drive economic recovery, create new jobs, reduce dependence on imported oil, improve air quality, and avoid greenhouse gas emissions. National programs and 10 state-level policies have laid the groundwork for a strong electric vehicle (EV) market growth in India. However, for large-scale EV adoption, robust financing needs to co-evolve with the market.

Financiers largely perceive the electric mobility market as high risk because of the market's untested business models, uncertain credit history for new and smaller borrowers, technology challenges, among others. Higher risk perception leads to higher cost of financing, which inhibits the flow of capital required to scale up electric mobility. However, stakeholders, especially at the state-level in India, are developing new and innovative financing solutions that can mitigate and manage risk to catalyze private investment in electric mobility.

Source: WikiCommons

FIVE KEY FINDINGS:

1. From *financiers' perspectives*, electric mobility is a relatively unknown asset class with high perceived and real risks. Potential solutions to manage and mitigate risks include multi-stakeholder deals, public private partnerships, joint revenue sharing agreements, product warranties, proven business models, and dedicated green financing institutions.
2. From *borrowers' perspectives*, very few EV specific financial products are available commercially. Potential solutions, such as interest-rate subvention, multi-stakeholder contracts, lease financing, and battery financing, are promising means to increase borrowers' access to financing.
3. From a *policy perspective,* each sub-segment of the EV ecosystem needs coordinated policy support. A thriving electric mobility ecosystem consists of reliable vehicles and components (e.g. batteries), viable and profitable business models, ubiquitous charging infrastructure, electric public transportation, and a robust resale market.
4. From *industry perspectives,* long-term policy support, local manufacturing, and reliable supply of components can reduce borrowing costs. Industry-wide norms for leasing that establish an enforceability framework, gross cost contracts, and multi-stakeholder agreements can help lower capital expenditure for buyers and increase financier confidence in the project cash flows.
5. From *customers' perspectives*, perceived purchasing risk is high, with low customer confidence with regards to adequate charging infrastructure, vehicle after sales service and resale markets. Solutions, such as a backstop price guarantee by a third-party entities, rebate programs, and tax incentives, can increase customer demand for EVs.

To advance solutions for EV financing, this issue brief presents stakeholder perspectives, including those of financiers, borrowers (including dealers and operators), policy makers, industry, and customers. The methodology used includes stakeholder interviews, virtual roundtable discussions, meetings with state officials, and desktop research.

Overview of Electric Mobility Financing

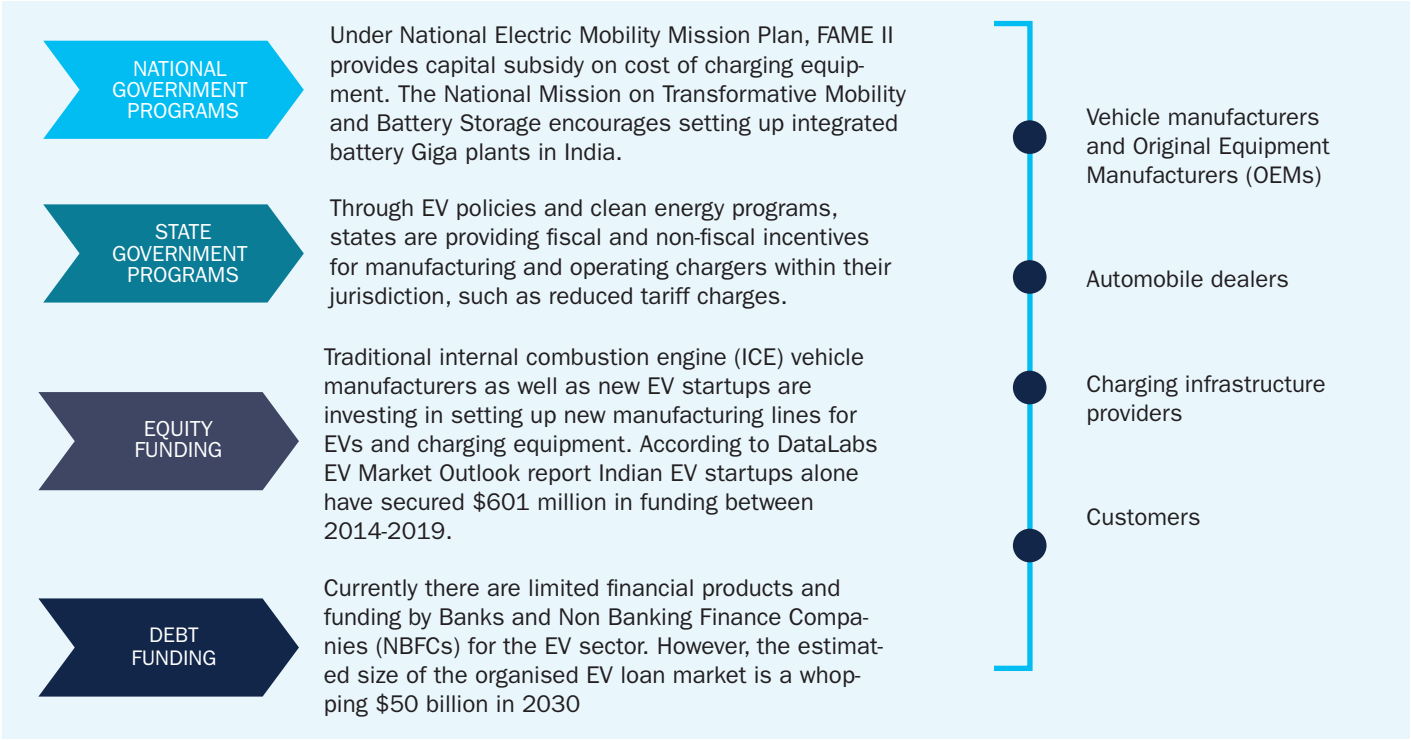
A robust electric mobility ecosystem is vital to India's COVID-19 economic recovery and to achieving its goals on sustainable transportation, air quality, and climate change. Five years since India first announced a comprehensive policy, the Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme, a nascent electric mobility industry is starting to take shape. In 2019, the Department of Heavy Industry, launched an even larger FAME II scheme with a budget of ₹ 10,000 crore ($1.4 billion) to ramp up the manufacturing and adoption of electric vehicles (EVs) as well as the charging infrastructure ecosystem in India. At the sub-national level, ten states have already notified EV policies and six others are in the process of drafting their policies.

While long-term national and state-level policies have laid a solid foundation and signaled India's commitment to electric mobility, for large-scale adoption of EVs, a supportive financial environment needs to co-evolve to meet the market needs. Achieving India's electric mobility goals requires the loan market to grow to ₹360,000 crore ($50 billion) by 2030—a significantly higher investment than the current level.[1] Financiers in the EV space, like

Source: Shankar S, Creative Commons

those in most emerging technologies industries, have to contend with a higher number of unknowns since the market is relatively new. Even though automobile financing has been around in India for decades, there is limited data for specific EV parameters like battery degradation, resale value, and maintenance costs. Moreover, new segments in the electric mobility value chain, such as charging infrastructure, are still evolving. As Fig. 1 indicates, there are national, sub-national, and private stakeholders in the electric mobility financial market in India. Major banks and non-banking financial companies (NBFCs) are the key financiers, especially for debt financing.

Figure 1. Financing sources and market segments for electric mobility in India



A diverse set of stakeholders are engaged in the demand side of the EV market. Borrowers can be classified in four main segments each with their own financing requirements (Fig 1):

- *Vehicle manufacturers and Original Equipment Manufacturers (OEMs):* Includes established players like Tata, Mahindra, Hyundai and several new entrants with less-established credit history such as Ather, Okinawa, Ampere, Smart-E. The newer, smaller players need both equity and debt to scale up operations.
- *Automobile dealers*: A mix of new and old dealers diversifying into electric mobility. Dealers mostly need debt financing and working capital loans.
- *Charging infrastructure providers:* A new category of borrowers, typically small and medium entrepreneurs. Infrastructure providers need both equity and debt to scale up operations.
- *Customers*: Individuals and institutional buyers of EVS, including transport operators, transit agencies, fleet operators. These buyers are usually sensitive to upfront costs, interest rates, and loan-to-value ratios and need debt financing at affordable terms.

Making Electric Mobility Bankable

From the financiers' perspective, electric mobility is a relatively unknown asset class with high perceived and real risks. Potential solutions to manage and mitigate risks include multi-stakeholder agreements, public private partnerships, product warranties, proven business models, appropriate financing models and dedicated green financing institutions.

Source: Shankar S, Creative Commons

Generally, a project is deemed "bankable" when cash flows and underlying risks are well-understood. Ultimately, risk determines the cost of financing and whether the project is considered worth investing in at all. When it comes to financing a relatively new technology like electric mobility, financers look to a business balance sheet and credit history to determine if the borrower can make good on their loan obligation. However, the EV market is nascent, and it is difficult to forecast revenue projections for EV start-ups five to even ten years down the line. There is also no ascertained resale value for EVs, and there is very little data on EV revenues and sales. Due to the nascency of the EV market, it is difficult for lenders to appraise new start-ups increasing operational risk perception.[2]

Despite strong national and state policies, the demand for EVs is still uncertain, presenting long and short-term risk that borrowers may default on their repayment. In some instances, the risk of delayed payments can be even higher when the EV contracts are with public institutions like state transport companies. Smaller, less credit worthy borrowers add to counterparty risks for financiers. Further, lack of performance history makes it difficult to estimate the maintenance and battery replacement costs and validate the downtime of the EV on account of breakdown, repairs and servicing. Due to underlying contract enforcement challenges, the counterparty risks infringe on financial institution's willingness and ability to lend.[3]

Technology risks compound lenders' a perception of financial risk. The variability in battery life and capacity creates range anxiety. Uncertainty around replacement risk of batteries, limited warranty, availability of traction motors as against the life of the vehicles, vehicle maintenance costs, and inadequate charging infrastructure add further operational performance concerns.[4]

Ultimately, operational, counterparty, and technology risk add layers of uncertainty to electric mobility financing structures. This makes it difficult for financiers to offer EV buyers, dealers, and OEMs reasonably priced financing products, especially working capital and long-term debt needed to promote market growth.

POTENTIAL SOLUTIONS FOR BANKABILITY

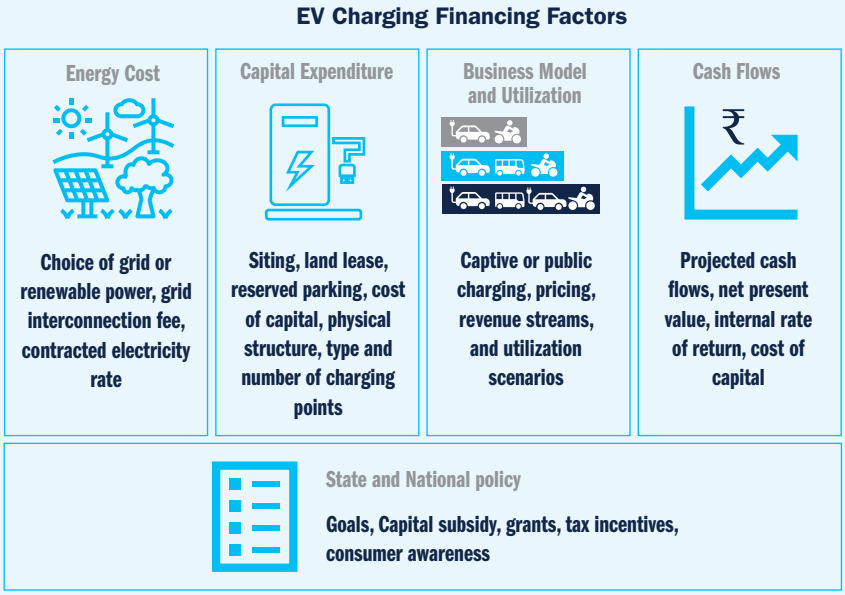
Managing counterparty risk is critical for financers to lend in nascent markets, such as electric mobility. To de-risk repayment by city transit agencies for procurement of electric buses, for example, Gross Cost Contracts (GCC) can be effective. These contracts establish an enforceability framework with adequate payment security (see infographic in Box 2). Another option would be usage or service contracts with a non-cancellable clause; these types of contracts set up minimum promised cash flows to meet debt obligations monthly. Multi-stakeholder deals or public private partnerships (PPPs) are another means to manage counterparty risk. A guarantor with a known

credit history enables financial institutions to hedge the risk of default. Government participation also helps attract private investment and helps establish greater market confidence.[5] Having OEM's participate in financing schemes distributes performance and maintenance risk. This type of deal ensures a set warranty or maintenance period covered by the OEM and incentivizes the OEM to be responsible for their products' performance. Product warranties can help mitigate the risk of unknown technology. These warranties help to build consumer confidence and can enable dealers to receive more favorable financing terms. Many e-rickshaw models have established OEM guarantees, such as those between Lohia Auto Industries (an OEM) and IndusInd Bank. Electric cars that offer warranties include Hyundai Kona (five years, unlimited kilometers) and Tata Nexon EV (eight years or 160,000 kilometers, whichever is earlier).[6]

FINANCIERS' PERSPECTIVE ON CHARGING INFRASTRUCTURE

Financing for charging infrastructure demonstrates the challenges typically faced by financiers in new markets with emerging business models. Bankers want to understand the cash flows and associated risk before making a financing decision. For a typical charging business, the chief outflows of cash are capital expenditure, grid connection cost, energy costs for procuring electricity (grid or renewables), debt servicing, site leasing fees (if any), and operations and maintenance.

Inflows of cash are harder to predict. Revenue is dependent on the average number of vehicles utilizing a given charging station and what price they pay for charging. For example, residential customers might be willing to pay extra for fast charging and extended range, but only up to a point. Some commercial customers might be able to utilize off-peak hours for charging at a lower price point.



Projecting cash flows requires assumptions about the growth rate of electric vehicles in the coming years, which is heavily dependent on state and national policies, vehicle models, consumer awareness, and charging infrastructure. Internationally green banks like the New York Green Bank have customized financial products to fund credit worthy sponsors of charging infrastructure with high captive customer footfall such as retail, parking lot operators, hotels etc. Dedicated green financing institutions that better understand these risks and allocate capital to manage them, can make a big difference in developing such emerging markets.

DEDICATED GREEN FINANCE INSTITUTIONS FOR RISK MITIGATION

Dedicated green finance institutions, such as India's proposed IREDA Green Window, that leverage public funds to catalyze a market for private investment can help make a compelling business case for electric mobility investment. Similar to green banks, green windows would be driven by their mission to nurture and grow nascent clean energy markets until they are ready for self-sustaining private investment. Effective approaches demonstrated by global green banks include identifying market barriers, designing financing structures to mitigate and manage risk, and even assuming a higher risk through taking junior positions on their lending.

Often, catalytic finance institutions work well with existing public funds and programs and make them go farther in their impact. For example, the New York Green Bank complements the state subsidy program by designing innovative financial structures covering the entire EV value chain from manufacturing, battery leasing, fleet purchases to charging infrastructure.

TATA CLEANTECH CAPITAL – GROSS COST CONTRACT MODEL FOR EV FINANCING

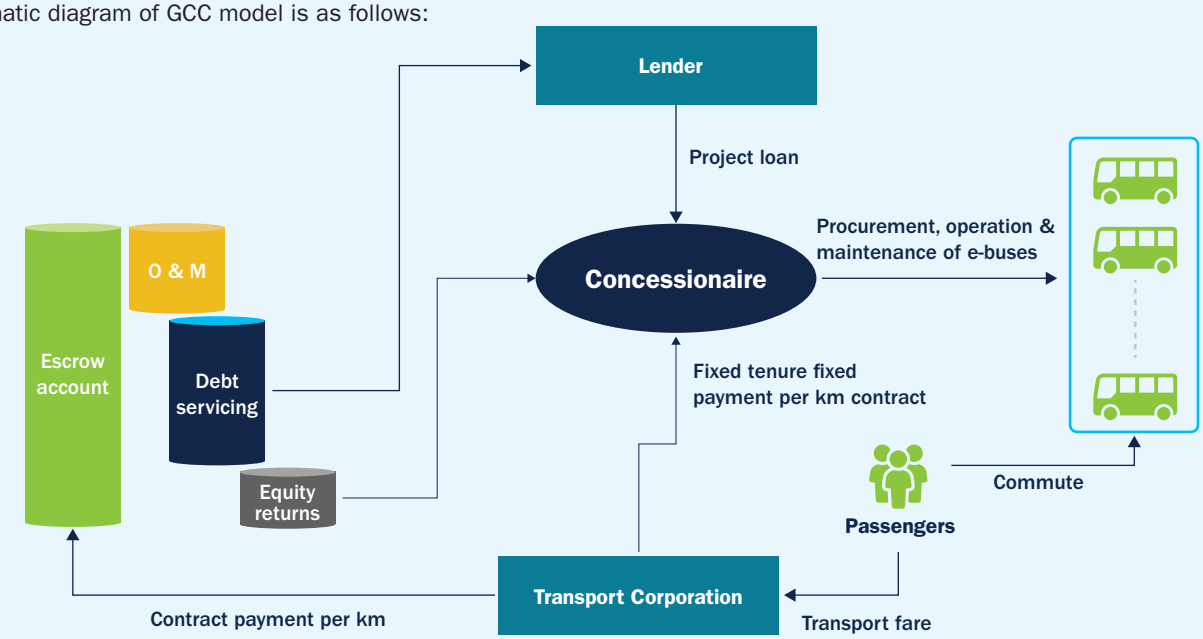
In India, Tata Cleantech Capital Limited (TCCL), India's first private sector climate finance institution and a member of the global Green Bank Network, is a leading electric mobility financier. TCCL recently received a ₹ 213 crores ($30 million) facility from CDC Group, the UK's development finance institution and impact investor, through directed green lending facility. This facility will enable TCCL to offer loans to businesses across India that focus on e-mobility, water, and energy efficiency solutions. TCCL has already identified the subsectors and developers for deployment of this line. For electric mobility, TCCL aims to target electric vehicles, charging infrastructure and battery swapping systems.

In 2020, TCCL sanctioned its first transaction in electric mobility worth ₹ 7.1 crore ($1 million) to a last mile delivery player engaged in deployment of electric vehicles for intra-city cargo movement. Last-mile transportation includes deliveries within a fixed and limited radius such as by retail or food delivery businesses, e-commerce, and home service businesses. TCCL structured the financing by ring-fencing the cash flows, devising a monitoring framework that increased the utilization rates for electric vehicles and resulted in a lowered total cost of ownership (TCO).

In 2021, TCCL sanctioned an e-bus transaction with a committed funding line of ₹ 88 crore ($12.4 million) to an electric mobility service provider, towards a Gross Cost Contract project. Under this model, the service provider is contracted to supply and operate electric buses for a 10-year period in a large municipal jurisdiction in Gujarat. The concessionaire (operator/ supplier) contracts with the transport corporation and is paid on a fixed cost per km basis. The supplier is responsible for procurement of e-buses and related O&M infrastructure for the defined tenure. Further, a minimum km per day is also defined in the contract.

This model presents a win-win scenario for the concessionaire, STCs and lenders. The concessionaire is not directly exposed to the ridership risk given the take or pay arrangement. STCs are not exposed to performance risk of the buses as the onus is put on concessionaire. If structured properly, STCs can lower their operational costs via this business model since TCO ownership is lower when compared to internal combustion engine counterparts. The ticket fare collected from passengers is deposited in an escrow account protecting the interests of the lenders.

Schematic diagram of GCC model is as follows:



Source: TCCL 2021

Enhancing Access to Capital Across the EV Value Chain

From the borrowers' perspective, very few EV specific financial products are available commercially. Potential solutions, such as interest-rate subvention, multi-stakeholder contracts, lease financing, joint revenue sharing agreements, and battery financing, are promising means to increase borrowers' access to financing.

Consumer finance for personal use electric cars and two wheelers is available from a few public and private banks and NBFCs in India. However, other than the State Bank of India, no other bank offers a customized product for electric cars. The three-wheeler segment, with both e-rickshaws and e-autos, is seeing some customized lending products from lenders. These products are structured to provide lower interest rates and other incentives to attract price-sensitive borrowers, such as auto-rickshaw operators who typically buy these vehicles for livelihood purposes.

Vehicle and component manufacturers: Large established internal combustion engine (ICE) vehicle manufacturers such as Mahindra, Tata and Tier 1 component suppliers that have diversified into the EV space have established balance sheets and access to banks and capital markets. The newer pure play start-ups with smaller balance sheets and credit history find it challenging to raise commercial capital at competitive terms. Some of these companies are at a pre-revenue stage and have no other option but to survive on funding from promotors and early-stage equity investors. Others may be at the early revenue stage and looking for working capital from the formal banking sector but find it challenging to access bank finance.

Some companies in the heavy vehicle segment, such as manufacturers and suppliers of e-buses, need term financing to sell to customers since few dealers exist for the heavy vehicle segment. Given the high vehicle cost, buyers in the heavy vehicle segment prefer to pay in affordable installments aligned with their own earnings.

Dealers: Automobile dealers often play the role of facilitating loans for vehicle purchase and help manage repayments. Dealers need debt capital themselves to expand and diversify their operations to include electric mobility. Large established dealers who have diversified into EVs are able to access financing based on existing credit history and balance sheet strength from commercial banks and auto financing NBFCs. EV dealerships in smaller cities face greater challenges in borrowing funds. Smaller dealers, with ₹ 3 to ₹ 4 crore ($420,000 to $560,000) annual revenues, need competitive pricing for working capital and long-term debt.

Charging infrastructure providers: Access to convenient, cost-effective, and fast charging infrastructure can significantly accelerate EV adoption rate in India. However, like other emerging clean energy segments, charging infrastructure needs customized financial solutions, in addition to long term policy support, to grow the market. Another issue in financing charging infrastructure is that the life of main charging equipment is around 7 to 8 years and the life of other electrical equipment required to set up the chargers is 20 to 25 years. However, typically lenders are willing to provide loans for 7 to 8 years, in keeping with the life of the main chargers. Considering the utilization of charging stations is typically between 10% to 40% for the first 5 years, repayments in 7 to 8 years is not viable.

Source: G P Sampath Kumar

Customers: EVs can be twice as expensive as comparable ICE vehicles on an outright purchase cost basis. Even after national and local subsidies, upfront costs for electric vehicles including personal vehicles, two wheelers, and commercial vehicles (taxis, autos) can be significantly higher. Competitive interest rates and higher loan-to-value ratios can help make financing accessible to a greater number of potential buyers.

POTENTIAL SOLUTIONS FOR ENHANCING ACCESS TO CAPITAL ACROSS THE EV VALUE CHAIN

Vehicle and component manufacturers: Electric vehicles in India often have imported components, such as batteries and other electronics. A significant number of imports are from China, raising concerns of geopolitical tensions affecting supply. India's focus on domestic manufacturing in these high value components will help in boosting the confidence of lenders and buyers with regards to assured supply of parts and honoring of warranties. Although SMEs and early stage companies often struggle to raise debt finance, there are some options available including at the Government of India supported, Small Industries Development Bank of India (SIBI) that has a host of financing schemes for early stage enterprises.

Dealers: Multi-party agreements between lenders, dealers and established OEMs that cover the continuous supply of parts and warranties from the OEMs can help improve the risk perception of lenders vis-à-vis smaller dealers.

Charging infrastructure: Land lease costs, especially in metro cities, can account for one of the largest components of total operating expenses. If the state and city jurisdiction can make land available on a revenue sharing basis (from utilization of the charging station), costs can be reduced significantly by around 7 to 8 ₹ / kWh.[7]

Consumer finance: To improve affordability longer loan terms can be offered with higher loan-to-value ratios (LTVs). Another solution would be to establish an interest rate subvention, currently some state EV policies offer an interest rate subvention to reduce the cost of loans. Batteries are the most expensive component of the vehicle - more than half the total cost. If batteries are financed separately through leasing or pay-per-use models, the entire dynamics of consumer finance will change drastically, increasing affordability.

Setting Policies to Spur Growth

A supportive policy environment is critical for the expansion of the EV market. Over ten states in India have final or draft EV policies that support the national electric mobility policies. The states with approved EV policies are Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, New Delhi, Tamil Nadu, Telangana, Uttarakhand, and Uttar Pradesh, while Bihar, Gujarat, Himachal Pradesh, and Punjab are working on finalizing there EV policies.[8]

States across India are taking it upon themselves to embrace electric vehicles and create a regulatory environment that fosters electric mobility growth. State incentives range in scope, and enacted policies include anything from subsidies to charging infrastructure campaigns. Thus far, most EV state policies include a form of reimbursement or subsidy program. Several states have waved road taxes and registration fees for electric vehicles. There are also subsidy programs to incentivize rickshaw drivers to replace high polluting ICE-based rickshaws with e-rickshaws.

Some states have focused on the ease of doing business. Uttar Pradesh's state EV-policy outlines a single-window compliance system that processes all approvals required for EV and battery manufacturing. Several other states, such as Tamil Nadu and Telangana, have focused on job creation outlining specific EV job targets, and re-skilling programs that will increase the EV manufacturing and EV maintenance and operations workforce. States have also set commitments to electrify their public transportation sector and to transition to 100% electric-buses.

State policy schemes can help create an environment for information sharing and innovation. Karnataka policy includes supporting venture capital funding for e-mobility start-ups and outlines how Karnataka will support the creation of a secondary market for batteries. Several state policies also emphasize knowledge sharing and the need to educate the public on electric mobility benefits. Kerala's state policy outlines the need for electric mobility demonstration hubs to foster broader customer demand.

Charging is another core component of state EV policies. Nearly every approved EV state policy scheme mentions charging and outlines targets and/or subsidy schemes to establish a more robust public charging infrastructure. State and city policies have an important role in expanding public procurement for EVs and generating demand for the ecosystem to develop.

POLICY SPOTLIGHT: TELANGANA EV POLICY

State level electric mobility indicate to e-mobility players the state governments focus to encourage growth in the sector and provide support. The Telangana policy was notified in October 2020. Key provisions that enhance financier confidence are:

- Ambitious goals to generate demand for electric mobility.
- Commitment to attracting investments worth ₹ 28,400 crore ($4 billion).
- Incentives such as capital subsidies, tax reimbursements, power tariff subsidies, interest subvention and transportation subsidy.
- Existing state self-employment schemes shall be extended to provide financial assistance for the purchase of Electric Vehicles for commercial purposes.

Developing policy provisions and clearly identifying relevant state departments and agencies to disburse benefits and guidelines can help enhance access to capital and strengthen the EV value chain.

Source: Hyderabad metro Power Grid to provide electric vehicle charging stations -The Hindu Businessline

Building an Electric Mobility Ecosystem

A thriving e-mobility ecosystem consists of reliable vehicles and components (i.e. batteries), viable and profitable business models, reliable after-sale service, ubiquitous charging infrastructure, public transportation, and a robust resale market. There is a need to develop and finance each sub-segment of the electric mobility ecosystem.

For large-scale adoption, mobility solutions need to be adaptive, cheap and convenient. Driving demand and availability for electric mobility will depend on improving EV reliability, increasing the availability of charging, and scaling manufacturing and production. Thus, it will be critical for the electric mobility ecosystem to evolve and innovate in tandem. The e-mobility sector is an interconnected market. Growth is dependent upon improving battery longevity, charging infrastructure, intelligent networks, and innovative payment platforms. A piecemeal financing approach is unlikely to be as effective as supporting the entire mobility ecosystem. A thriving e-mobility ecosystem consists of reliable vehicles and components (i.e. batteries), viable and profitable business models, easily accessible charging infrastructure, public transportation, and a robust resale market.

Technology challenges have constrained EV demand and subsequently added to commercial banks 'and financial institutions' hesitancy to extend loans to the electric mobility market. Batteries present arguably the most significant technology constraint. Issues regarding charging, discharge capacity, and battery lifespan have affected the operational performance of EV. Batteries also present a waste issue; currently, lithium-ion batteries are manufactured and sold in ways that make it difficult to repair or recycle them, adding to mounting e-waste.[9]

Source: Pradeep Gaur, Mint

Potential Solutions to Building an Electric Mobility Ecosystem

Innovative business models: Innovative models, such as "Fleet operator and owner driver partnerships," can help mitigate credit risks perceived by lenders. The operator can provide second loss guarantees to lenders for loans taken by drivers who often do not have credit history or the necessary financial strength to get loans easily from formal financial institutions. Fleet operators have an existing relationship and an agreement or contract with the driver. They better understand usage patterns and the ability of the driver partner to pay loan installments. To give additional comfort to the lender, the operator can provide minimum vehicle usage assurance in their contract with the drivers or give a similar assurance to the lender.

Business models should be tailored to address existing technology constraints. A battery leasing program is an innovative way to manage battery costs. Under a battery leasing program, EVs are sold without the battery; the battery is then leased from the battery manufacturer itself. That way, the battery would remain on the books of the manufacturer for a fixed duration of time. The manufacturer then takes on some of the transactional risks and is responsible for the maintenance costs for the predetermined leasing period.[10] This can also fortify the case for policies focusing on battery subsidies instead of the entire EV.

Embracing sustainability: For EVs to become a reliable mobility solution, they must be both commercially and environmentally viable. Strengthening the circular economy of batteries will be one of the keys to ensuring that the eclectic mobility sector is truly a sustainable solution. A circular economy structure for batteries presents revenue opportunities for OEMS, such as recycling and secondary use applications for batteries.[11]

Investing in charging infrastructure: Access to convenient, cost-effective, and fast charging infrastructure can significantly accelerate the EV adoption rate in India. Increasing access to charging is best way to overcome customer range anxiety. To increase charging, there needs to be a profitable business model to spur the investment in charging infrastructure, one such model is a charging as a service model. In this model, just like their oil-powered counterparts, electric vehicles drive in, charge up, and pay for the amount they draw. Charging infrastructure is generally divided into two categories: captive charging stations that are owned, or hosted, by retail stores, workplaces, parking lot operators or fuel stations for their patrons. Public charging stations cater to all vehicles irrespective of ownership. Private entities, public companies, and utilities act as charging service providers. While private companies like Fortum, Ola, and Lithium have set up chargers in limited geographies, public companies, like Energy Efficiency Services Limited (EESL), have taken a nationwide approach to reach most major

cities. Oil giants like Hindustan Petroleum Corporation Limited (HPCL) and Bharat Petroleum Corporation Limited (BPCL) have also entered the market.[12]

A ubiquitous national charging infrastructure network would also help reduce the cost of charging infrastructure. Currently, India has limited standardized requirements regarding private or public charging infrastructure. The lack of clear implementation of standards creates delays and adds cost.[13]

The siting of charging stations is another critical question. The location and type of charges is key to meeting customers' demands. For optimal siting, charging should be sited in safe locations with 24-hour access. It is also important that stations are highly visible with multiple overlapping locations to avoid range anxiety.

Growing public transportation: The growth of public e-buses has surpassed that of any other electric vehicle segment, and the continued success of e-buses is key for spearheading overall e-mobility market growth. While the initial cost of e-buses is still above the cost of conventional diesel buses, the total the cost of ownership for e-buses has reached cost parity. The additive co-benefits of reduced greenhouse gas emissions and improved urban air quality further increases the benefits of e-buses.[14] Drawing on lessons learned from successful e-bus transitions in Europe and China can help accelerate adoption in India. Building inter-agency support and ensuring transit agencies have the capacity to adopt to the technical constraints of e-busses are key for a seamless transition.

Incentivizing broader e-rickshaw adoption could help spur greater market confidence in electric mobility. The growth opportunity is high, as the e-rickshaw market has a 43% CAGR from 2019 to 2030. Rickshaws are naturally suited for electrification; the bulk of rickshaws trips occur in cities and trips fall well within the range of batteries. Additionally, there are co-benefits such as reduced air pollution and self-employment benefits that occur from a more robust electric e-rickshaw market.[15]

Establishing a re-sale market: Currently, there is no known resale market for EVs, and this adds to the risk for the customers and lenders. Creating a system with a backstop financer guarantee would help reduce customer risk. OEMs and OEM affiliated finance companies such as Tata Motors Finance, can help set up a secondary market or vehicle repurchase ventures to assess the residual asset value. This would reduce uncertainty and risk around residual values of assets.

INNOVATIVE BUSINESS MODELS FROM STATES IN INDIA

E-Rickshaws: Three-wheelers are an important segment in Telangana. A few models that are being piloted include a fixed charge per day from drivers; under this type of scheme, drivers sign an agreement with metro corporations like Hyderabad Metro Rail Ltd (HMRL), Delhi Metro Rail Corporation (DMRC), Noida metro, and ETO motors, an electric mobility solutions service provider. These corporations then charge drivers a per day fee for using their e-rickshaw – typical usage of 120-130 km/day. Ten locations have been shortlisted across Telangana, and 100 e-rickshaws per location will be deployed by 2021. ETO motors is in the process of identifying drivers interested in participating in their pilot trail. They plan to charge ₹ 500/day ($7 /day) to rent e-rickshaws and after three years in the program they will transfer the vehicle for a token fee to the driver.

ETO has also set up a scheme to charge a fixed charge per day to the fleet operator for vehicle and driver provided by ETO. This model is running in Bangalore. ETO has signed an agreement with Uber where their vehicles are onboarded on the Uber platform and run for a specific number of hours per day

Charging Service Providers: Access to charging is critical to support broader EV adoption and to reduce customer range anxiety. Fortum India, a subsidiary of leading Finnish clean energy company Fortum Oyj, partnered with Indian Oil Corporation Limited to launch its first public electric vehicle charging station in Hyderabad in July 2018.[16] Currently, Fortum has 73 charging points and 40 charging stations in Ahmedabad, Bangalore, Delhi, Gurugram, Hyderabad and Noida.[17] Fortum is focused on improving the EV drivers' experience. While initial build out costs and low average utilization rates present hurdles for creating a more profitable business model, Fortum is focused on expanding its services and creating a more robust charging network. Fortum is optimistic that utilization in India will begin to increase gradually and is focused on developing a more user-friendly charging services platform. Fortum has adopted an easy to use pay-as-you go service model and operates a cloud based EV management tool. Using the tool customers can track their vehicle range and locate charging stations.

Endnotes

1 NITI Aayog et al., *Mobilizing Finance for EVs in India: A toolkit of Solutions to Mitigate Risk and Address Market Barriers*, Jan. 2021 https://rmi.org/insight/mobilizing-finance-for-evs-inindia/ (Accessed Feb. 12, 2021)

2 NRDC et al., *Challenges, and Solutions in Accessing debt Finance for the E-mobility Sector in India Webinar*, June 24, 2020

3 NRDC et al., *Challenges, and Solutions in Accessing debt Finance for the E-mobility Sector in India Webinar*, June 24, 2020

4 NRDC et al., *Challenges, and Solutions in Accessing debt Finance for the E-mobility Sector in India Webinar*, June 24, 2020

5 NRDC et al., *Challenges, and Solutions in Accessing debt Finance for the E-mobility Sector in India Webinar*, June 24, 2020

6 Gupta, S., "New Warranty Options for Hyundai Kona Electric", Motor Octane, Aug. 4, 2020 https://motoroctane.com/news/207219-hyundai-kona-electric-warranty (Accessed Feb. 20, 2021)

7 As per an estimate by the Administrative Staff College of India

8 NITI Aayog et al., *Mobilizing Finance for EVs in India: A toolkit of Solutions to Mitigate Risk and Address Market Barriers*, Jan. 2021, https://rmi.org/insight/mobilizing-finance-for-evs-inindia/ (Accessed Feb. 12, 2021)

9 BCG, *The case for Circular Economy in Electric Vehicle Batteries*, https://www.bcg.com/en-us/publications/2020/case-for-circular-economy-in-electric-vehicle-batteries (Accessed Feb. 12, 2021)

10 BCG, *The case for Circular Economy in Electric Vehicle Batteries*, https://www.bcg.com/en-us/publications/2020/case-for-circular-economy-in-electric-vehicle-batteries (Accessed Feb. 12, 2021)

11 BCG, *The case for Circular Economy in Electric Vehicle Batteries*, https://www.bcg.com/en-us/publications/2020/case-for-circular-economy-in-electric-vehicle-batteries (Accessed Feb. 12, 2021)

12 NRDC et al., Scaling Up Electric Vehicle Charing Infrastructure: Lessons from China and the United States for the Indian Context, July 2020 https://www.nrdc.org/sites/default/files/charging-infrastructure-best-parctices-202007.pdf (accessed Feb. 20, 2021)

13 NRDC et al., Scaling Up Electric Vehicle Charing Infrastructure: Lessons from China and the United States for the Indian Context, July 2020 https://www.nrdc.org/sites/default/files/charging-infrastructure-best-parctices-202007.pdf (accessed Feb. 20, 2021)

14 IFC, *Electric Busses: Why Now?*, January 2020 https://www.ifc.org/wps/wcm/connect/a2571c4c-9fd9-433c-9a87-5d0076380a1d/IFC-TransportNotes-WhyNow-final.pdf?MOD=AJPERES&CVID=m-Lof6I (Accessed Feb. 12, 2021)

15 Dialogue and Development Commission of Delhi and RMI, "Deliver Electric Delhi:
Pilot on Electrification of Final-mile Delivery Vehicles in Delhi," 2020 https://rmi.org/insight/deliver-electric-delhi/; Singh, V., India Innovation Lab for Green Finance, "Financing for Low-Carbon Auto Rickshaws," Sept. 2018 https://www.climatepolicyinitiative.org/wp-content/uploads/2018/10/Financing-for-Low-Carbon-Auto-Rickshaws_Instrument-Analysis.pdf (accessed Feb 20, 2021)

16 Verma A., "Fortum Launches Two EV Charging Stations in Hyderabad," IamRenew,
July 2018, https://www.iamrenew.com/green-transportation/fortum-launches-two-ev-charging-stations-hyderabad/ (accessed Feb. 20, 2021)

17 Fortum, "Fortum charge & drive," https://www.fortum.in/sites/default/files/image-entity/flyer.jpg (accessed Feb. 20, 2021)

Resource Guide

India Focused Resources

Location is Everything: Approaches to Siting Electric Vehicle Charging Infrastructure for the Indian Context
https://www.nrdc.org/sites/default/files/location-everything-ev-issue-brief-20200127.pdf

Charging Forward on Powering Vehicles
https://www.nrdc.org/sites/default/files/charging-forward-powering-vehicles-20200728.pdf

Growing Clean Energy Markets in India With Green Windows
https://www.nrdc.org/sites/default/files/growing-clean-energy-green-windows-202001.pdf

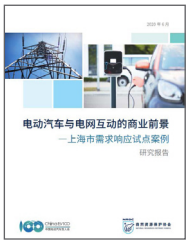
Investing in a Green Future India's Initiatives in Clean Energy Finance
https://www.nrdc.org/sites/default/files/india-initiatives-clean-energy-finance-20201211.pdf

International Resources

Best Practices for commercial and Industrial EV Rates
https://www.nrdc.org/sites/default/files/media-uploads/best-practices-commercial-industrial-ev-rates_0.pdf

Driving Out Pollution: How Utilities Can Accelerate the Market for Electric Vehicles
https://www.nrdc.org/sites/default/files/driving-out-pollution-report.pdf

Analysis on Developing a Healthy Charging Service Market for EVs in China
http://nrdc.cn/Public/uploads/2019-04-20/5cbb125a31059.pdf



Outlook on Business Models for EV-Grid Integration – Analysis on EV DR Pilot in Shanghai
http://nrdc.cn/Public/uploads/2020-06-02/5ed5f51a5972a.pdf