

# Part 1: Guesstimation Exercise

Since no country/city has been mentioned in the problem statement, we consider Kanpur, a Tier-2 city in India with a population of approximately 3 million.

Electricity rate in Kanpur = ₹7/unit (101kW- 500kW)

Average time to charge 1 scooter = 6-8 hours (2kW battery)

Average distance = 75km/cycle

Average lasting time (between 2 cycles) = 1 week (considering a person travel in a radius of 6-8km from home to work)

Weekly cost =  $7 \times 7 = ₹49 \approx ₹50$  on an average

**Thus, monthly cost =  $(4 \times 50) = ₹200$**  which makes it a more economical option

However, the **battery life** of an electric scooter in India is **2-5 years** as compared to 15 long years in case of a scooter fueled by petrol which poses a question on its longevity.

Out of 3 million people, considering 5% of the population is high-class,

$\Rightarrow 3,000,000 \times 0.05 = 150,000$  people will not have an electric scooter since they are capable of buying a car.

Considering 15% of the population to be lower class, they will not be having an electric scooter due to low income ( $< ₹33,000$ ) and would opt for public transport.

Average salary in city of Kanpur is ₹30,000 which makes the majority of remaining 70% population lower middle class;

Considering 30% of population has sufficient income to purchase as well as manage expenses of an electric scooter, that is,

$\Rightarrow 2,100,000 \times 0.3 = \mathbf{630,000}$

Out of the remaining population, considering 5% of the population prefers to use the railway, metro or travel by bus due to factors like highly polluted air of Kanpur and hot weather combined with long distances, age, metro closeness etc.

$\Rightarrow \text{Remaining population} = 630,000 - (630,000 \times 0.05) = 598,500$

A tier-2 city like Kanpur will have both nuclear (having 3-4 members) as well as joint families (having 7-8 members). Assuming there are 6 members per family on an average,

Number of families =  $598,500 / 6 = \mathbf{99,750 \text{ families}}$

Each family would own one scooter at max.

$\Rightarrow \text{Total number of scooters in use} = \mathbf{99,750 \approx 99.8k}$

$\therefore$  There will be approximately **99.8k** electric scooters in a city with a population of 3 million