

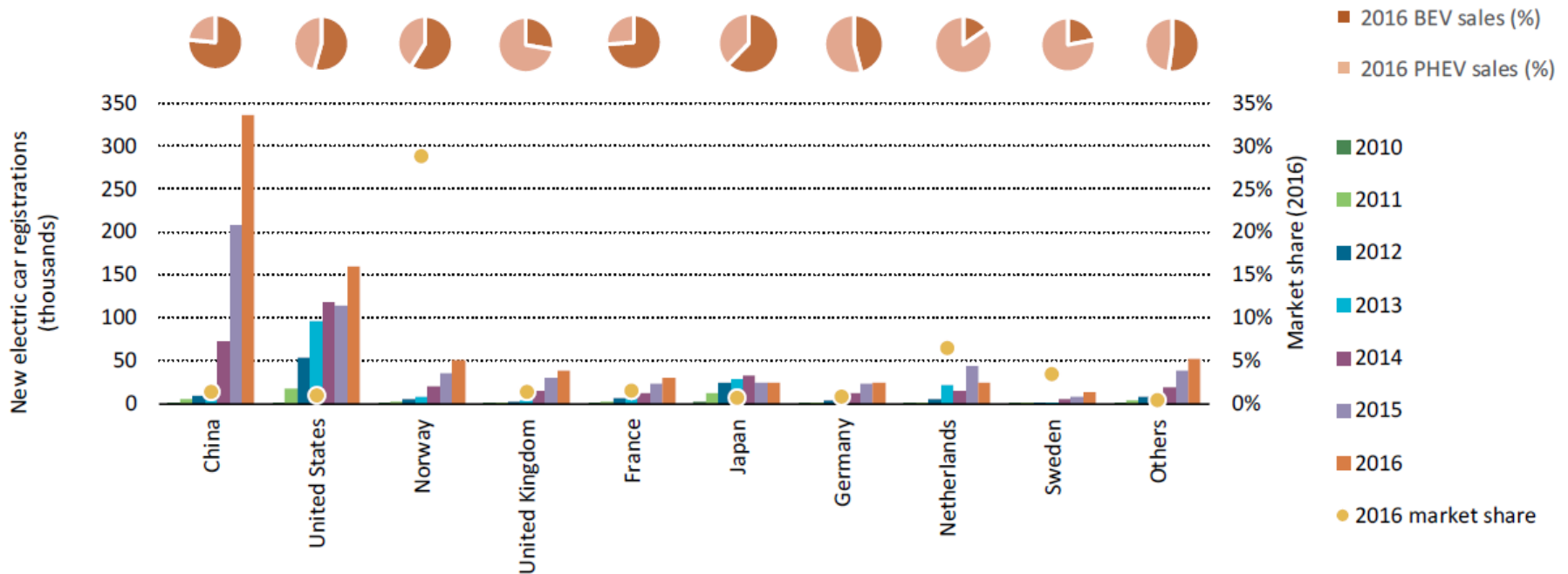
A Study of Electric Mobility for City of Hyderabad

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Electric Cars:



Electric 2 Wheelers:

- China is the largest market and in 2016 nearly 26 million units sold

Context

Strong enabling policies in India

Focus Area	Action/Target	Policy
Fuel quality standards	Phase in Euro V fuel standards from 2019 onwards	Auto Fuel Vision and Policy 2025
Emission norms for cars	Euro IV (2017) Euro V (2021) Euro VI (2024)	Auto Fuel Vision and Policy 2025
Promoting Electric Vehicles	Subsidies for EV, infrastructure investments and R & D	National Electric Mobility Mission Plan, 2020
Vehicle Fuel Efficiency Program	Passenger vehicle fuel efficiency standards, labelling and penalties	In process of implementation (includes EVs)

Source: Dhar, S., Pathak, M., & Shukla, P. R. 2017. Electric vehicles and India's low carbon passenger transport: a long-term co-benefits assessment. *Journal of Cleaner Production*, 146: 139-148.

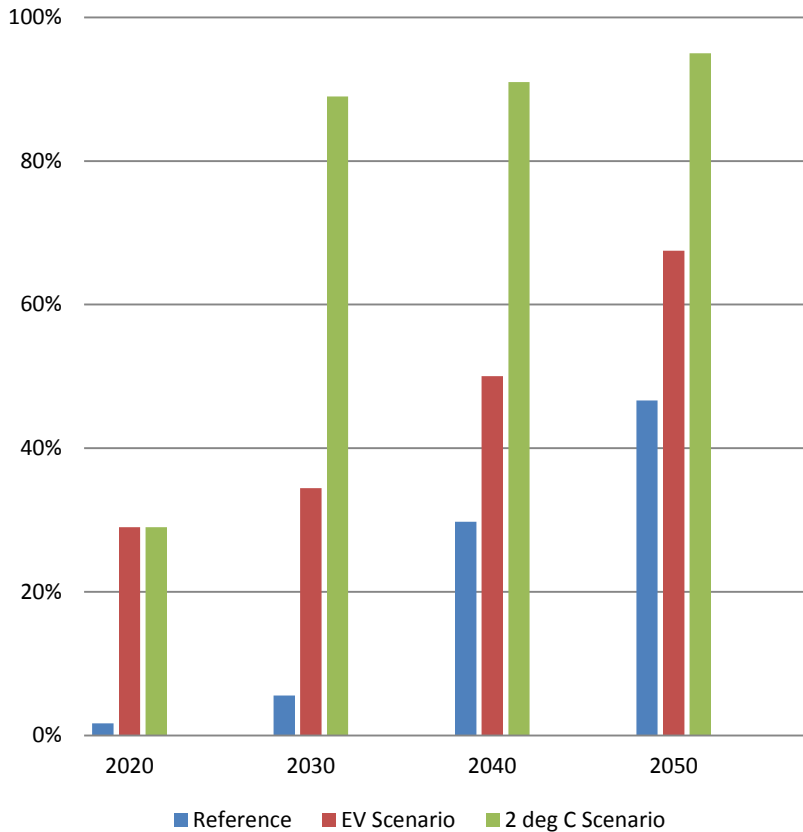
Achievement

Country	Stock	Market Share
China	648,770	1.4 %
US	563,710	0.9 %
Norway	133,260	28.8 %
India	4,800	0.0 %

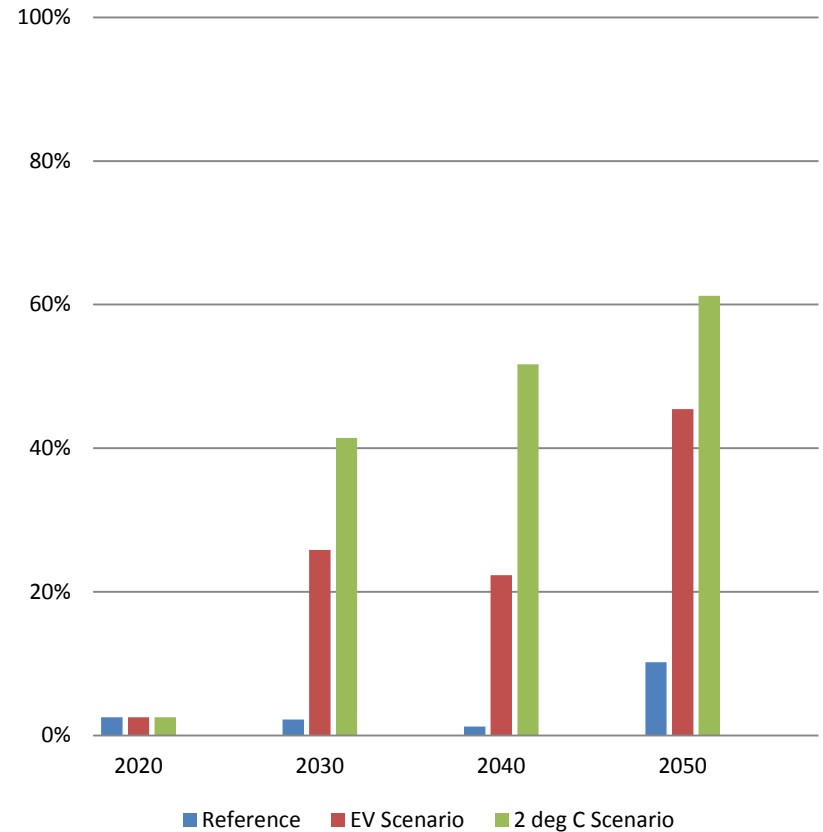
Source: IEA. 2017. Global EV Outlook 2017: Two million and counting. Paris: International Energy Agency.

Context

Share of EV 2 Wheelers



Share of EV 4 Wheelers



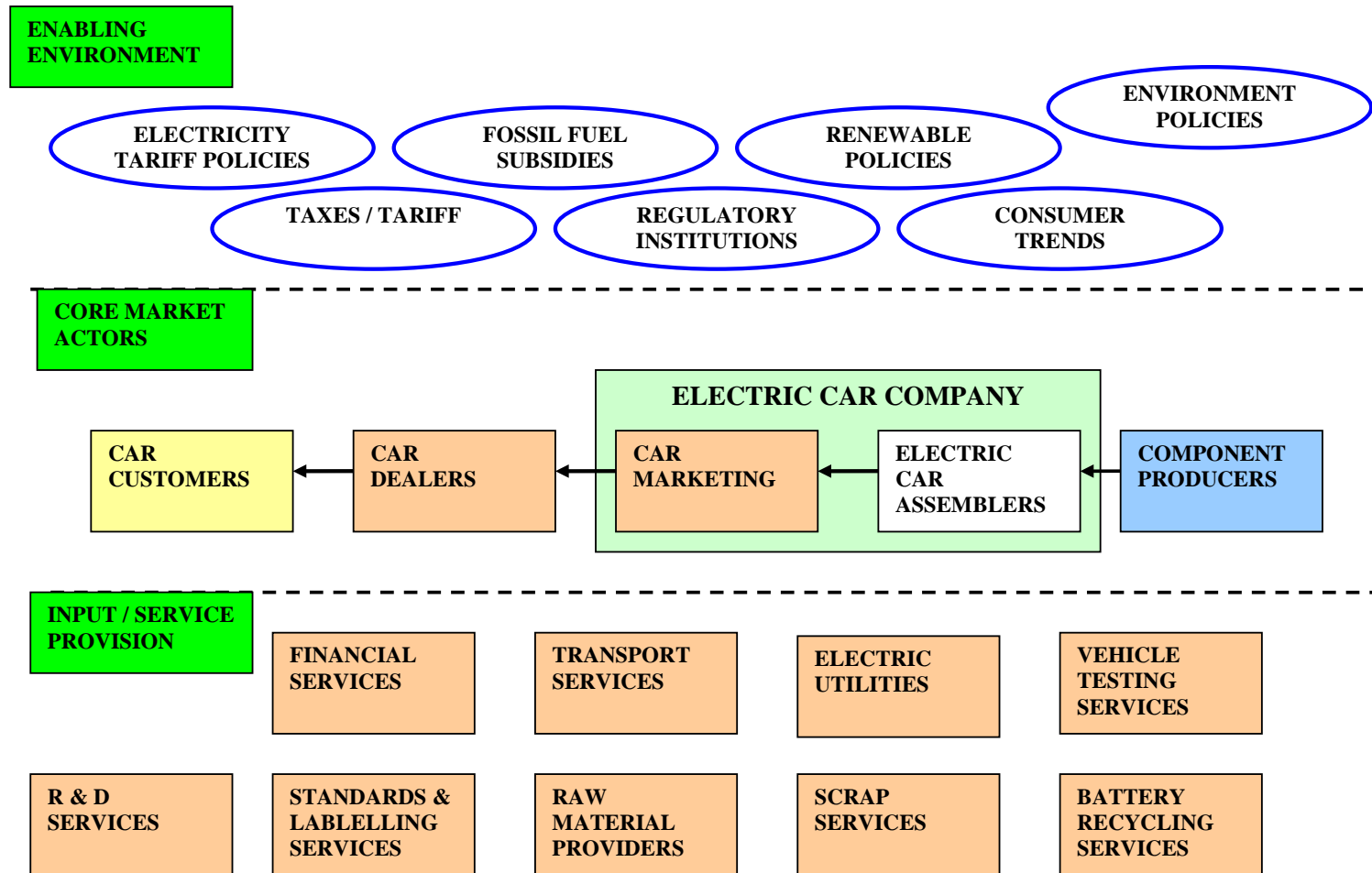
Source: Dhar, S., Pathak, M., & Shukla, P. R. 2017. Electric vehicles and India's low carbon passenger transport: a long-term co-benefits assessment. *Journal of Cleaner Production*, 146: 139-148.

OBJECTIVES

- Undertaking a detailed study of the existing supply chain for electric vehicles including support infrastructure.
- Investigate the barriers current users face for electric vehicles (EVs)
- Identify the likely improvements that can improve demand for EVs

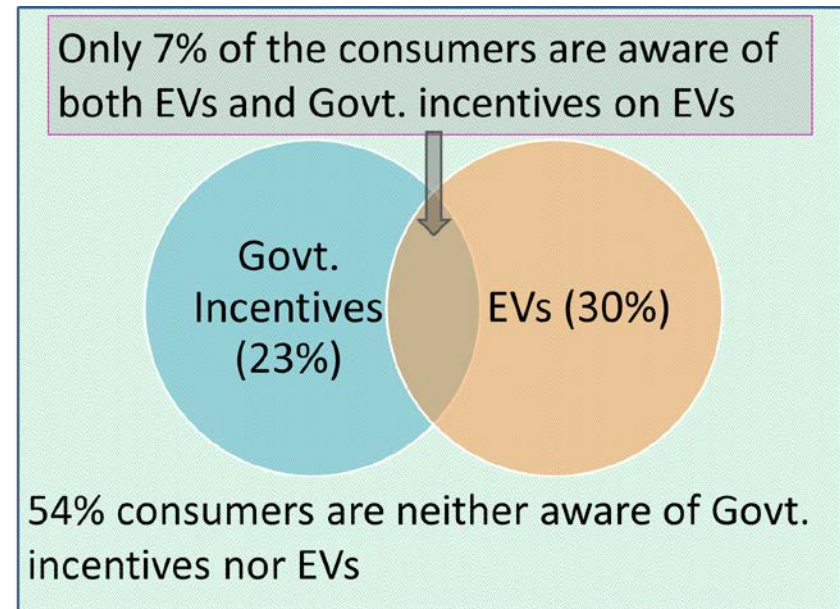
- Market Mapping using qualitative interviews of dealers, municipal officials, etc.
 - 20 stake holders interviewed (including HMRL, TSRTC, GHMC & Industries and Commerce Ministry, Telangana State)
- Analysis of consumer preferences, a market study titled “Study on Electric Mobility in India” was conducted for the city of Hyderabad between May and September 2017
 - 1000 consumers surveyed and

Market Map for EVs



Results - Awareness

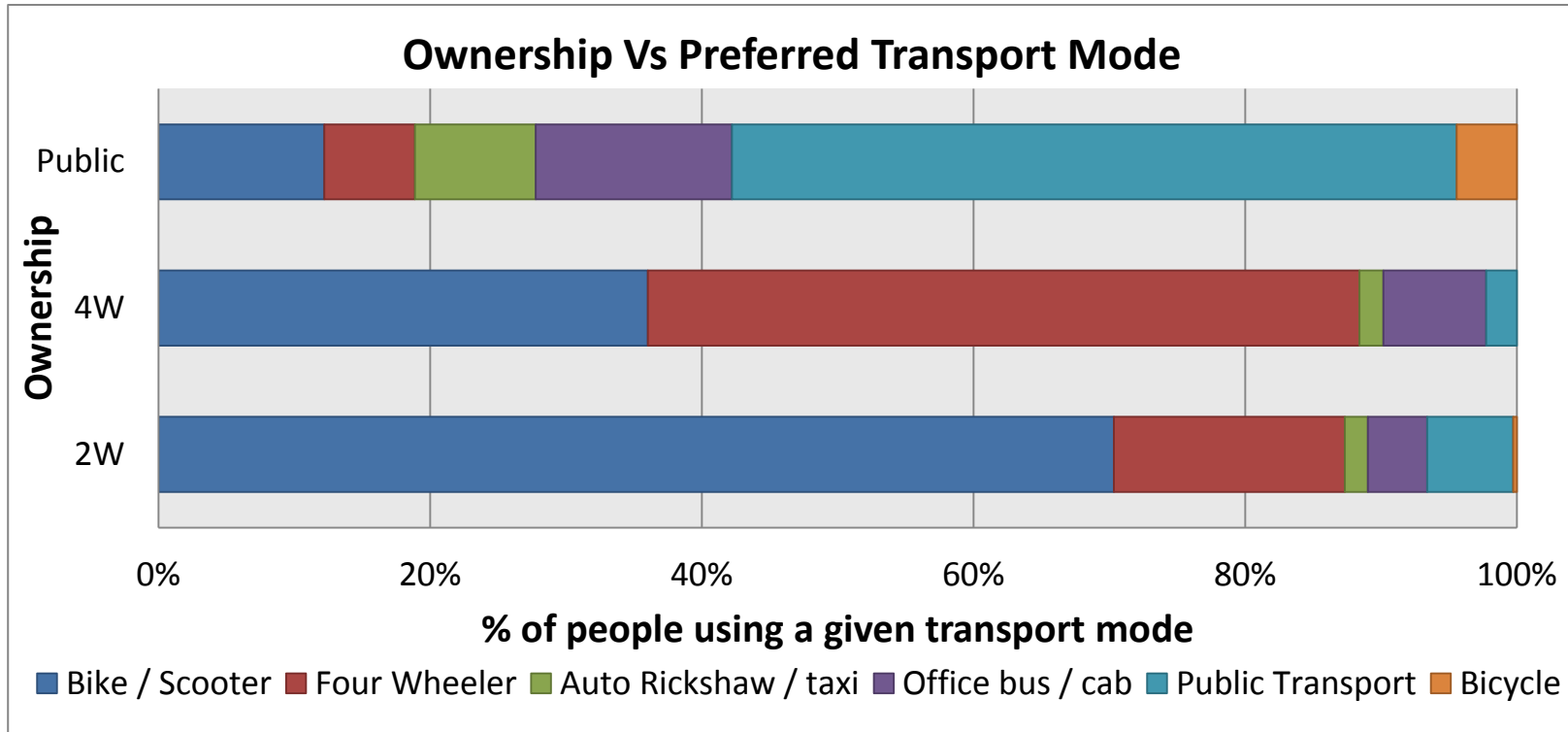
- Awareness is low
- Automakers are also not pushing EVs
 - Hero has maintained a portfolio of 18 EVs since 2010[♣]
 - Maruti, Tata had showcased EVs as early as 2010[♣]
- Tender for 10,000 EV cars (ESSL)



Source : Srinivas Cherla & Amit Garg, 2017, Study on Electric Mobility in India, UNEP DTU Partnership

♣ <https://timesofindia.indiatimes.com/business/india-business/maruti-will-make-electric-cars-in-gujarat/articleshow/60521285.cms>

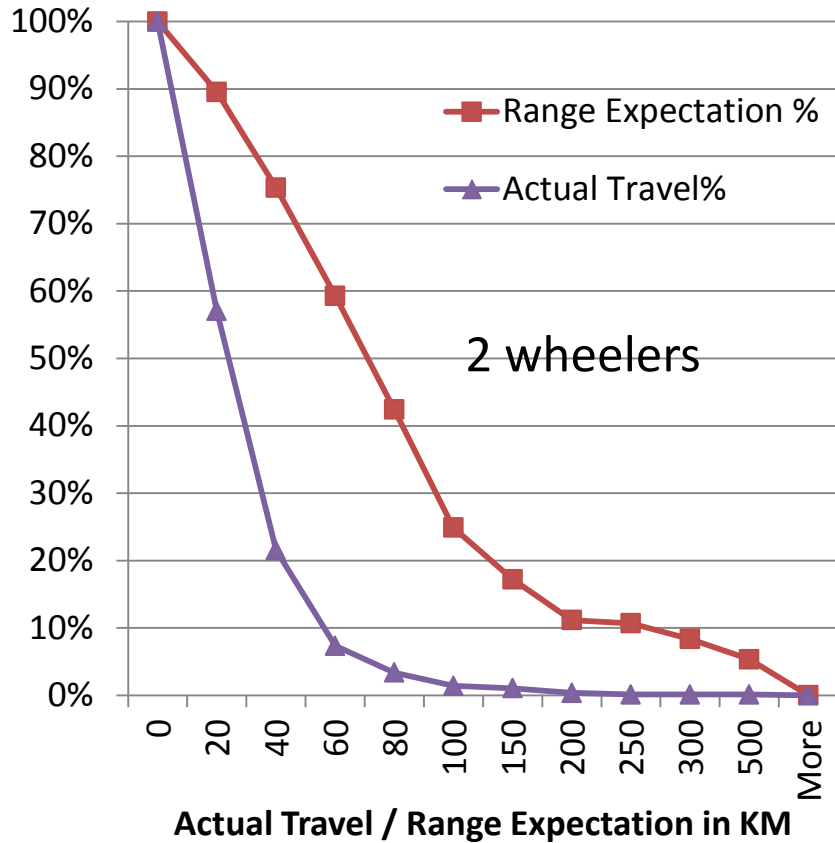
♣ L. Philip, "How manufacturers are gearing up to seize the opportunity in electric vehicle space," Economic Times, 29 August 2017



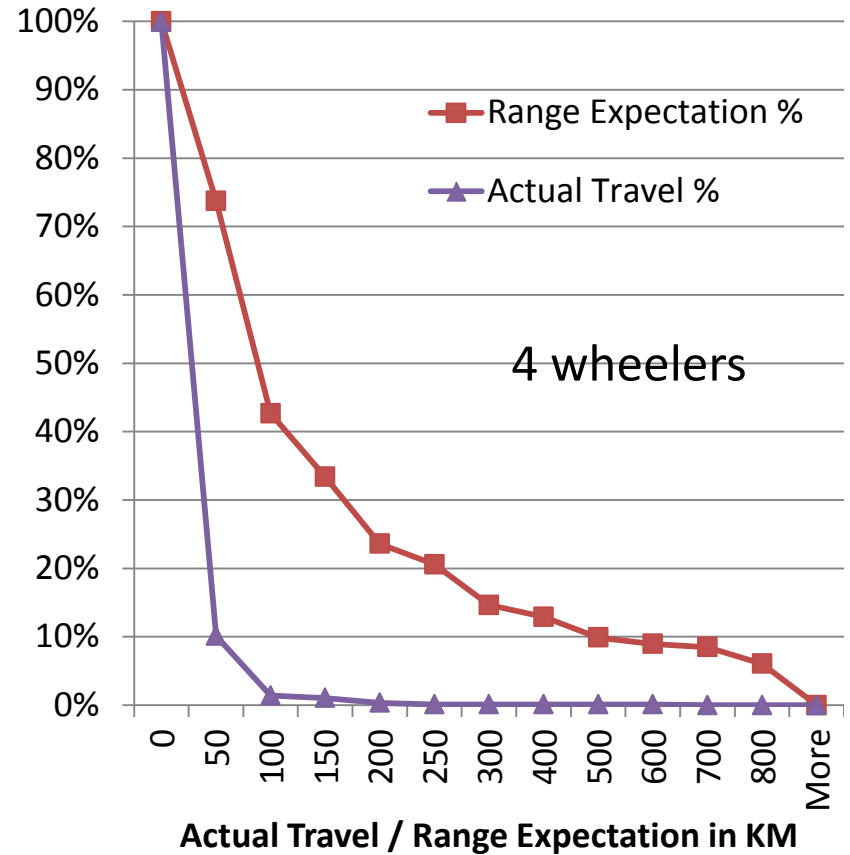
Source : Srinivas Cherla & Amit Garg, 2017, Study on Electric Mobility in India, UNEP DTU Partnership

- Vehicle owners in Hyderabad do not prefer shared or public modes of travel
- A mere ~12% take public/shared transport. (Compare with 18% reported in Dhaka)*
- This could be because of inconvenient / poor service, lack of access, non-availability etc.

* "Travel mode choice preferences of urban commuters in Dhaka A pilot study" Minhaj Mahmud, Atonu Rabbani, March 2012

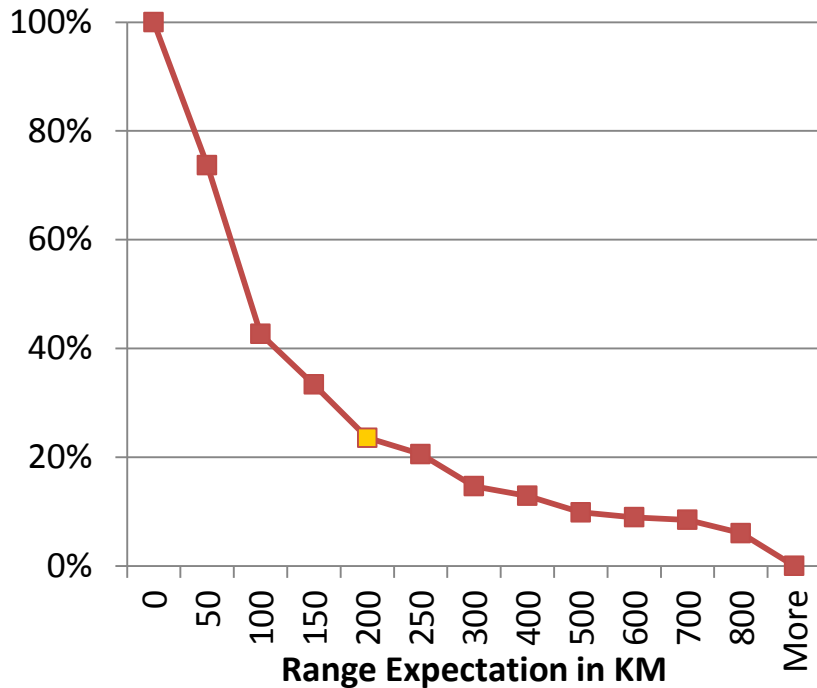


~ 100 km range will meet expectations of 3/4th of the consumers

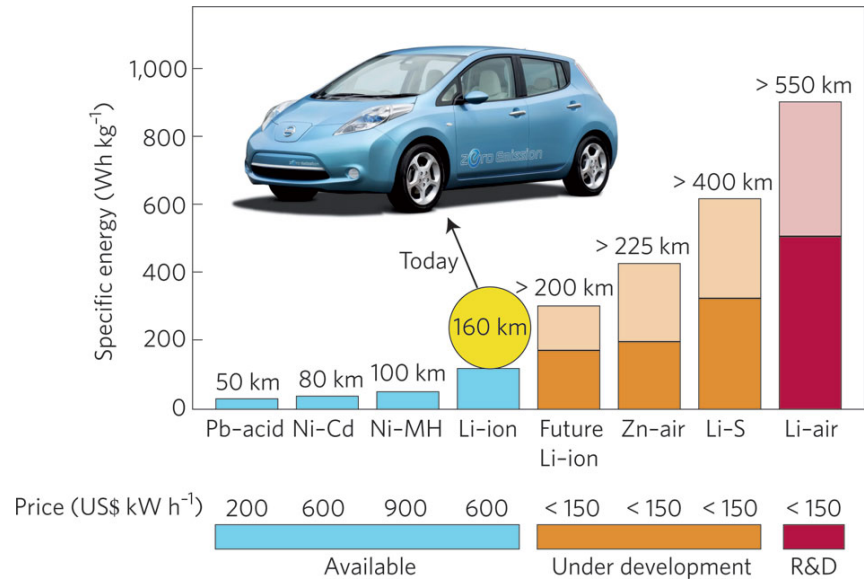


~ 200 km range will meet expectations of 3/4th of the consumers

Results - Driving Range



Source : Srinivas Cherla & Amit Garg, 2017, Study on Electric Mobility in India, UNEP DTU Partnership



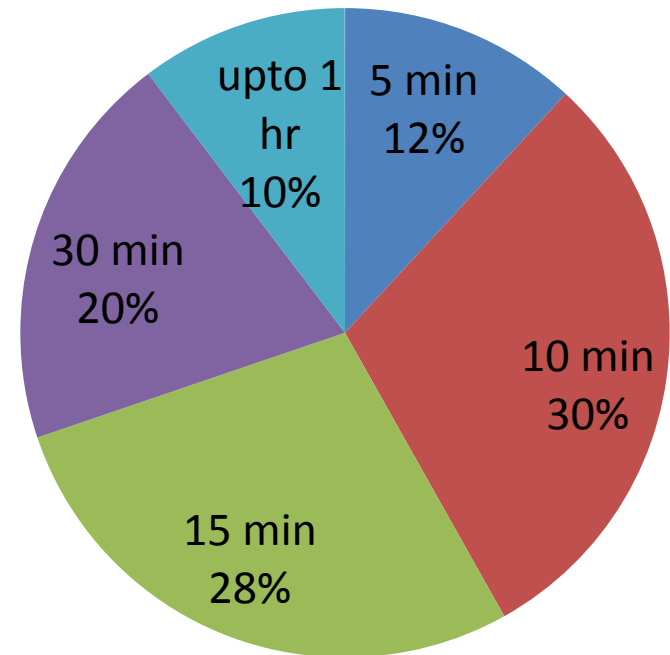
Source : Bruce PG, Freunberger SA, Hardwick LJ, Tarascon J-M (2012) Li-O₂ and Li-S batteries with high energy storage. Nature Materials 11(1):19-29

Current battery designs can satisfy 75% of customers expectations

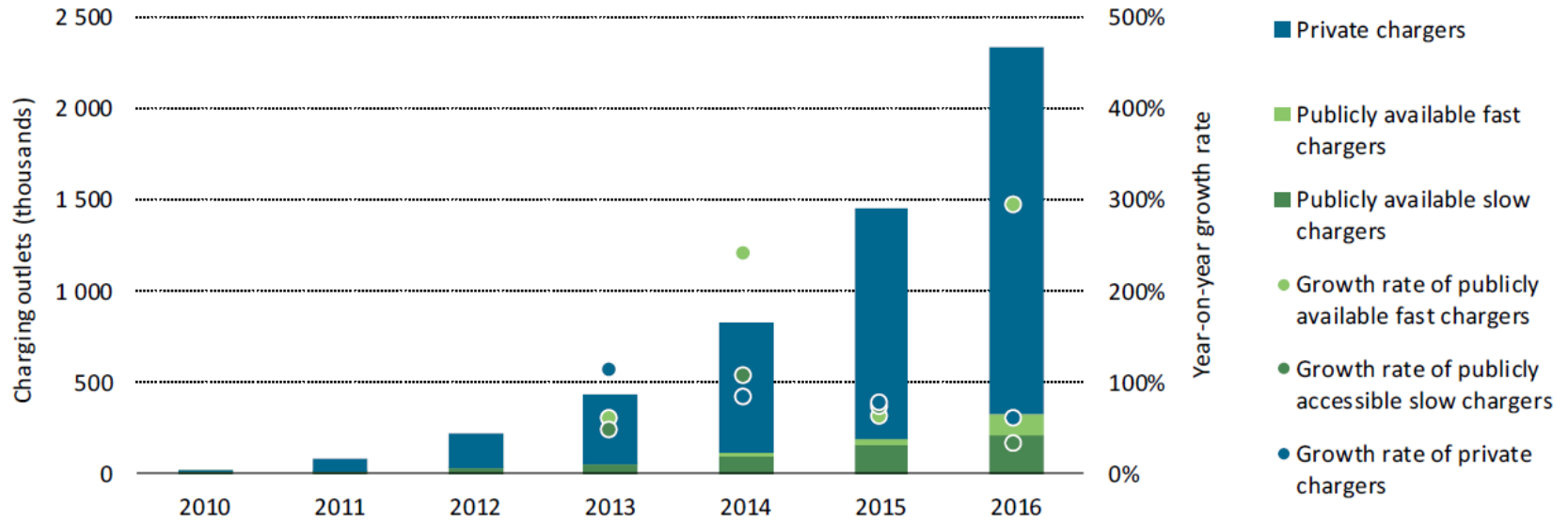
Results - Charging time

- Up to 70% of the consumers are willing to wait between 5 and 15 minutes at a public charging station for a booster charge
- DC super charging stations are capable of delivering to this need

Maximum agreeable waiting time for 40 km range extension



Electric Vehicle Supply Equipment



Note: Private chargers in this figure are estimated assuming that each electric car is coupled with a private charger.

Source: IEA. 2017. Global EV Outlook 2017: Two million and counting. Paris: International Energy Agency.

Results – Purchase Criteria

- 1 Availability of Charging stations
- 2 Initial purchase cost
- 3 Driving range per full charge
- 4 Top Speed / Acceleration / Performance
- 5 Maintenance cost / Servicing costs
- 6 Running cost
- 7 Look and feel / Styling
- 8 Re-sale value
- 9 Environmental benefits
- 10 Vehicle Variant and Segment(Hatchback/Sedan/SUV)

Conclusions

- **Consumers:**
 - **Awareness** about EVs and government schemes/policies related to EVs needs to be improved
 - Adequate public charging **infrastructure** would give confidence to consumers that they won't be stranded
 - Reducing initial **cost**, and offering financial incentives will nudge the consumers to take technical and operational risks associated with emerging technologies like EVs
- **Industry:**
 - **Indigenous** supply chain does not exist for EVs. EV component imports should be encouraged while pushing auto makers for technology transfer and development of local supply chain
 - **Standardization** will help reduce the cost; **Strict regulations** will help improve consumer safety.
 - Government should stay **consistent** with policies that have already been announced so that industry investments can be protected
 - Revise automobile engineering course curriculum & re-train existing workforce through automotive skill council



PROMOTING LOW CARBON TRANSPORT IN INDIA



Electric Vehicle Scenarios and a Roadmap for India



Thank You!