



# Overcoming 'Range Anxiety' in Electric Vehicles



**Entry challenge Caselet**

The Indian Automotive Industry is currently in a growth stage. The automobile production and sales (in India) is expected to grow at higher rates over the next decade than in most other auto hubs. However, with each make of auto product, additional combustion-engine-based vehicle we manufacture and use, we will be adding carbon dioxide and other pollutants, using additional fuel, and putting excessive load on our already saturated city infrastructure and traffic.

According to a no. of studies, Electric Vehicles (EVs) are less polluting, have better total-cost-of-ownership (TCO) and are expected to rapidly become affordable for Indian Customers. However, range in electric vehicles always troubles the driver with the thought of whether he will be able to make it to the destination without running out of battery (charge), hence the term Range Anxiety was coined. In fact based on a study, Range Anxiety was considered as the primary barriers for Electric Vehicle buying.

The data in Table no. 1 clearly shows about delineation of EV Cars options currently available in India. While companies like Tesla and Nissan is offering the EV range greater than 200 kms, the cost goes beyond the affordability range in an already cost sensitive Indian Market.

Where?	Vehicle?	Range	Cost
India	Tata Tigor Electric	100 km	Rs. 12 lakhs
	Mahindra eVerito	110 km	Rs. 10 lakhs
	Mahindra e2o Plus	110 km to 140 km	Rs. 7.5 – 8.5 lakhs

**Table no. 1: Indian Electric Vehicles**

Electric vehicle range depends on the way energy is gained and the way energy is consumed.

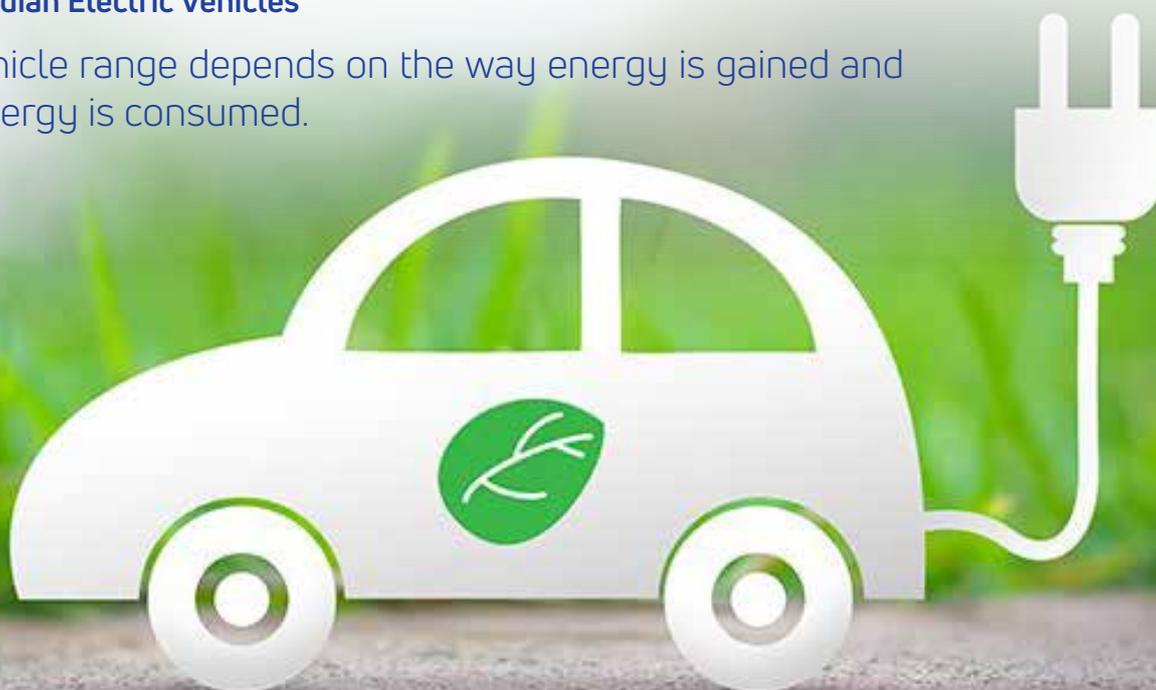
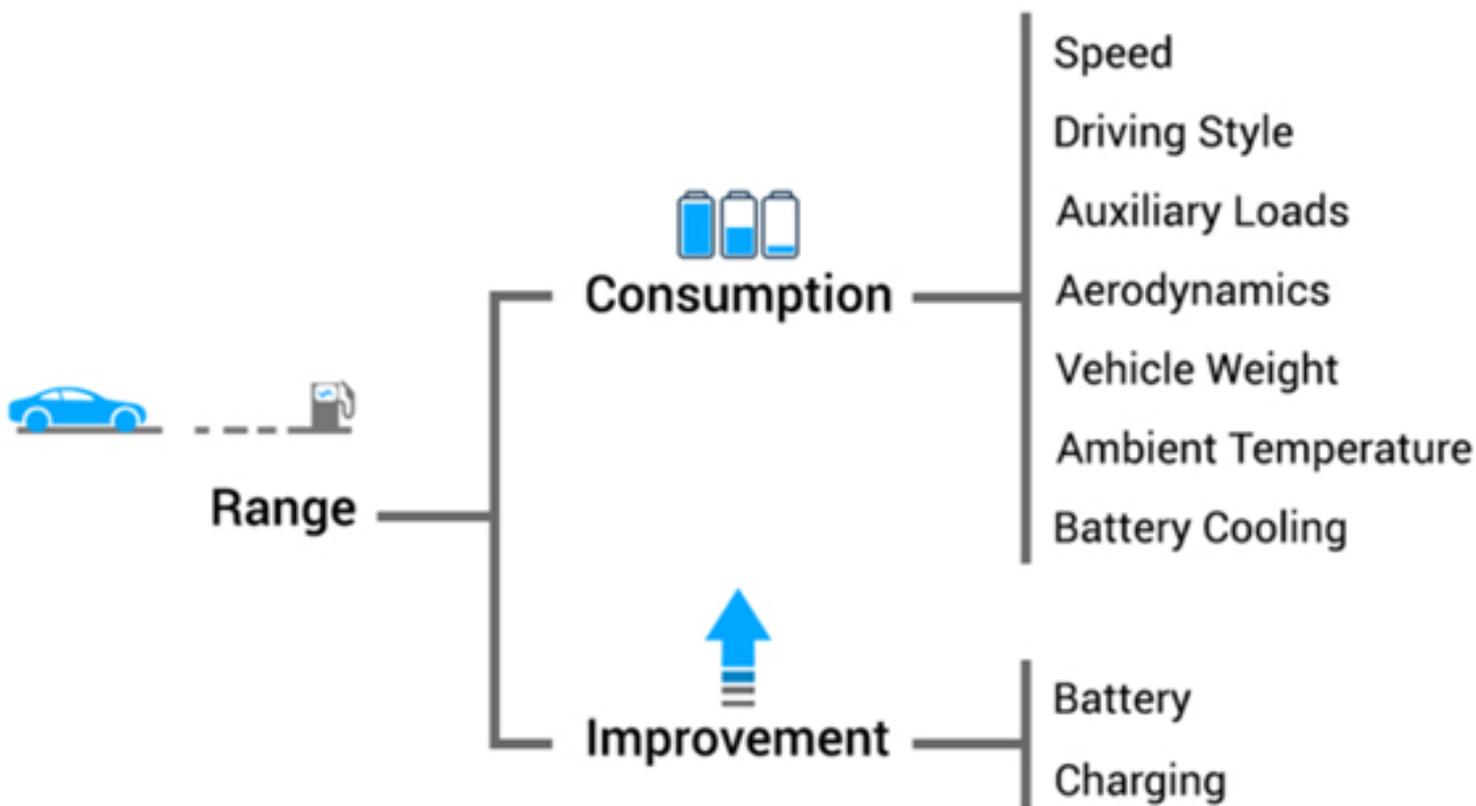


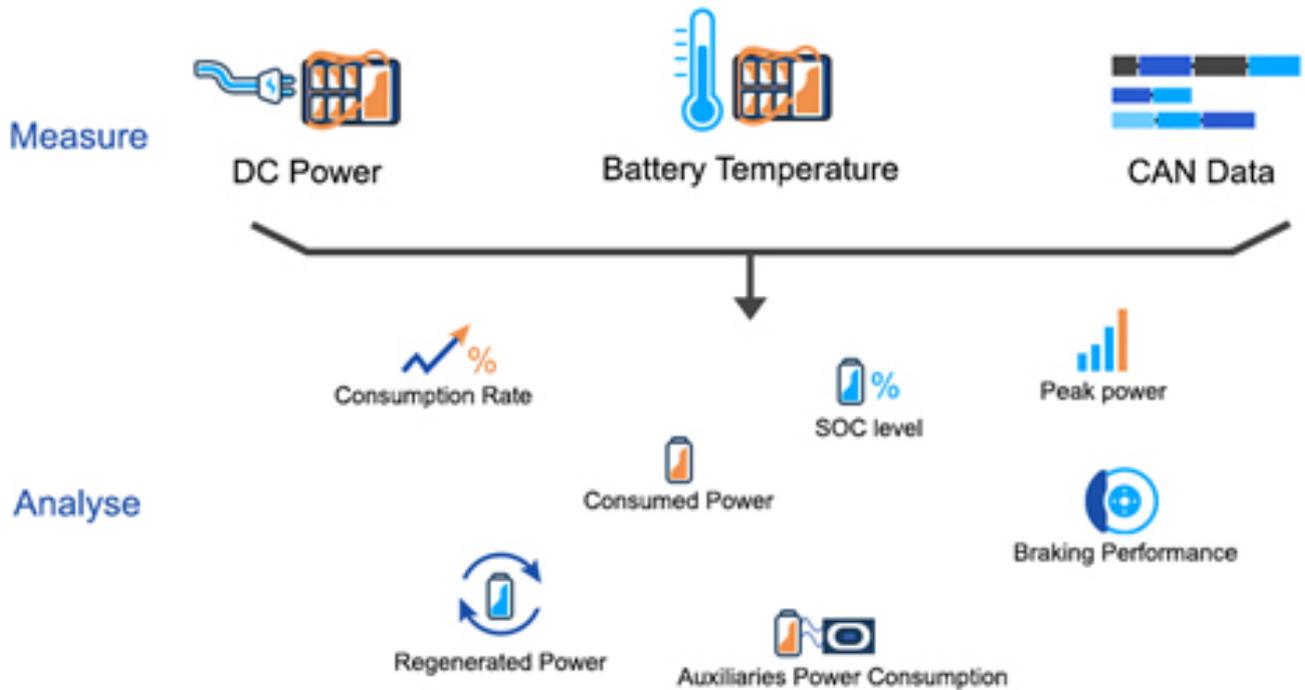
Figure no. 2 shows both categories of parameters that affects the range of EVs. While speed, driving style, auxiliary loads, aerodynamics and vehicle weight affect the range of EVs in the same way as they do for Internal Combustion engine vehicles, factors like ambient temperatures and battery cooling significantly impacts only the range of EVs. Improvements in Battery and Charging technologies may play significant role in reducing the range anxiety.



**Figure 2: Major parameters that affects EV Range\***

While it is a challenge to eliminate EV Range Anxiety, the advancement of electronics and In-Vehicle Network provides an opportunity to analyse the data, generate insights and develop innovative solutions to resolve this problem. Figure 3 shows some of the parameters that can be measured and analysed in an Electric Vehicle.





**Figure 3: Few parameters that can be measured and analysed in EVs\***

**Solution Required:**

In the development of Electric Vehicles, with the understanding of different parameters that influence range, different insights that could be generated with data and your own blue-sky idea, how can Tata Motors come up with a solution on eliminating the range anxiety?

