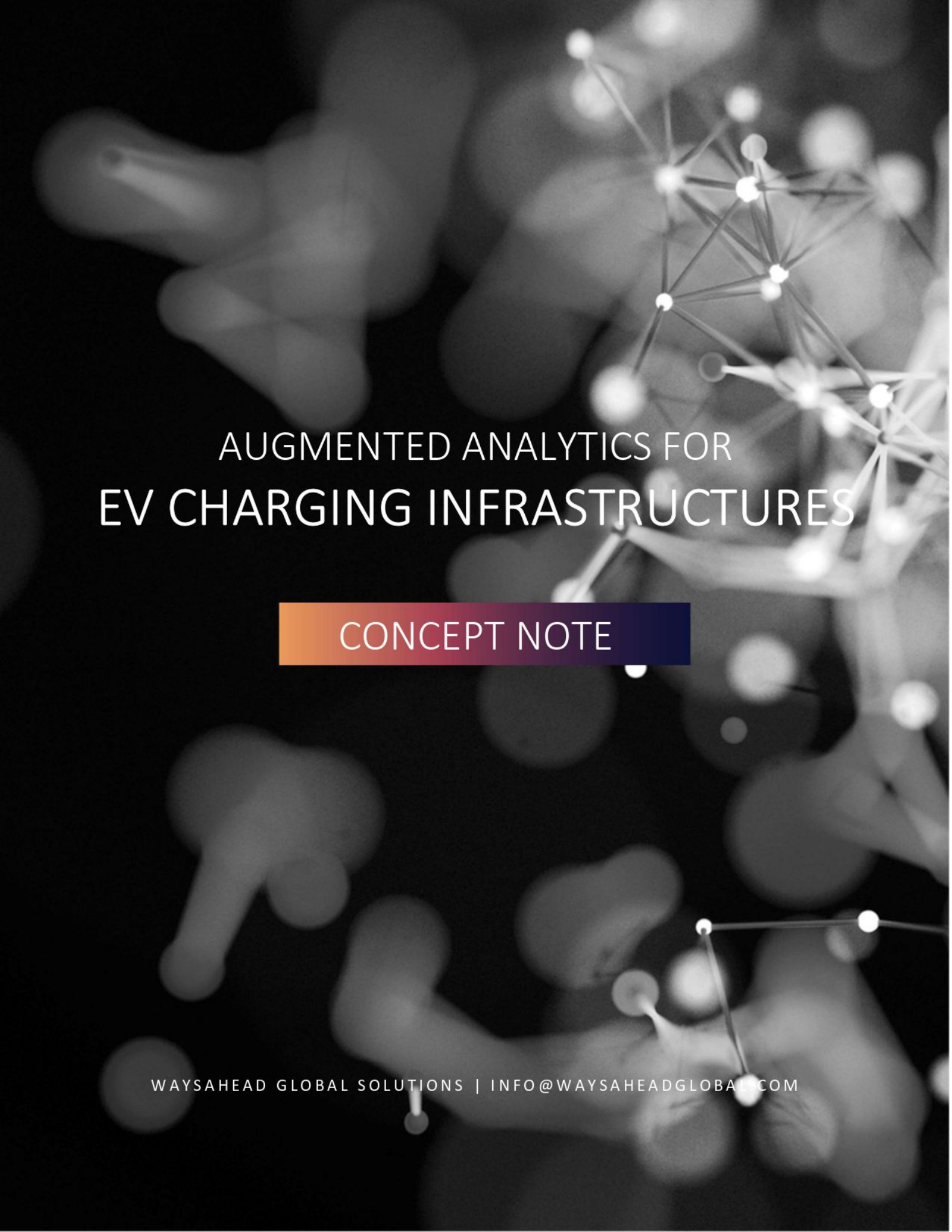

# AUGMENTED ANALYTICS FOR EV CHARGING INFRASTRUCTURES

## CONCEPT NOTE

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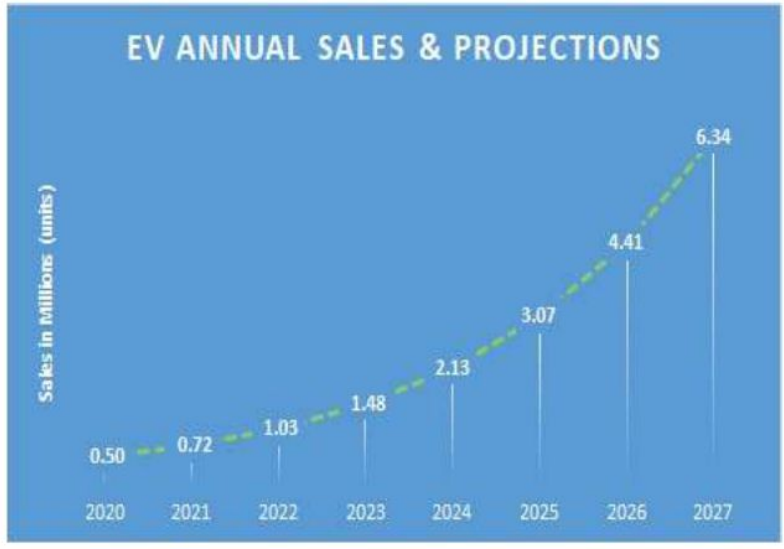
# INTRODUCTION

## CURRENT SCENARIO - STATISTICS

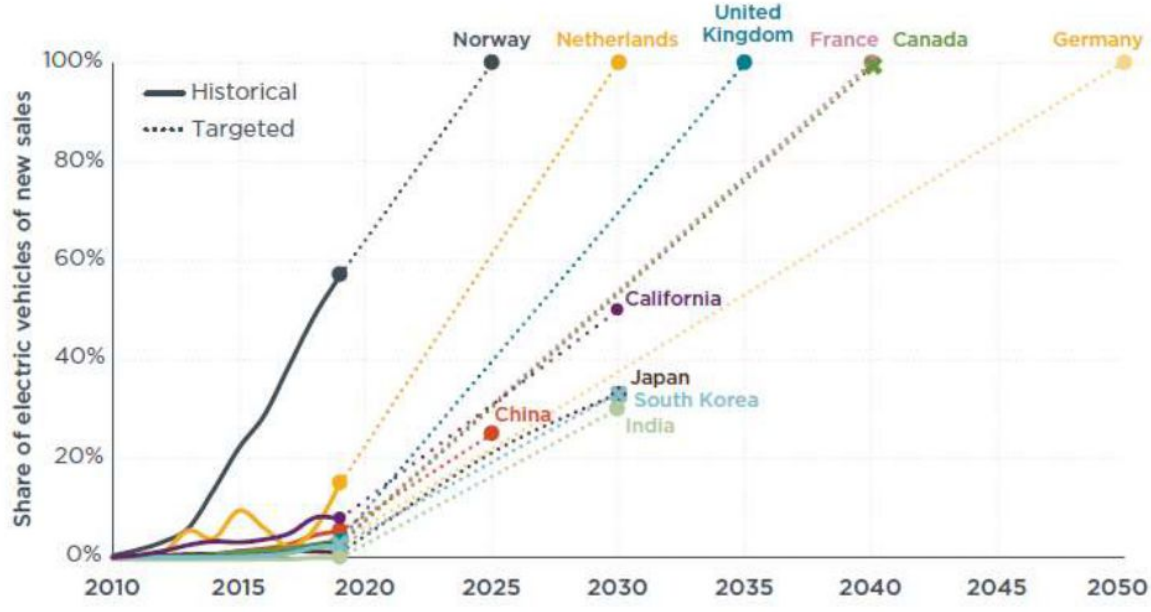
The Indian automotive industry is due for a major transition into renewable energy-based transportation. The requirements to support such a transition are huge and infrastructure is going to play a pivotal role in the success of the same.




With such growing adaptability of EVs across India, large volumes of data are generated from EVs, drivers, charging stations, and infrastructure. Data related to EV would be enormous be it with respect to **variety**, **volume**, or **velocity**. Hence, harnessing this big data requires data analytic solutions to retrieve intelligent and actionable insights.

The EV market is expected to grow at CAGR of **44%** between 2020-2027 and is expected to hit **6.34** million units of annual sales by 2027," according to the IESA report.

The following figure shows the exponential growth trajectory of EV sales of top countries adapting and supporting the makeshift.




Historical and targeted electric shares of new passenger vehicle sales by markets. (as per International Council on Clean Transportation)

Actionable for effective setup of the EV infrastructure:

- Develop policies and strategies for setting up EV charging stations.
- Developing intelligent charging algorithms for Improved Analytics
- Solving energy efficiency issues

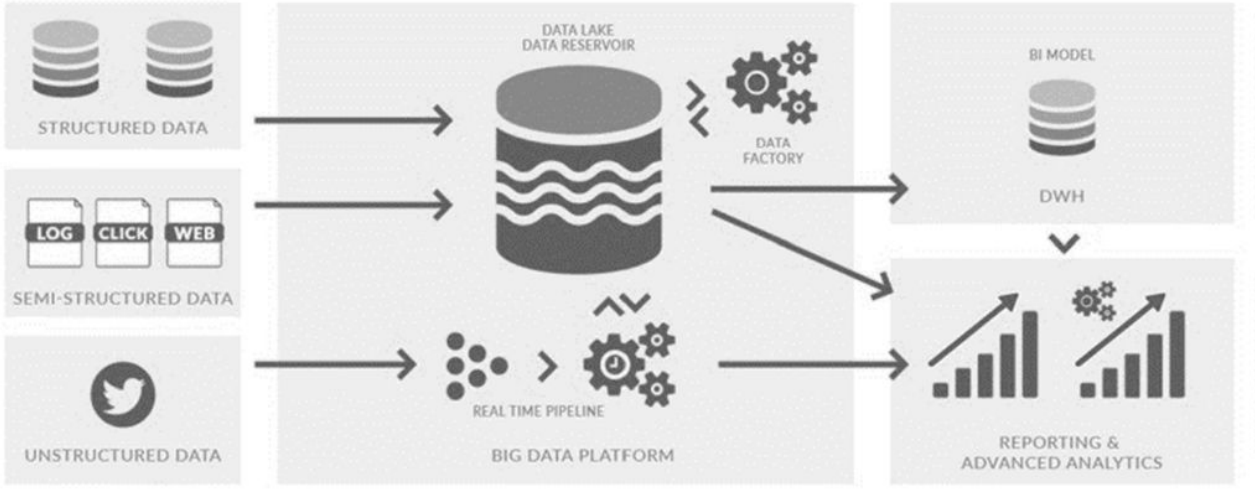
## PROBLEM

The EV market in India is on an upward trajectory and the fastest adapters of this new technology are city-goers living in developed urban areas. The unchangeable truth of developed urban cities is the **space crunch**. Lack of room for development in already overpopulated cities will create hindrances while adapting the infrastructure to support the advent of electrified vehicles.

Backdated infrastructure also becomes a major obstacle calling for an upgrade, which is both time consuming as well as heavy on the economics considering the arduous task that it is.

## INTELLIGENT ALGORITHMS

To solve the problems around EV charging infrastructure efficiency and efficacy, we propose to build autonomous augmented analytics platform. The platform would be capable of collecting data from various sources and provide **real-time actionable insights** to its consumers.




**Optimized charging** – models can be developed by taking into account the data on grid demand, charging station, vehicle battery, user, etc

**Consumption prediction** – to predict the consumption of battery and improve the accuracy of battery consumption.

**Heat Map generation** – The analysis of the heat map that we generate form the data logged, can help us deduce demands by assigning EV population based geographical clusters, for charging.

**Consumer and vehicle behavior** – This could provide additional insights about the charging patterns of consumers.

## SOLVING ENERGY EFFICIENCY ISSUES

Based on trend analysis of EVs and their charging patterns, optimizations can be achieved. This enables us to provide hardware maintenance, record heat maps, prescribe solutions for faster charging thereby enhancing user experience.

### Smarter and Greener Cities

Pollution is being attributed as one of the main reasons for climate change. Hence, it becomes imperative to opt for environment-friendly solutions, like EVs. Recently, Amazon has ordered electric delivery vans from a Michigan-based startup, called Rivian, in an attempt to tackle climate change.

- Opting for EVs will reduce greenhouse gas emissions that will result in improving the overall health conditions of the society.
- Further reduction in these emissions is possible if the EVs can get charged on renewable energy like solar and wind.
- The metal parts used in EVs do not cause any damage to the environment even though they are not totally environment friendly.
- Natural resources like oil fields can be preserved as EVs don't require drilling for oil.
- The innovation of electric cars with advanced technologies boosts up economic growth.

We propose to build resilience across industry and the larger community, in terms of effective infrastructural development for the Electric Vehicles and smart transportation systems.

## SCOPE:

1. Ability to become a huge data-point analyzer for understanding the EV market from initial days of boom.
2. Early understanding of customer demands & requirements helps enforce faster actions for better and polished infrastructural development.
3. Analysis of the collected data can be of great benefit for refinement of infrastructure and future upgrade of systems.

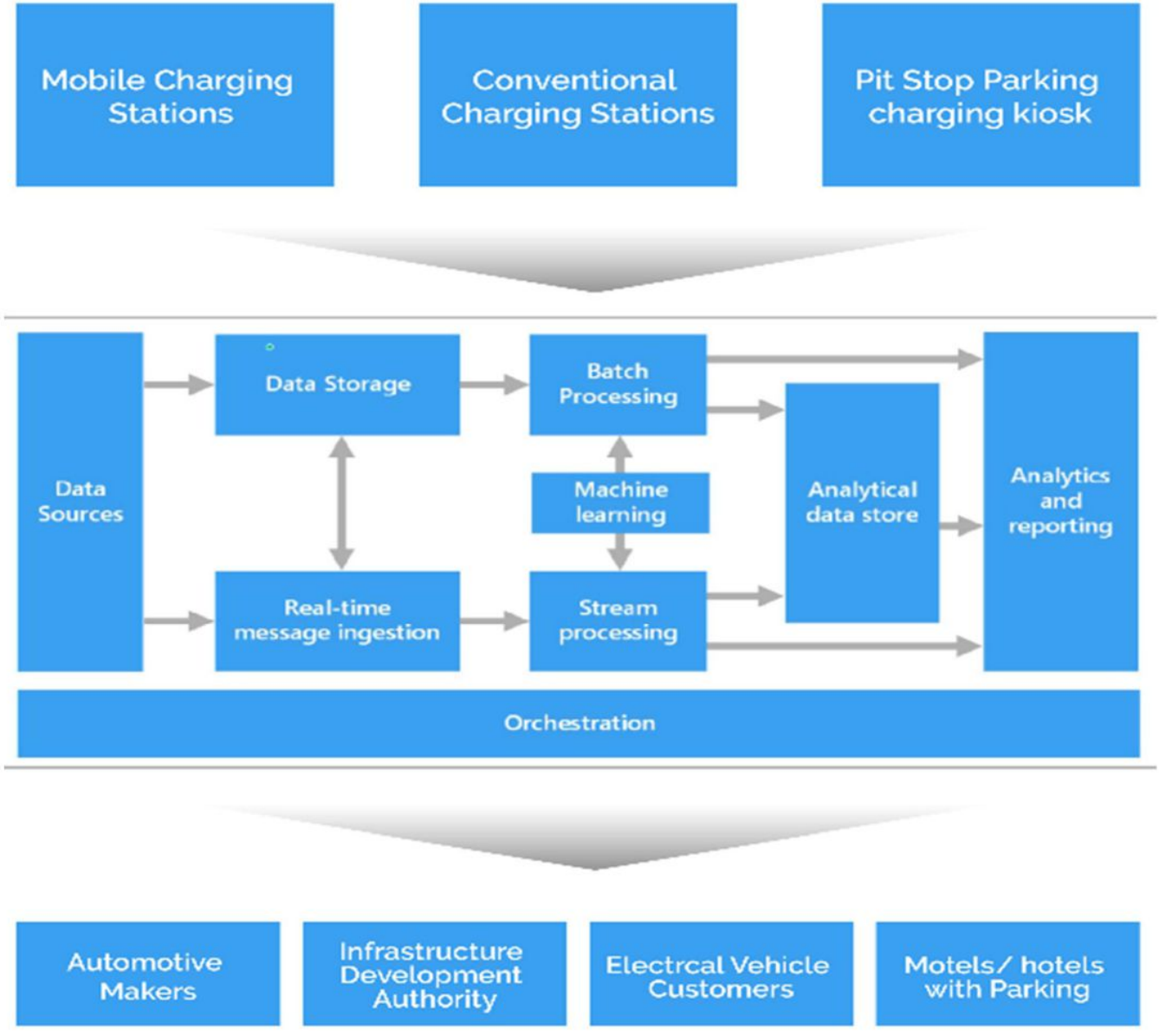
## DID YOU KNOW?

The number of Electric Vehicles available for sale in the market is growing and for good reason. Electric Vehicles have been around for a very long time. Believe it or not, the first functional and successful Electric Vehicles was a 6-seater wagon made by William Morrison, a chemist in the US in the year 1890!

Unsurprisingly, the second most trusted option beyond the ICE-powered vehicles is Electric Vehicles (EVs). Electric Vehicles have become a popular choice in recent years, growing from mere project cars of celebrities who wanted to boost their green creds to a natural choice for the urban commute.

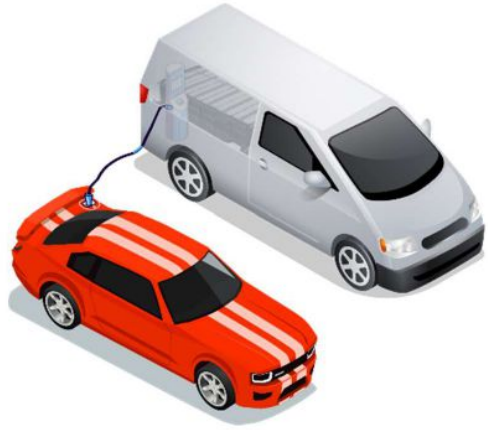
## HIGH LEVEL SOLUTION DESIGN:

We propose to integrate all three available channels as explained in the diagram below:



# L A N D S C A P E :

## Use Case Scenario - I – *Mobile Charging Station*



**Concept:** - A mini-Van sized mobile vehicle embedded with state of the art EV Charging components, making the dream of charge on the go a reality, by discharging the attached batteries in the van, to subsequently charging the attached electric vehicle.

**Value – Add:** -

- Catering to the Space Crunch problem
- Deriving a consumption, a pattern for all the electric vehicles.
- Creating and generating hot spots for smoother and optimized service delivery.

## Use Case Scenario - II – *Conventional Charging Kiosk (Petrol Bunk Style)*

**Concept:** - Conventional styled EV Charging stations for the Electric Vehicles being charged and parked for a substantial amount of time to be fully charged before it is take for a ride.

**Value – Add:** -

- Average customer dwell time for charging their Electric Vehicle.
- Predicting vacant space for charging EVs for the next customer(s)
- Analyzing usage patterns to optimize the electricity requirements.

## Use Case Scenario - III – *Motel/ Recreational Pit Stopping Arenas (Charging Kiosk)*

**Concept:** - Conventional styled EV Charging stations for the Electric Vehicles being charged and parked for a substantial amount of time to be fully charged before it is taking for a ride.

**Value – Add:** -

- While taking a break on a long trip, recharging the vehicle, with the charging kiosk in parking lot
- The data collected from the customer's eating pattern and other purchases made and the Electric Vehicle driven by them can fetch a lot of data based on the taste preferences of the customer and a lot of inferences can also be drawn from the same data collected.
- Inferential data analytics will help the managers of the facility to offer best of the best service an also create a trend pattern, which will improve over time giving the managers actionable insights to further optimize their entire facility.

## TECHNOLOGY

Proprietary algorithms and Artificial Intelligence induced data analytical solutions will prove to play a pivotal role in firstly, developing the much-needed infrastructure and subsequently to creating a seamless maintenance and constant optimizations for the entire ecosystem.

1. **Prescriptive Data Analytics:** Using this technique of Data analytics developing and optimizing the entire ecosystem would be fast tracked and also with such rich and deeper insights, it is also bound make significant optimizations to the available resource constraint, and hence effectively solve the aforementioned problems.

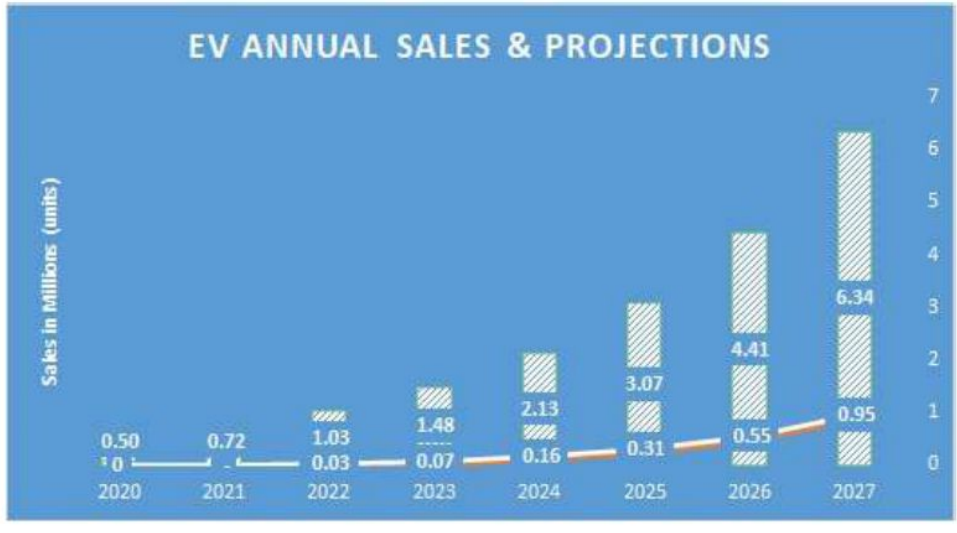
2. **Predictive Data Analytics:** This technique of Data Analytics will help us to predict and create trends on whole host of parameters ranging from the EV charging requirement based on geographical areas, the consumption pattern of the EV customers and finally a deeper insight for the automotive manufacturers to make better optimized EVs and even better-connected infrastructure to complement their vehicles.

3. **Inferential Data Analytics**: Just like the above two mentioned techniques, Inferential data analytics is going to support to load shed the heavy lifting for the entire infrastructural development. Subsequently, by drawing actionable inferences from the entire project better and more informed decisions can be taken up.

## BUSINESS PROPOSAL

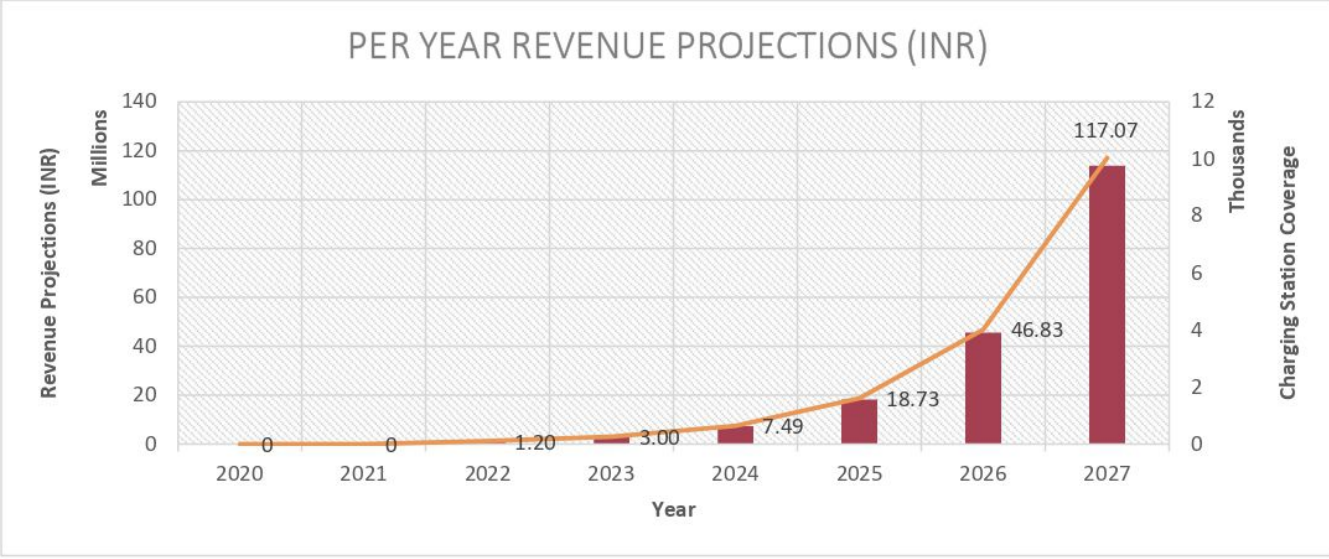
We propose to offer DAaaS (Data Analytics as a Solution) to all the stakeholders as mentioned in the below solution design. The idea is to provide user friendly access of an optimized EV Infrastructure to the consumers.

In order to make the overall process more efficient, necessary upgrades and maintenance procedures have to be conducted from time to time, using the power of data analytics, will be crucial to cater to existing users as well as derive future sales and improved infrastructure of EVs in India.




**We target to catering the data analytical requirements of approximately 1 million Electric Vehicles by 2027 accounting to 15% of the market share, based on the IESA Report.**

# REVENUE MODEL




Based on the aforementioned projection the revenue stream we are proposing is, we will be rendering our data analytics solution to our B2B clients (mentioned in above infographics) at INR 499 per month. Marking the gross revenue of INR 11 Lakhs as early as 2022, and subsequently INR 11.7 Cr. by 2027, with approximately 10,000 EV charging stations by deploying our Data analytics solution.

### Summary:

| | | |
|---|---|---|
| **1.** | Revenue from one station per month | : **INR 499.00** |
| **2.** | Expected coverage of EV charging stations by the end of FY2022 | : **100** |
| 3. | Expected revenue by the end of FY2022 | : **INR 11,98,800.00** |
| 4. | Expected coverage of EV charging stations by the end of FY2027 | : **Approx. 10,000** |
| **5.** | Expected revenue by the end of FY2027 | : **INR 11,70,70,312.50** |

**Please note that the above revenue figures are recurring on yearly basis.**

# CONCLUSION

It is evident that, no matter how fast we think the EV revolution is going change the way we commute, the fundamental questions remains the same. Lack of sufficient infrastructural development to support a transition this big will be a humungous task to fight out. And also, the fact that unlike the conventional petrol bunks, where in the refill was carried out by transporting petrol/diesel through a fleet vehicle over long distances to your nearest petrol stations. The EV charging facilities have to be on grid, and always ready to charge the next vehicle, making the scope of data analytics more prominent, that the former, as these facilities need to be constantly checked and kept under strict supervision in order to provide uninterrupted service.

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