wbcsd

Advancing electrification of ride-hailing in India:

A BluSmart case study

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Executive summary

India is home to 22 of the world's 30 most polluted cities and, globally, road transport is one of the fastest growing sources of carbon emissions.[1] In a rapidly urbanizing India, commuting has become an important source of pollution.

Among various forms of urban commute, the ride hailing industry[2] is evolving into a preferred form of personalized transport in India. Ride-hailing now represent a relatively high percentage of urban vehicles in most major Indian cities and their high mileage makes them large contributors to problems of climate change and air quality in cities. Ride-hailing cars, representing 1.2% of the total car stock in India (as of 2019) contributes to 6% of the total emissions caused by cars in India.[3]

According to the Union of Concerned Scientists,[4] ride-hailing trips in cities using internal combustion engine vehicles (ICE) today results in a 69% increase in the average pollution generated by the trips that they displace. In cities, ride-hailing trips using ICE vehicles typically displace low-carbon trips, such as public transportation, biking, or walking. This calls for an acceleration in electrification of ride-hailing in cities while continuing to invest in convenient and low-cost public transport along with comfortable first- and last-mile connectivity solutions. As per our analysis, a 100% adoption of electric ride-hailing cars in India by 2030 could avoid 51% of the total CO_2 emissions caused by equivalent size of ride-hailing ICE cars in 2030[5] (refer to Figure 1).

Given its growing size and impact on air quality and climate change, the ride-hailing market is a critical component in India's clean mobility ambition. Convenient, low cost, shared mobility is driving increased penetration of ride-hailing services in India and high utilization of cabs (150-220 km/day).[6] This increased utilization, in turn, makes the business case viable for electrification of these vehicles. Electric Vehicles (EVs) have lower operational costs compared to ICEVs. Further, electrification of the ride hailing segment can help drive down cost of vehicles and build up charging infrastructure, that are necessary steps in broader adoption of EVs for private use.

The objective of this report is to document practical experiences and lessons from EV adoption in ride-hailing. BluSmart, a new all-electric car ride-hailing service in India, was selected for this demonstration. We hope that lessons learned from this demonstration will help BluSmart to scale up its own operations, but also support electrification of ride-hailing across all similar services and platforms, in India and globally.

BluSmart's ride-hailing platform started with the objective of transforming Indian cities by providing 100% electric, sustainable, efficient, affordable and reliable mobility solutions. Launched in 2019 as India's first all-electric car ride-hailing company, BluSmart has since completed 5 million clean km through plying their vehicles on BluSmart and other platforms. The company now operates a fleet of 300+ EVs and has installed 200+ chargers for their operations in cities and suburbs of Delhi and Mumbai.

With the key objective of accelerating EV adoption in the ride-hailing market, this report aims to highlight:

- BluSmart's journey in integrating and operating EVs
- Challenges in integrating EVs into ride-hailing operations
- Learnings for other existing and prospective ride-hailing companies

Some of the key lessons learned from BluSmart's demonstration project are summarized below:

- Company-owned or leased electric cars (vis-à-vis driver owned cars) supports early EV adoption, better customer experience, buy-in from driver-partners, increased utilization of vehicles and better charging infrastructure planning
- Optimization of driver-car ratio, specific to characteristics of EVs, increases vehicle utilization ensuring profitability in operations
- Early, strategic placement of EV charging hubs can reduce dry run for ride-hailing vehicle assets[7] making such charging hubs viable in high demand locations
- Sharing captive charging infrastructure with other EV users can improve infrastructure utilization, accelerate capex amortization, and address range anxiety concerns
- Redesigned parking spaces can reduce turnaround time and queuing at charging hubs
- Captive charging hubs can be a constant touch point between service provider, vehicles and drivers, and can be used to maintain verifiable sanitization schedules during the COVID-19 pandemic

The COVID-19 pandemic has been a watershed moment for the mobility sector overall, and ride-hailing specifically. The report also highlights the COVID-19 response by BluSmart and how an EV fleet allowed them to be more resilient than some of their competitors.

The World Business Council for Sustainable Development (WBCSD) is working with India's mobility value chain to help accelerate the adoption of EVs so that businesses can be a part of the solution to India's urban pollution and emissions challenges. WBCSD hopes that this publication will support greater electrification of ride-hailing in the Indian and global markets and contribute to building back better.

Foreword

Foreword

The mushrooming of Indian cities and rapidly increasing urban migration is testing the limits of urban mobility systems, calling for urgent action.

India's shared vehicle market has undergone significant structural changes in recent years and the advent of ride-hailing services has been one of the major mobility transitions. The emergence of innovative, app-based ride-hailing services across vehicle segments has extended on-demand transport options for consumers beyond the traditional/offline taxi industry.

This growth in the ride-hailing market, primarily powered by petrol and diesel in India, has huge implications for India's energy use, carbon emissions and air quality. There is need for adoption of cleaner mobility pathways to provide economical, efficient and convenient mobility services that are safe, create new jobs and reduce dependence on fuel, with the least environmental impressions and adverse impacts on human health.

Higher utilization of ride-hailing fleets also presents an opportunity for EV adoption as the lower operational expenses make it cost-effective. The central and state government's offerings through policy, regulatory and subsidy support measures, are strongly incentivizing EVs over their ICE vehicle counterparts.

Progressive businesses in India, such as Mahindra, who are leading manufacturers of EVs, and BluSmart, who are deploying electrified ride-hailing services, are leading the way globally towards a decarbonized and sustainable mobility future. The message is clear: businesses have started to find economic value in EV adoption. Early adoption of EVs by businesses and fleets can provide the scale to create micro-systems which can grow, replicate and eventually combine, to form larger ones.

The COVID-19 pandemic stands to be the most abrupt shock to the global economy in modern times. With transport being one of the COVID-19 transmission vectors, the pandemic has affected shared mobility at large, including ride-hailing. Businesses have a vital role in determining the ways in which urban mobility systems will evolve. The effects of the pandemic on mobility highlight the need for vehicles and transportation systems that are resilient to further shocks. At such times, forward-thinking businesses need to build back better and invest in cleaner modes of transport that can allow the world to benefit economically, socially, and environmentally. The return of clear blue skies and undeniably positive effect on air quality in cities provides the evidence needed to consider transitioning to electric vehicles.

The desire to act and make a difference will lead to the implementation of sustainable solutions by businesses and government. This report and related work that is being carried out both through the World Business Council for Sustainable Development (WBCSD) and through leading companies, is an important step forward in consolidating knowledge on the best ways for ride-hailing companies to adopt and scale electric mobility today. We hope it will guide and inspire widespread adoption of electric ride-hailing in India and encourage action in other countries too.

Mahesh Babu
MD and CEO,
Mahindra Electric Mobility Ltd.

Anmol Jaggi
Founder, BluSmart

1 Introduction

1 Introduction

In December 2019, WBCSD released the India Business Guide to Electric Vehicle (EV) Adoption as a ready reckoner for fleet managers, procurement managers, and corporate sustainability teams looking to adopt EVs. The guide identified ride hailing as one of the three most scalable use-cases for business and fleet EV adoption in India.

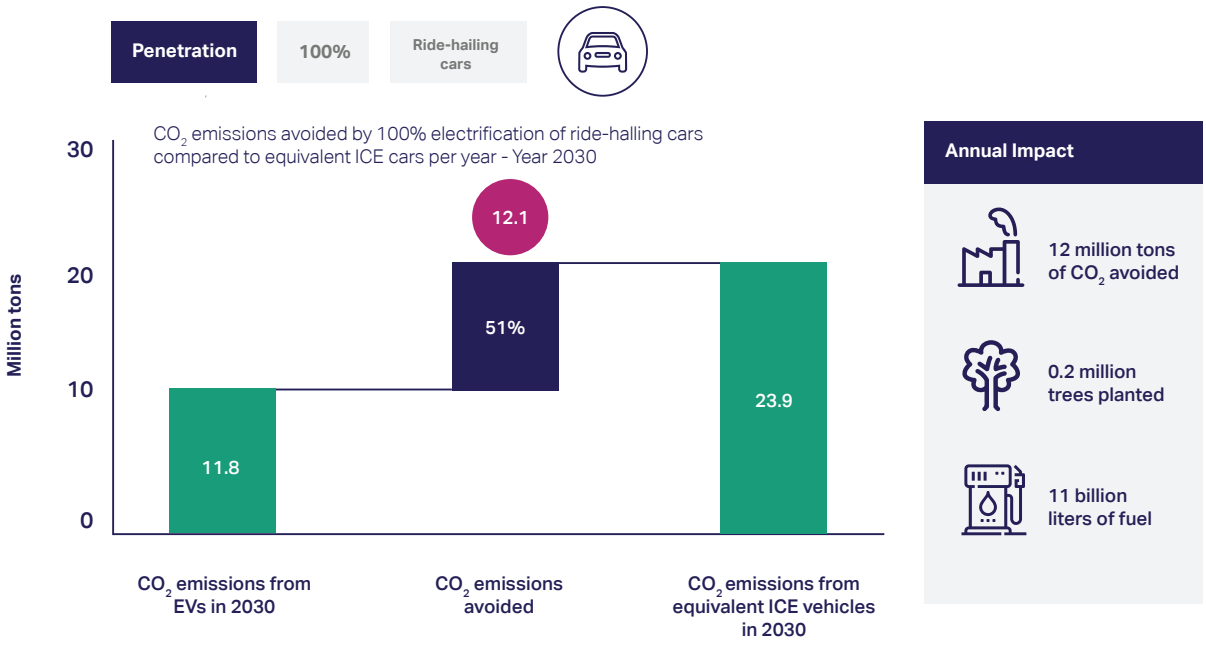
This report captures the experiences of a demonstration project – BluSmart – which was chosen from multiple nominations that were received through a call-for-applications. The selection was based on scalability, replicability and the magnitude of impact it will have in terms of carbon emissions reduction. A total of three such demonstration projects will be covered through a series of reports.

The ride-hailing industry is evolving into one of the preferred forms of personalized commute in India. The market is estimated to have a total turnover of USD $26 billion in 2020. It has been projected to grow at a compound annual growth rate (CAGR) of 19.1% and to reach a turnover of USD $ 52.5 billion by 2024.[8] While the current COVID-19 pandemic may delay achievement of turnover targets, medium to long term growth of ride-hailing in India is very likely. This would qualify ride-hailing as a significant and growing contributor to road transport air pollution in India.

As per our analysis, a 100% adoption of electric ride-hailing cars in India by 2030 equates to a reduction of 12 million tons of CO_2 emissions per year, avoiding consumption of 11 billion liters of fuel per year, which is equivalent to plantation of 0.2 million trees per year in 2030 (refer to Figure 1). Also, owing to the higher utilization, electrification of a ride-hailing car today could save 4.75 times the emissions saved due to the electrification of a private car.[9]

The good news is that, on a total cost of ownership basis, all-electric ride-hailing is possible and economically viable today EVs if the utilization of vehicles is high. WBCSD's previous report India Business Guide to EV Adoption explains how vehicle segments with high utilization are viable candidates for electrification in 2020 (refer to Figure 2).

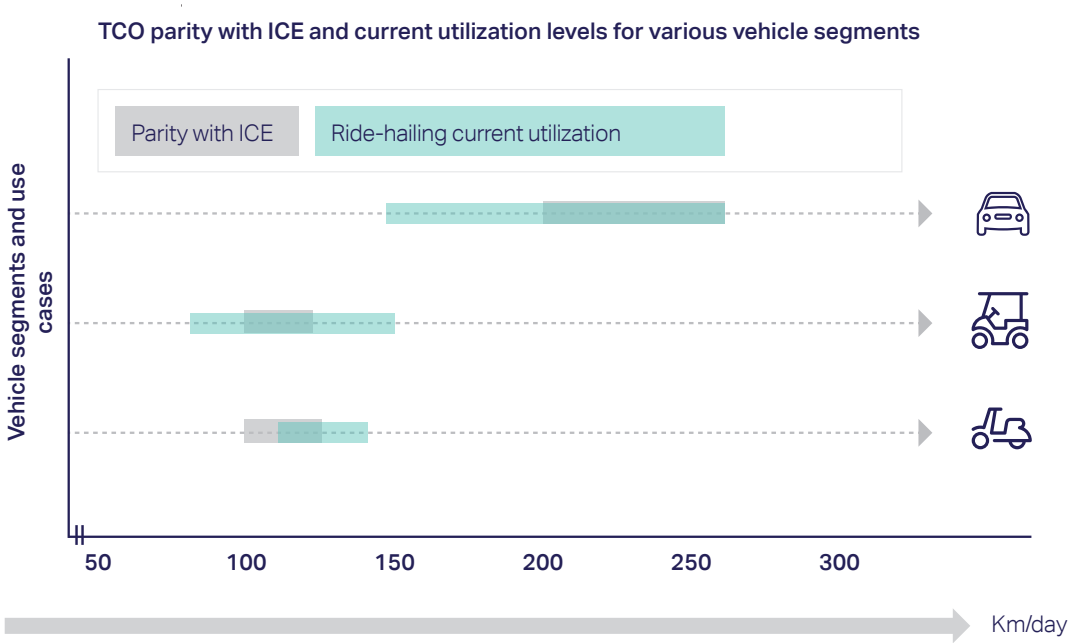
Figure 1: CO_2 **emissions avoided (million tons) by ride-hailing electric cars compared to equivalent ICE fleet - 2030**



Hence, the ride-hailing market is one of the catalyzers for adoption of vehicle electrification efforts in India.

Through this case study, WBCSD outlines experiences from the massive leap taken by BluSmart towards a low carbon future and less polluted cities.

Figure 2: Total cost of ownership (TCO) parity comparison for vehicle segments and ride-hailing utilization levels[10]



2 Project overview

2 Project overview

Launched in June 2019, BluSmart Mobility – part of the Gensol Group – has created a new ride-hailing mobility ecosystem using cleaner battery electric technology. The ride-hailing platform started with the objective of transforming Indian cities by providing 100% electric, sustainable, efficient, affordable and reliable mobility solutions. Apart from the alternative fuel differentiator with respect to other shared mobility services, BluSmart's vehicle ownership model serves as an enabler to solve the challenge of drivers finding it difficult to afford monthly installments for electric cars.

Figure 3: BluSmart Business Overview[11]

> With the electric mobility revolution, India will move towards a shared, electric and connected world, resulting in improving the lives of millions of people.[12]

Amitabh Kant, CEO, NITI Aayog
(At World Environment Day, June 2019 on flagging Blusmart's cars)

To reduce the capital intensity of operations, BluSmart procures electric cars on a fixed monthly lease and avoids upfront capital investment. The driver partners, whose shifts are managed by BluSmart, are leasing the vehicle on a minimum earning guarantee basis. The vehicles have access to dedicated charging hubs developed by BluSmart. A BluSmart mobile application can be used to hail cars.

Targets and timeline

The infographic below highlights BluSmart's journey since July 2019.

Figure 4: BluSmart stakeholder map

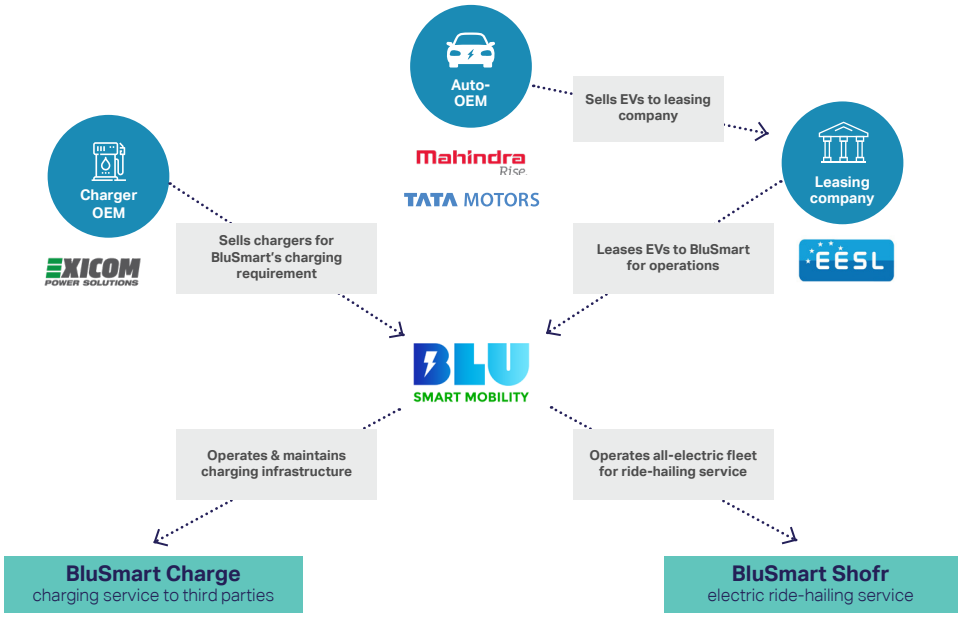
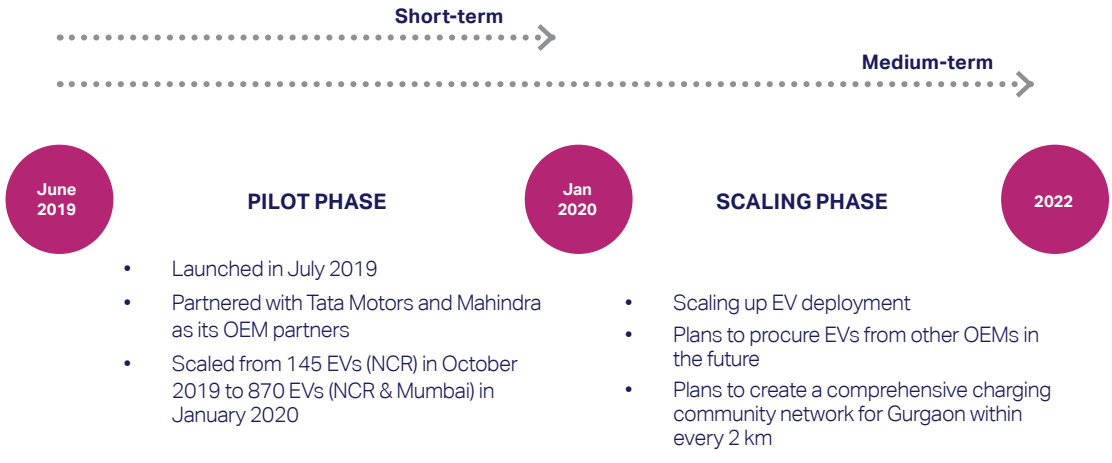


Figure 5: BluSmart EV adoption timeline



3 The business case

3 The business case

Sustaining electric ride-hailing business successfully requires technological and economical awareness about EVs and fleet operations.

In this emerging market, a few missteps could give EV adoption a rocky start. The sharp emergence and evolution of technology has led to favorable economics for EVs against their ICE counterparts. Also, leveraging the low operational cost of EVs, while reducing capital costs and overheads is the key for profitable operations.

The business case captures elements of BluSmart's strategy that makes EV-based operations viable by delving into BluSmart's technology choices and business model decisions.

Technology

A. Vehicles

India is a relatively new market for EVs and is at a nascent stage of development. When BluSmart's operations were launched in July 2019, there were only two models of EV passenger cars available in the fleet segment. As of February 2020, there are five electric car models available in the market, thus offering a larger choice to fleet operators.

The current BluSmart fleet consists of vehicles from Mahindra, Tata Motors and Hyundai Motors. The initially procured Mahindra's e-Veritos had a range of 140 km, while the subsequent vehicles offers a range of 181 km.[13] Similarly, the initial vehicles from Tata Motors' e-Tigors had a range of 120 km, while the subsequent variant by the same OEM offers a range of 213 km.[14] With a certified range of 452 km,[15] Hyundai Kona has the highest range among BluSmart's fleet.

B. Chargers and charging strategy

For charging its fleet, BluSmart utilizes a mix of both DC fast and AC slow charging stations. To address challenges around limited availability of public charging infrastructure network in Indian cities leading to increased dry run and range anxiety, BluSmart opted to invest in captive charging stations so that drivers could reliably charge their vehicles during the operations. EV/EV Supply Equipment (EVSE) ratio for operations is usually maintained at: 3.4 EVs per fast charger and 3.3 EVs per slow charger.

Captive charging network and third-party charging partnerships ensure charger availability in desired locations and reduce the risk of vehicles running out of charge during operations. BluSmart plans to share and monetize the charging network with public and other fleet operators, in the future. This would support the geographical coverage of charging infrastructure available to other entities and would result in increased utilization of the charging facility itself.

> We are proud to have partnered with BluSmart to offer Mahindra eVerito, India's first electric sedan on their ride-hailing platform. We worked closely with BluSmart during the initial stages as they shared our passion for transforming mobility in India, with clean and connected electric vehicles.

Mahesh Babu,
MD & CEO, Mahindra Electric Mobility Limited

C. Technology platforms

BluSmart has developed its proprietary backend technology platform. It has also developed applications specifically designed for customers, drivers, dispatch centers, hub operations and charging users. Developing in-house technology allows BluSmart to optimize its ride operations as per current EV charging hub model and provide an array of features which can be updated in a fast-tracked manner such as the Blu Wallet, which allows for seamless payments on the platform, the Rental product, which allows customers to keep the vehicle with them for longer periods of time. BluSmart technology also improves customer experience by reducing late arrivals through automated supply-demand density matching, recent customer/driver ratings, frequency and more.

The vehicle assignment algorithm itself works on a technology stack built over AWS Beanstalk. BluSmart uses Quartz as a job scheduler for all its ride requests. Redis is used for storing and quick access of driver locations which are matched with ride requests. This system can currently handle 1 million ride requests per hour in a single city.

The full breadth of BluSmart technology infrastructure is given below:

BluSmart app: an app which can be used by BluSmart's end customers to schedule and take rides, track ongoing trips, make payments, save favorite places etc.

BluSmart driver app: an app for drivers which they use for reporting on duty, asset takeover/handover, servicing trips, keeping track of their earnings etc.

Dispatch center: a web application used by BluSmart's dispatch and operations team for tracking and monitoring all ongoing, upcoming and past rides.

Hub operations dashboard: a web application used by BluSmart's operations team to manage all onboarding and day to day hub operations related to charging, parking, drivers, cars, cash collection, incident reporting etc.

Data analysis and visualization: a tableau-based visualization and analysis dashboard for all of BluSmart's business decision-making and planning. It consists of all data from its rides, customers, cars, chargers, drivers etc.

BluSmart charge app: an app which can be used by EV owners to find and reserve charging locations and charge their EVs by paying directly on the app.

Economics

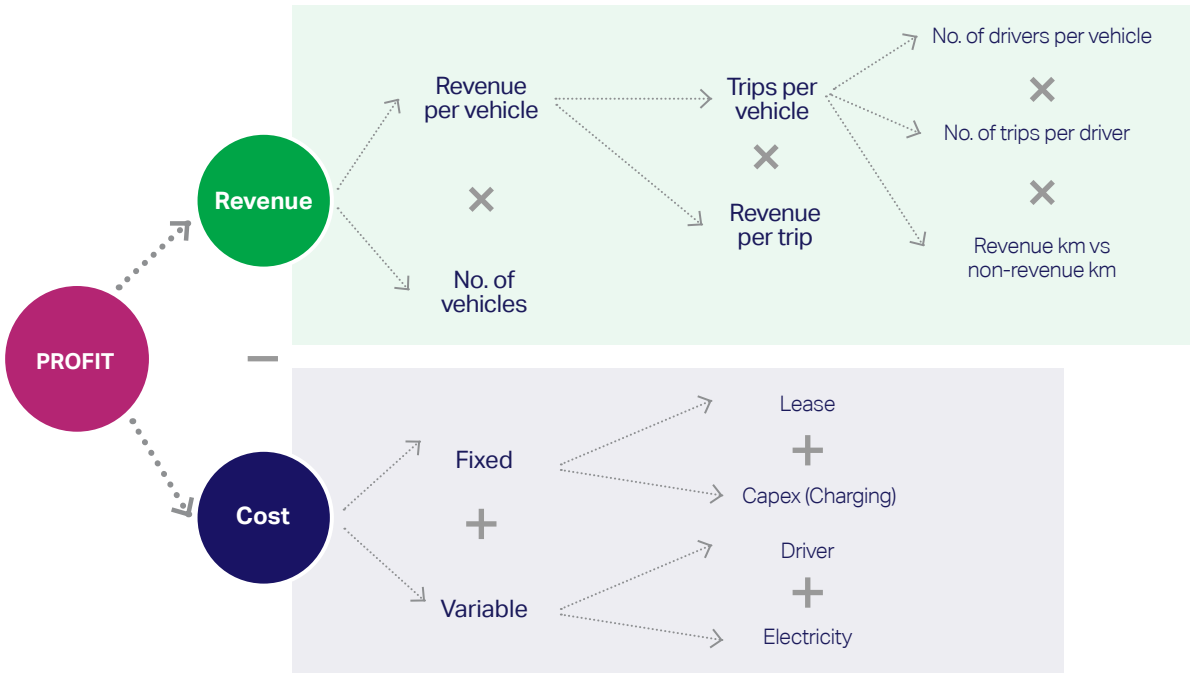
A. Revenue and cost drivers

BluSmart provides ride-hailing services to customers through its fleet of EVs. It aims to gain a profitability advantage over other ride-hailing service providers by leveraging on the lower operating costs of EVs. The revenue and cost drivers of an EV fleet operator's business (in this case, BluSmart) can be visualized through the framework given below.

BluSmart's current fleet is contracted on a monthly-lease basis through various leasing entities including Energy Efficiency Services Limited (EESL), a Super Energy Service Company (ESCO), which enables consumers, industries and governments to effectively manage their energy needs through energy efficient technologies. This leasing model helps BluSmart avoid a significant capital expenditure and instead use the capital to improve its technology platform.

Another benefit of the leasing model is that it helps minimize the technology risk since the low range vehicles can be handed back to the leasing companies after the lease-period and be replaced by longer-range, higher performance vehicles that may be available in the market in the future. This also helps avoid the uncertainties attached with the residual value of EVs in the (not yet evolved) used cars market.

Figure 6: Revenue and cost drivers for BluSmart operations



Profitability can be increased through:

- Increasing trips per driver and drivers per vehicle in tandem
- Boosting revenue km vs non-revenue km
- Increasing fare per ride (INR/km)

Profitability would be increased if:

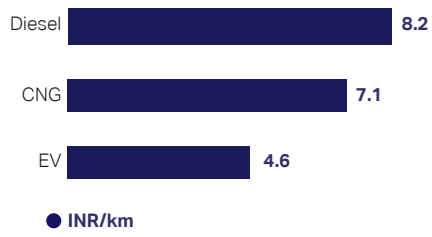
- there is reduction in EVs' leasing cost
- the charging power tariff is decreased
- the charging capex and overhead costs such as land lease are reduced

B. Total cost of ownership

Based on BluSmart's operations and internal calculations, at 200 km/day of utilization, the total cost of operating EVs is at INR 4.6/km[10] (USD $0.06/km)[17] when compared to INR 7.1/km (USD $0.10/km) for CNG vehicles or INR 8.2/km (USD $0.11/km) for diesel vehicles. The computation of total cost of ownership (TCO) considers leasing , fuel cost, charger cost, maintenance and other associated costs.

> From an ecosystem perspective, this tender [has] triggered building of the needed infrastructure.[16]
>
> **Saurabh Kumar,**
> **Executive Vice Chairperson, EESL, on signing an MoU with BluSmart for 500 EVs**

Figure 7: Total cost of operations (TCO) comparison (leasing EVs)



4 Lessons learned

4 Lessons learned

Ride-hailing business models in most countries are based on improving vehicle utilization of privately-owned vehicles. However, due to regulatory restrictions in India, traditional app-based ride hailing services in the country rely on driver-partners owning vehicles and driving them through the day to recover costs as well as earn a living (very similar to traditional taxis).

As explained in WBCSD's India Business Guide to EV Adoption, most driver-partners are not yet comfortable owning EV assets, primarily due to limited understanding of EV technology and economics, limited or no access to public charging infrastructure, inability to individually finance EVs that usually have a higher upfront cost as well as anxiety stemming from limited range of existing vehicles available in the Indian market.

One of WBCSD's early conclusion shows that early electrification of fleets will depend on the number of company or investor owned/ leased vehicles – such that there is sufficient scale available to help create captive charging infrastructure, access finance and optimize operations across fleet to increase utilization.

This shift in business model can be both an impediment and an opportunity.

To distinguish itself from the prominent ride-hailing companies operational in India, BluSmart's strategy has been to re-imagine ride hailing as a service and try to solve issues faced by traditional ride-hailing fleets and its stakeholders while using fleet ownership and electrification as levers for solutions.

1 LEARNING

COMPANY-OWNED OR LEASED ELECTRIC CARS (VIS-À-VIS DRIVEN OWNED CARS) SUPPORTS EARLY EV ADOPTION, BETTER CUSTOMER EXPERIENCE, BUY-IN FROM DRIVER-PARTNERS, INCREASED UTILIZATION OF VEHICLES AND BETTER CHARGING INFRASTRUCTURE PLANNING

App-based ride-hailing fleets such as Ola and Uber utilize the driver ownership model wherein the driver serving in the fleet owns the vehicle himself/herself through own funds or bank financing. This helps the ride-hailing fleets achieve large scale while remaining asset-light. But this model causes certain challenges with respect to EV ownership, such as:

CHALLENGE: DRIVERS FIND IT INCREASINGLY DIFFICULT TO AFFORD OWNING OR LEASING ICE VEHICLES, EVs WITH HIGH UPFRONT COST ARE LIKELY TO AGGRAVATE THE CHALLENGES FOR DRIVER-OWNERSHIP IN THE INDIAN CONTEXT

The current EV vis-à-vis ICE vehicles upfront cost disparity (for cars) makes it difficult for driver partners to purchase and manage charging of EVs, which is a governing factor in ownership models in ride-hailing fleets (refer to India Business Guide to EV Adoption for current EV vis-à-vis ICE vehicles cost disparity among vehicle segments and use-cases). Driver-owned vehicles may likely be suitable once the business models and technology are proven and a public charging infrastructure has been built out.

CHALLENGE: RIDE-HAILING PLATFORMS HAVE LITTLE CONTROL OVER CUSTOMER EXPERIENCE

Ride-hailing platforms with a driver-ownership model have little control over the customer experience, as drivers are private contractors, taking rides and maintaining vehicles as per own preferences and hygiene standards. Additionally, due to drivers putting in more hours, driver fatigue and poor hygiene have a direct impact on customer experience.

BluSmart Initiative: Company-owned or leased-vehicle ownership model

Early adoption of electric cars for ride-hailing is likely to be led by investors owning and operating fleets at a scale that allows them to manage charging, driver training and optimization of fleet operations. Currently, driver-owned ride-hailing models are more suitable for two-wheeler and three-wheeler vehicle segments wherein the cost-disparity is lower and the charging/swapping management is relatively easier than the four-wheeler vehicle segments.

BluSmart's company-provided-vehicle model serves as an enabler to solve the challenge of drivers finding it difficult to afford monthly installments for EVs. Additionally, this model also provides BluSmart the ability to plan and optimize other operational requirements, including optimization of driver-car ratio, that is instrumental to economic viability of electric mobility. Several such benefits arising from company/investor-ownership of electric vehicles have been captured in learnings 2 to 6.

Impact of this initiative

Lower financial burden on drivers: A major hurdle for drivers has been bearing the financial burden of owning the vehicle. Through procuring vehicles itself (on lease basis), BluSmart has taken away the pressure of high monthly Equated monthly installments (EMIs) from EV drivers.

> The BluSmart driver model is beneficial for me as I can earn more with my ride-based incentives without worrying about owning a car and paying its EMI.
>
> **Virender Yadav, BluSmart Driver**

2 LEARNING

OPTIMIZATION OF DRIVER-CAR RATIO, SPECIFIC TO CHARACTERISTICS OF EVs, INCREASES VEHICLE UTILIZATION ENSURING PROFITABILITY IN OPERATIONS

Electric cars are currently 30% more expensive than equivalent ICE cars. Fleet operators must devise ways to utilize the EVs as high as possible so that the lower running expense advantage can be maximized to attain superior unit economics in comparison with ICE vehicles and generate greater revenue. A few challenges are:

CHALLENGE: LOW UTILIZATION OF EVs TRANSLATES TO LOWER PROFITABILITY WHEN OTHER FIXED COSTS (SUCH AS LEASING EXPENSES) REMAIN CONSTANT

Vehicle utilization refers to the ratio of hours of actual operation to the hours the vehicle is technically available for operations. For example, if a vehicle is operated for 12 hours out of the total available 24 hours in a day, then its utilization would be 50%. A higher vehicle utilization increases profitability since the fixed costs of leasing can be recovered faster over a larger number of revenue-generating rides.

CHALLENGE: INCREASED UTILIZATION LEADING TO DRIVER FATIGUE WITH TRADITIONAL DRIVER OWNERSHIP MODELS

A drawback with the traditional ride-hailing ownership model is driver fatigue and driver churn,[18] wherein drivers are spending additional hours on the road (often more than 8-12 hours) to ensure increased utilization and maximize earnings. Currently, there is lack of provisions in dominant app-based ride-hailing platforms in India for multiple drivers to operate the same vehicle asset. While some ride-hailing platforms have experimented company ownership of ICE vehicles with multiple drivers operating the same vehicle, they concluded that lifespan of ICE vehicles was severely impacted with 12-16 hour shifts. In case of EVs, if a single driver owns and operates an EV, it will under-tap the opportunity to run extra kms per day without severely impacting the life of the vehicle asset.

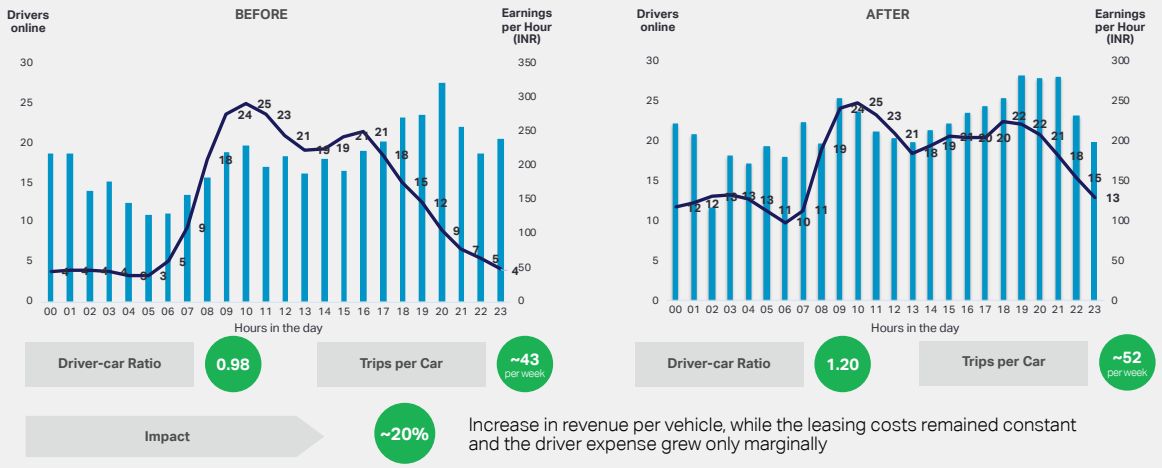
BluSmart Initiative: Optimizing driver-car ratio to increase EV utilization and fulfill latent demand

The company ownership model accommodates staffing of more than one driver for one vehicle. Using this approach, the vehicle can be operated for much longer hours and higher revenue can be generated even while lease cost remains fixed, thus increasing profitability.

Data analytics enabled BluSmart to map average earnings per hour (EPH) and the number of drivers online for each hour of the day. This mapping showed a relatively lower number of online drivers during the high-EPH time slot between 5 PM and 1 AM and the relatively low, yet sizeable demand during the time slot between 1 AM and 7 AM, as shown on the left-hand side in figure 6.

Subsequently, to capture the demand optimally during all timeslots of the day, BluSmart introduced double driver-shifts for a certain number of vehicles. The optimization of driver-car ratio resulted in 20% increased revenue per vehicle, parallelly addressing the concern of driver fatigue.

Figure 8: BluSmart optimizing the driver-car ratio during high-earning time slots



3 LEARNING

EARLY, STRATEGIC PLACEMENT OF EV CHARGING HUBS CAN REDUCE DRY RUN FOR RIDE-HAILING VEHICLE ASSETS MAKING SUCH CHARGING HUBS VIABLE IN HIGH DEMAND LOCATIONS

Limited availability of public charging infrastructure has been a major impediment for EV adoption. Large scale adoption of EVs needs to be accompanied by system-wide changes, through setting up of both private and public charging infrastructure. Early adoption by government and businesses can provide the scale to create micro-systems which can grow, replicate and eventually combine, to form larger ones. Today, ride-hailing services are using informatics and analytics to optimize charging strategy and EV routes, to seamlessly solve most challenges around range anxiety and limited availability of public charging infrastructure.

CHALLENGE: HIGH DRY RUN OF FLEET VEHICLES DUE TO CHARGING REQUIREMENTS

Dry run denotes the percent of time that the vehicle is running idle, without a paying passenger. Higher dry run will lead to lower profitability since the vehicle operations during the dry run are not supported by an income-generating passenger. Dry run begins to creep up when charging infrastructure is placed away from high demand regions, since this would mean additional time spent travelling away from pick-up zones to charge the vehicle.

CHALLENGE: HIGH ASSOCIATED COST OF EV CHARGING

Cost of EV charging increases due to high associated costs and overheads in installation and operation of charging infrastructure. The effective cost of EV charging would include land rentals, cost of grid upgradation, cost of manpower to operate chargers and the power tariff.

BluSmart Initiative: Strategically placing charging hubs based on demand traffic

Strategic placement of charging hubs in key demand catchment areas helped BluSmart achieve two key operational requirements: optimally meeting demand and reducing dry-run time. An extended geographical coverage of charging infrastructure would also address the range anxiety concerns of EV drivers, in general.

Optimally meeting demand

Data analytics has enabled BluSmart to develop heat maps showcasing customer demand in different areas within the city. BluSmart has utilized these heat maps to identify ideal locations for setting-up and operating their charging hubs. This ensures that once the cars are charged, BluSmart drivers will have higher probability of getting rides nearby and will be able to drive towards the passenger quickly, thereby, increasing revenues.

Figure 9 and 10 depict BluSmart's process of selecting sites for charging hubs; to meet demand in Delhi and Gurgaon, BluSmart operates four charging hubs. The location of these hubs corresponds with the demand centers (highest pick-up and drop densities) reflected in the demand heat maps.

Impact of this initiative

By placing the charging hubs close to demand centers, and relying on multiple charging hubs for operations, BluSmart has reduced the distance travelled by the cabs between charging hubs and the passenger. This has led to reduction in dry run percentage of its EVs. This is illustrated in Figure 11.

Apart from strategic placement of chargers, the increase in revenue can also be attributed to increased passenger demand, driver charging behavior, promotional incentives etc.

Figure 9: Demand heat maps for BluSmart cabs across Delhi National Capital Region (NCR)

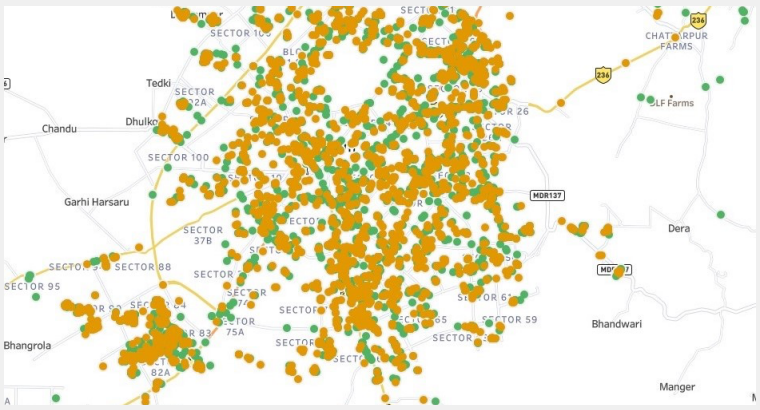


Figure 10: BluSmart charging hubs on a map of Gurugram

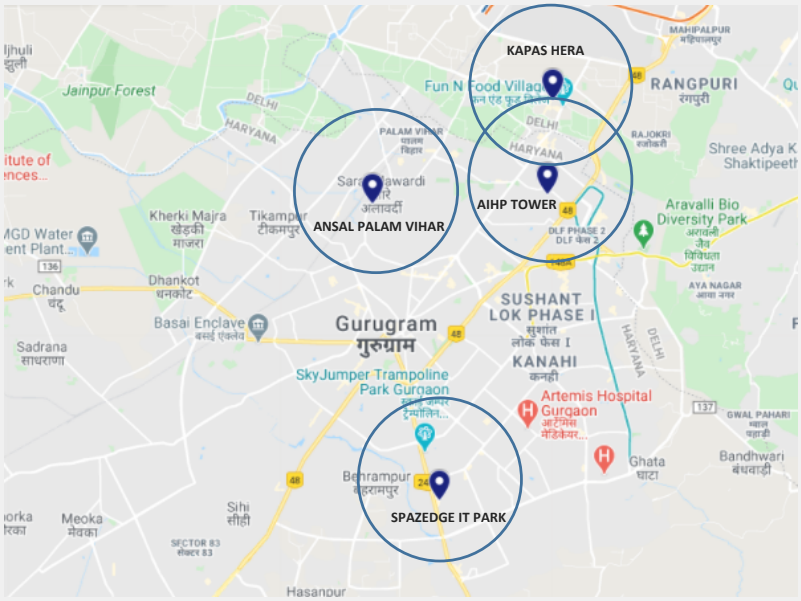
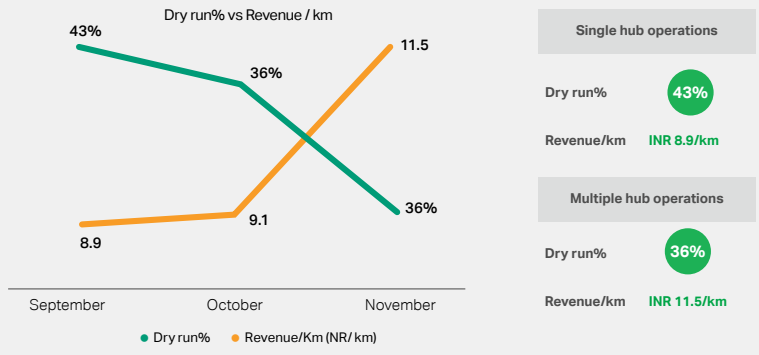


Figure 11: Reduction in dry run % over months and its impact on revenue/km



BluSmart aims to reduce dry run % to sub-10% levels in the future through optimally placed charging hubs

4 LEARNING

SHARING CAPTIVE CHARGING INFRASTRUCTURE WITH OTHER EV USERS CAN IMPROVE INFRASTRUCTURE UTILIZATION, ACCELERATE CAPEX AMORTIZATION AND ADDRESS RANGE ANXIETY CONCERNS

Poor rate of asset utilization is a major hurdle in operating expensive EV charging infrastructure. This issue can be even more acute for captive charging infrastructure as highlighted below:

CHALLENGE: SUB-OPTIMAL UTILIZATION OF CAPTIVE CHARGERS FROM FLEET USE ALONE

Often, EV fleet operators install captive chargers to solely cater to their fleet requirements, leading to high dependence to the scale of operations for economic viability. In fact, for early-stage market, captive-charging models with relatively small fleets, yield to low asset utilization and poor financial viability on a standalone basis.

BluSmart Initiative: Sharing charging infrastructure as a service to other EV users

BluSmart Charge is one of BluSmart's business segments to offer charging services to other EV users and increase asset utilization of chargers. This allows EV users to locate, book and pay for charging sessions.

Currently BluSmart cabs charge using both captive BluSmart chargers and public chargers. BluSmart operates approximately 190 captive chargers at four locations across Delhi NCR. The utilization of slow chargers usually lies between 10% and 15% and of fast chargers between 35% and 55%. To boost this utilization further and recover charger installation costs quicker, BluSmart has planned to extend charging services to other EV users at their captive charging hubs.

Even though this will serve as a relatively small revenue source compared to the ride hailing business of BluSmart, the charging service business will ensure higher utilization of chargers which will accelerate capex amortization on chargers.

5 LEARNING

REDESIGNED PARKING SPACES CAN REDUCE TURNAROUND TIME AND QUEUING AT CHARGING HUBS

The land lease rental forms a significant component of the overall charging operational expenses. A planned and judicious use of the space can avoid queuing at charging hubs and requirement of additional land, further adding to expenses. Some of the traditional parking and charging models can be optimally designed to address these concerns.

CHALLENGE: SUB-OPTIMAL SPATIAL CONFIGURATION OF CHARGING BAYS CAN CAUSE HIGH TURNAROUND TIME AND QUEUING

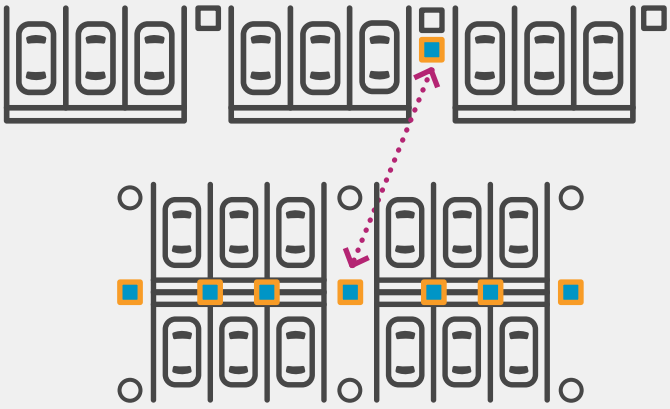
Parking or charging bays may put a constraint on the number of vehicles charging or parking at one time. If the charging constraint is lower than the operational threshold, EVs may have to wait in a queue to charge. This will cause an increase in downtime of EVs where they won't be able to generate any revenue.

BluSmart Initiative: Optimally designing charging hubs

In a traditional design (refer to the design on top in Figure 12), chargers are mounted against the wall or placed closed to the wall in the parking lot. This reduces the number of cars that can be charged simultaneously.

BluSmart adopted innovative and new parking designs (refer to the design on bottom in Figure 12) to overcome this constraint. Optimal placement of chargers in open spaces accommodates multiple charging of cars at once, thus increasing turnaround time at charging stations.

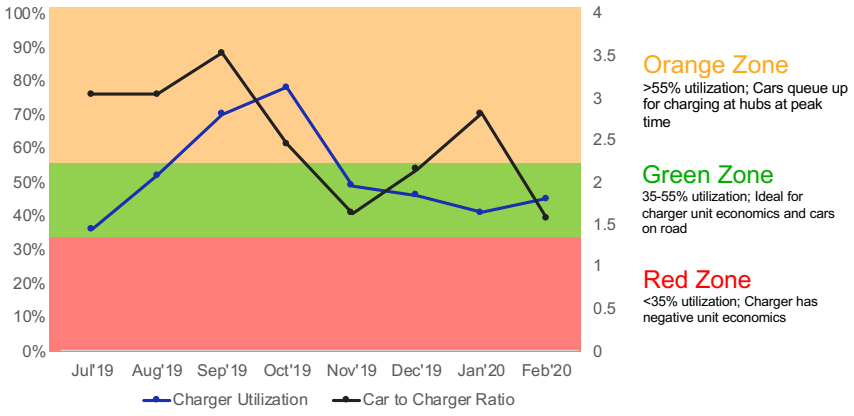
Figure 12: EV charging in traditional and optimized parking lot designs



Impact of learning 4 and learning 5:

The number of chargers in a hub, the parking hub design and the number of vehicles relying on hubs, determine charger utilization and their unit economics. According to BluSmart, variance in operations occurring due to the changing fleet numbers and chargers leads to different charger utilizations. BluSmart's operational analysis reveals the following (refer Figure 13). It should be noted that the charging utilization should be maintained at the optimum level (green zone). Beyond this, the EVs will either have to queue at the charging hub (orange zone) or the charging hub itself will not be profitable (red zone).

Figure 13: Charger utilization at hubs with changing fleet numbers



6 LEARNING

CAPTIVE CHARGING HUBS ARE A CONSTANT TOUCH POINT BETWEEN SERVICE PROVIDER, VEHICLES AND DRIVERS, AND CAN BE USED TO MAINTAIN VERIFIABLE SANITIZATION SCHEDULES DURING THE COVID-19 PANDEMIC

Movement of people generally witnessed a decline after the COVID-19 outbreak, especially shared mobility. It would be crucial for ride-hailing companies to implement innovative measures to revive consumer confidence and ensuring people safety.

CHALLENGE: DISREGARD OF VEHICLE AND DRIVER HYGIENE AND SANITIZATION WILL ADVERSELY AFFECT COMMUTER CONFIDENCE IN RIDE-HAILING

The mobility systems are currently not designed for social distancing and there is need for people, businesses and infrastructure to adapt quickly to that. In the current ride-hailing fleet model, there is limited physical interface or interaction between the fleet operator and the drivers, which is often an impediment in regular monitoring of sanitization/cleanliness standards of the vehicle and the safety/health status of the drivers. standalone basis.

BluSmart Initiative: Utilizing captive charging as touch point for monitoring sanitization and safety standards

In BluSmart's EV-only fleet model, drivers have to regularly visit the charging hubs to charge the cars. This creates a regular touchpoint to train the drivers and to monitor necessary self-hygiene and vehicle sanitization standards. These frequent interactions allow quick feedback loops between customer service teams, operations team and drivers, thus enabling continuous improvement in the service.

Other learnings from BluSmart's EV operations:

Best practices to increase battery life and maintain health of vehicle asset

Batteries form the biggest cost components in EVs. Charging pattern largely influences battery life and improper practices could lead to reduced battery life and heavy recurring costs when a big fleet of EVs is being operated. BluSmart followed the following practices to maintain battery health:

- All cars undergo a cycle of slow charge after 2-4 fast charging cycles. This helps in maximizing battery life and optimizing health.
- All car charging is monitored live on its hub dashboard and it has automated alarms in place in case of any abnormalities in charging or state of charge (SOC) behavior.

Economic viability of EVs could be reinforced by availing cheaper power tariffs

Earlier BluSmart was availing power tariffs at commercial rates i.e., INR 7-10/kWh (USD $0.09-0.13/kWh) which contribute to high operational cost. Now with both Delhi and Haryana announcing EV tariffs, BluSmart is availing power tariffs at lower rates, i.e., INR 4.5-6.5/kWh (USD $0.06-0.09/kWh). The government support on EV tariffs has greatly supported the EV cost structure.

Renewable-sourced power could reduce cost of charging and make EVs greener

EVs significantly reduce carbon emissions compared to ICE vehicles. The source of electricity for EV charging makes a significant difference in the carbon emissions saved by an EV compared to ICE vehicles counterpart. EVs manufactured and charged in renewable-source dominant power grids (like Sweden), can reduce emissions by 79% compared to ICE vehicles.[19] But if the power is sourced from a coal-dominant grid, the emission reduction by EVs could decline to as low as 28% compared to ICE vehicles (depending upon the share of clean energy in the total energy demand in that particular geography). Hence, use of renewable energy sources for EV charging must be encouraged. BluSmart plans to install rooftop solar at their captive charging locations.

Land rentals and load connections constitute big cost components in charging infrastructure

Getting higher load electricity connection, finding rental space in strategic locations and a power backup facility that meet all safety guidelines, are major challenges for installation of charging infrastructure. If adequate load connection is not readily available, fleet operators might have to invest in installation of expensive grid infrastructure (distribution transformers). Finding ideal locations of charging hubs with adequate load capacity at affordable rental prices becomes a major success factor for fleet operators.

Creating gender friendly, equitable mobility solutions

Backed by continuous driver trainings and ensuring safety standards, BluSmart is helping create a secure community. The percentage of female passengers as a proportion of total users on the BluSmart platform is around 1.5 to 1.8 times higher than that on other ride hailing platforms.[6]

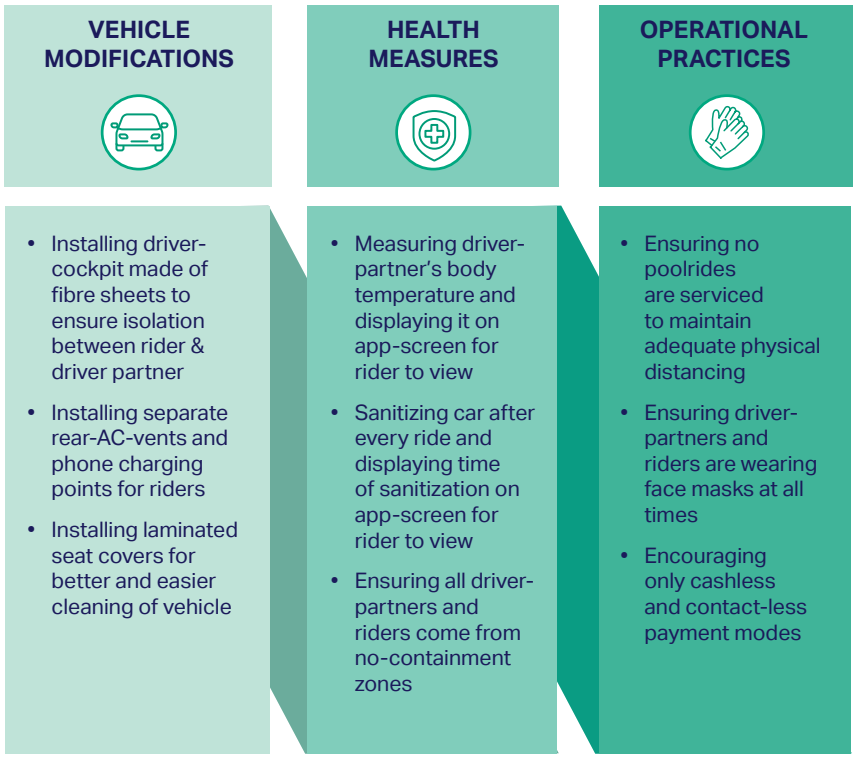
> Glad that riding an environment friendly electric car is possible today at the same cost of riding the fossil-fueled cars. It is a win-win for commuters as they get to contribute their part in cleaner cities.

Tanvi Sharma,
a BluSmart customer

5 Navigating COVID-19

Owing to the COVID-19 pandemic, the current mobility market scenario favors a switch from public transport (buses, metros etc.) to company cars, taxis and personal cars, for people who can afford it.[20] In the ride-hailing segment specifically, closed modes of commute (such as cars) are preferred compared to two-wheelers and three-wheelers where the proximity between passenger and driver is higher. In addition, shared/pooled trips are not preferred and not allowed in many cases. It would be crucial for ride-hailing companies to implement innovative measures to revive consumer confidence and ensuring people safety.

Figure 14: BluSmart major initiatives to combat COVID-19



Conclusion

The ride-hailing market offers a unique opportunity to integrate EVs and leverage their various benefits. BluSmart is demonstrating leadership in this space by operating India's first all-electric car ride-hailing fleet. It is fundamentally re-imagining the vehicle-ownership model compared to conventional ride-hailing fleets and removing the burden of owning the vehicle away from drivers and while remaining asset-light itself through leasing EVs from leasing/financial partners/ investors.

To achieve business viability for ride-hailing operations using EVs, BluSmart is increasing vehicle utilization level through higher driver-to-car ratios. Further, it is investing in a comprehensive charging network with redesigned parking bays to ensure minimum disruption in operations. By using the charging hubs as a regular touchpoint with drivers, BluSmart is implementing consistent hygiene standards for drivers and sanitation standards for its vehicles, thus delivering high quality consumer experience.

BluSmart's initial success highlights that integration of EVs in ride-hailing fleets is both technically and commercially viable. With improving technology, more vehicle options and increased availability of charging infrastructure in the near future, the business case of EV adoption in ride-hailing will only get stronger. With sustained business action from other ride-hailing companies and a supportive policy environment, EVs will soon enough start replacing ICE vehicles in the ride-hailing fleets and create major cost savings and carbon emission reductions.

In order to achieve a high-level of EV adoption in the ride-hailing market, and beyond, some amount of government support will be required. Some policy measures that governments could undertake to accelerate EV adoption in the ride-hailing market are:

Policy Theme	Industry Ask
Establishing charging networks for ride-hailing fleets	Support and strengthen development of charging networks within cities in collaboration with ride-hailing fleets, considering their day-to-day operations Promote availability of adequate grid infrastructure at ideal locations through distribution companies (DISCOMs) for faster and more economic installation of captive and public charging infrastructure
Incentivizing electric ride-hailing	Waive tolls and registration fees on a preferential basis for EVs Link the scrappage policy for ICE fleets with the sale or adoption of EVs
Facilitating EV financing	Facilitate collateral-free loans and easy financing terms to fleet operators and drivers for purchase of EVs

Furthermore, original equipment manufacturers (OEMs) must also play a more active role in this transition. They could work or engage with fleet-operators in designing or right-sizing EVs, keeping the ride-hailing application in mind. Looking at the global stage for examples, Didi Chuxing of China, has engaged with over 30+ OEMs (including Volkswagen, BYD, Toyota) to develop cars customized for the ride-hailing use-case; this also includes designing suitable, right-sized and right-priced electric vehicles. Finally, while BluSmart serves as a good example of enterprise and initiative for EV adoption in the ride-hailing market, it could be assumed that government interventions and active OEM participation combined, would compel more and more fleets to strongly consider switching to electric.

Partners for this report

BLUSMART MOBILITY – REMOBILITY MEMBER

Blu Smart is an all-electric ride hailing platform, which is on the mission to provide reliable, zero ride denials, zero surge, zero emission, affordable and sustainable mobility to consumers and improve the quality of life in mega cities of India. Founded in 2019, BluSmart is building a full stack business, disrupting the mobility space in Delhi NCR with its innovative driver partners engagement model and fleet & charging operations for electric vehicles.

THE CLIMATE GROUP

The Climate Group drives climate action. Fast. Our goal is a world of net zero carbon emissions by 2050, with greater prosperity for all. We focus on systems with the highest emissions and where our networks have the greatest opportunity to drive change. We do this by building large and influential networks and holding organisations accountable, turning their commitments into action. We share what we achieve together to show more organisations what they could do. We are an international non-profit organisation, founded in 2004, with offices in London, New Delhi and New York.

EY INDIA – TECHNICAL PARTNER

EY is one of the 'Big Four' accounting and management consulting firms with a strong global presence. As a leading advisor to the power & utilities sector, and the upcoming e-mobility sector, EY has worked with almost every major utility in the world, including 9 out of the top 10 Fortune Global 500 utilities. In India, EY has extensively worked in the e-mobility and battery storage space, with leading auto-OEMs, power- and transport-utilities, Government entities such as NITI Aayog, MoP, MNRE, DHI (MoHIPE), think-tanks, charging companies, battery manufacturers and more.

WE MEAN BUSINESS

We Mean Business is a global nonprofit coalition working with the world's most influential businesses to take action on climate change. Together we catalyze business leadership to drive policy ambition and accelerate the transition to a low-carbon economy. Our mission is to ensure that the world economy is on track to avoid dangerous climate change by 2020 while delivering sustainable growth and prosperity for all.

WILLIAM AND FLORA HEWLETT FOUNDATION

The William and Flora Hewlett Foundation is a nonpartisan, private charitable foundation that advances ideas and supports institutions to promote a better world. The Hewlett Foundation has been investing for a number of years in various strategies to avoid the worst effects of climate change and spare human suffering by reducing greenhouse gas (GHG) emissions. Our grants focus on cleaning up power production, using less oil, using energy more efficiently, preserving forests, addressing non-CO_2 greenhouse gases, and financing climate-friendly investments. Our grantmaking is focused in developed countries with high energy demand and developing countries with fast-growing energy demand.

Relevant business-focused initiatives in India

EV100

EV100 is a global initiative led by The Climate Group bringing together forward looking companies committed to accelerating the transition to electric vehicles (EVs) and making electric transport the new normal by 2030. The Climate Group harnesses the collective purchasing power of EV100 members to build demand for electric vehicles and send a clear signal to the market. Electric transport offers a major solution in cutting millions of tons of greenhouse gas emissions per year, as well as curbing transport related air and noise pollution.

URBAN MOBILITY LAB INITIATIVE

Rocky Mountain Institute India accelerates India's transition to a clean, accessible, and prosperous energy future. It engages government, industry, and civil-society leaders to design innovative policy frameworks and market solutions to support India's clean energy and mobility transformations. At the national level, RMI collaborates with NITI Aayog and Ministries to help establish a vision for the future of electric vehicles and energy storage in India. At the subnational level, RMI India collaborates with state governments, urban local bodies, and the private sector through its Urban Mobility Lab initiative to deploy pilot projects that realize environmental impacts and build confidence towards further action.

ELECTRIC MOBILITY INITIATIVE (EMI)

Electric Mobility Initiative (EMI) is a multi-funder platform mobilizing philanthropic efforts supporting the accelerated adoption of electric mobility in India. The initiative brings together like-minded organizations under a common strategy to drive forward electric mobility policy design and implementation. EMI collaborates with stakeholders across the spectrum including government, regulators and industry, through our grantees and partners who share our vision for a clean and secure energy future for India. EMI is hosted by Shakti Sustainable Energy Foundation.

MOVE – MOVING ONWARDS VEHICLE ELECTRIFICATION

MOVE is India Energy Storage Alliance's new initiative to help India move towards vehicle electrification and build a robust ecosystem for EV manufacturing & adoption. IESA is working with various stakeholders in the mobility sector to address barriers and focus on the aspects related to batteries for EVs and charging infrastructure.

Endnotes

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The guide has been prepared for general informational purposes only and is not intended to be relied upon as accounting, tax, legal or other professional advice.

ABOUT REMOBILITY

The objective of REmobility in India is to support the business adoption of electric vehicles, energy storage and renewable energy. The project will meet these objectives by identifying market barriers, sharing knowledge and collaborations, reviewing regulatory and policy frameworks, innovative business models and setting up scalable demonstration projects.

We are working with companies and experts from various parts of the national EV value chain, including original equipment manufacturers, charging infrastructure providers, battery manufacturers, utilities, renewable project developers, ICT providers and corporate end-customers. As of August 2020, over 80 experts and decision-makers from different parts of the EV value chain, including some institutional partners and end-customers, have agreed to share time and expertise to help meet our common objectives.

ABOUT WBCSD

WBCSD is a global, CEO-led organization of over 200 leading businesses working together to accelerate the transition to a sustainable world. We help make our member companies more successful and sustainable by focusing on the maximum positive impact for shareholders, the environment and societies.

Our member companies come from all business sectors and all major economies, representing a combined revenue of more than USD $8.5 trillion and 19 million employees. Our global network of almost 70 national business councils gives our members unparalleled reach across the globe. Since 1995, WBCSD has been uniquely positioned to work with member companies along and across value chains to deliver impactful business solutions to the most challenging sustainability issues.

Together, we are the leading voice of business for sustainability: united by our vision of a world where more than 9 billion people are all living well and within the boundaries
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