A Study of Electric Mobility for City of Hyderabad
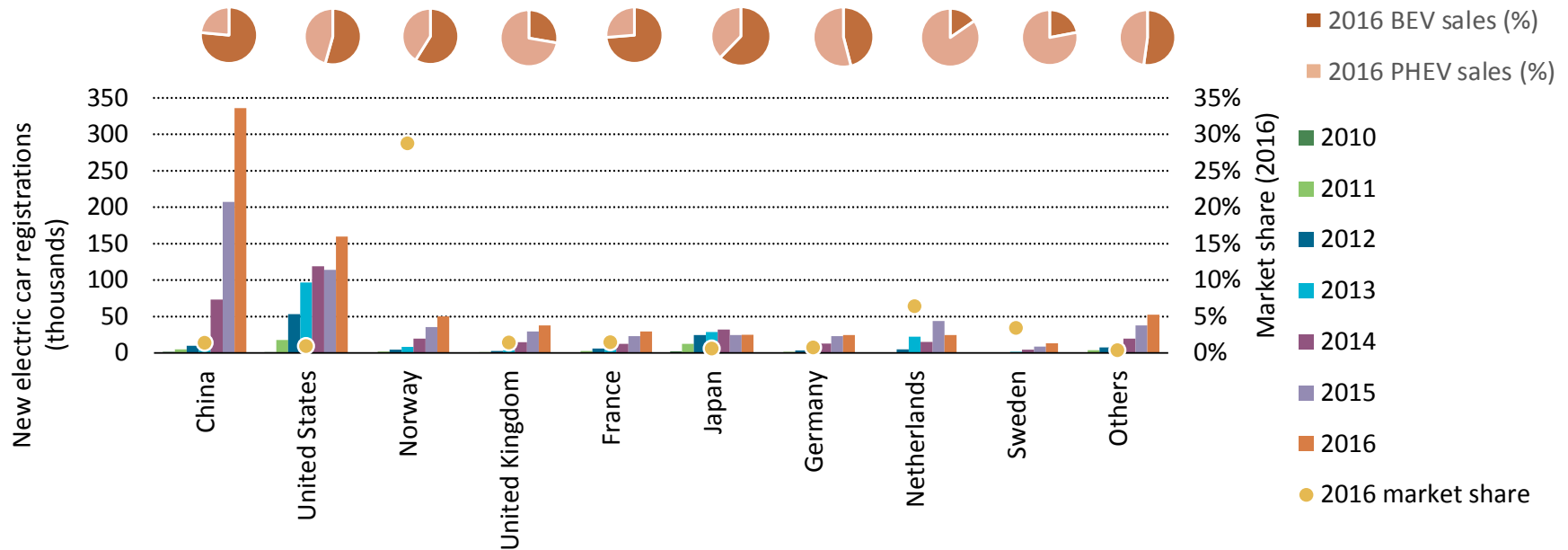
Subash Dhar, UNEP DTU Partnership

Srinivas Cherla, Sustain Impact

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- Context
- Objectives
- Methods
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- Conclusions

Context - Global

Electric Cars:

Electric 2 Wheelers:

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

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

Context - India

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.
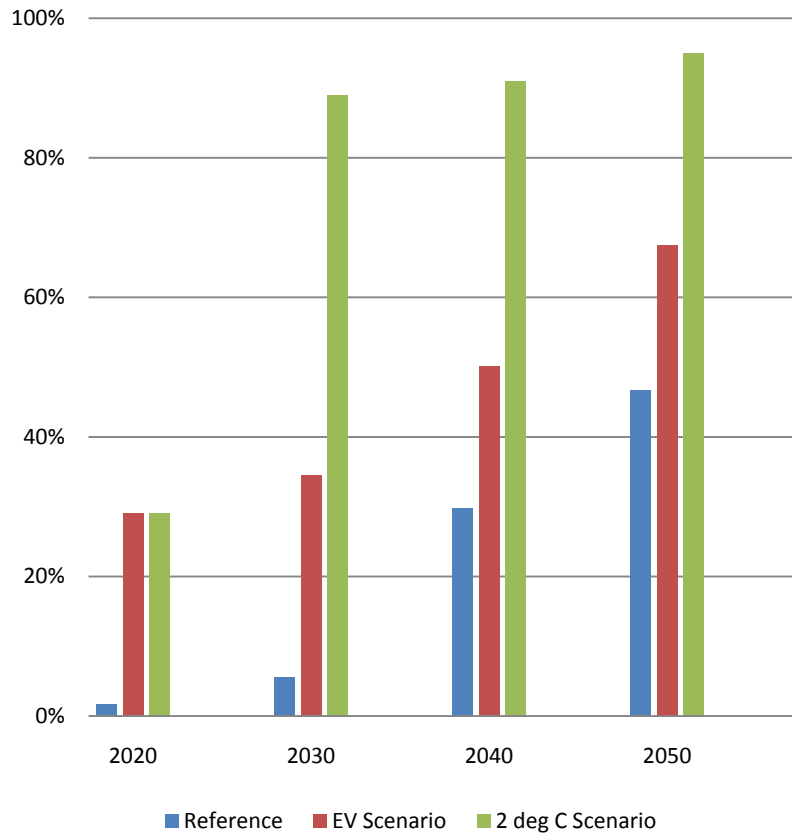
Achievement

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.
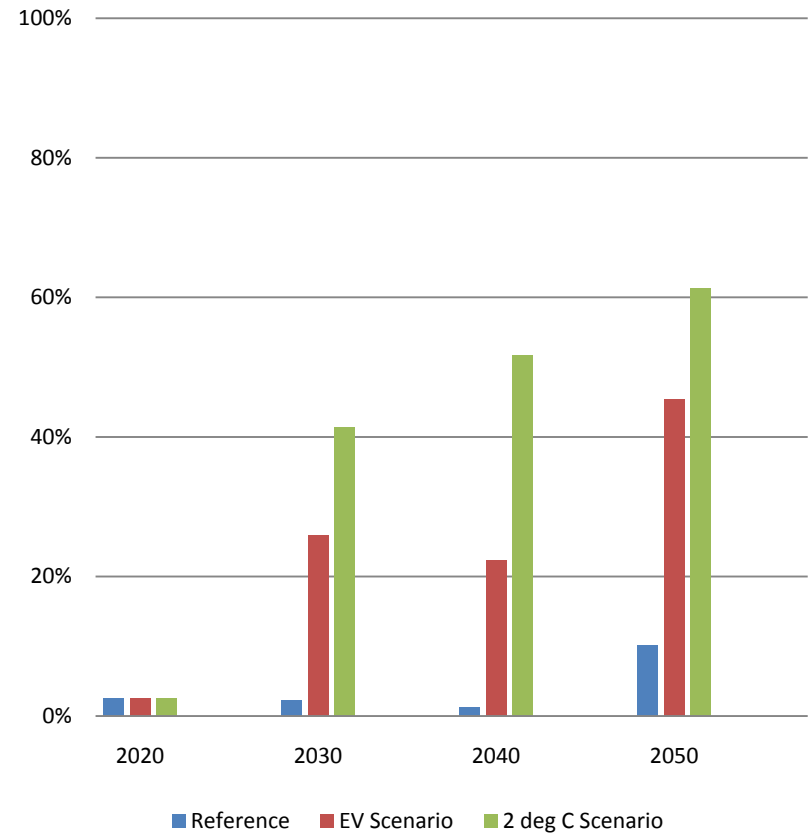
Tender for 10,000 EV cars (EESL)

Context

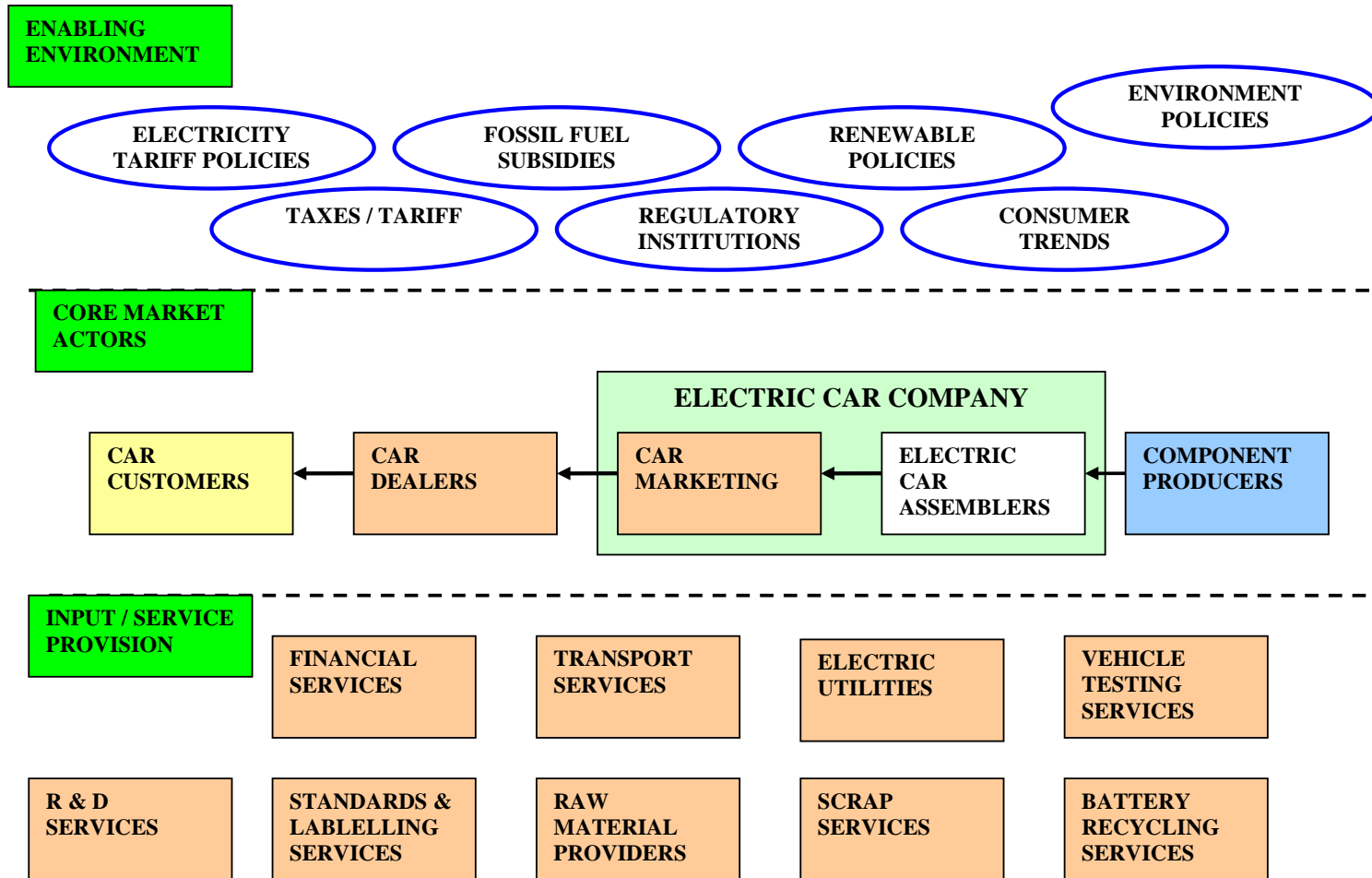## Share of EV 2 Wheelers

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 of the Study

- 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)

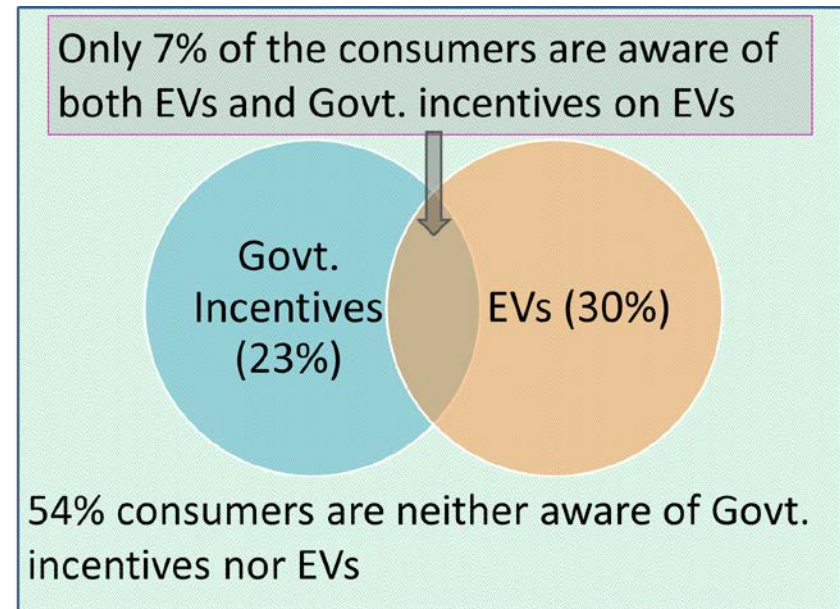- Identify the likely improvements that can improve demand for EVs

Methods

- <u>Market Mapping</u> using qualitative interviews of dealers, municipal officials, etc.
  - 20 stake holders interviewed (including HMRL, TSRTC, GHMC & Industries and Commerce Ministry, Telangana State)

- Analysis of <u>consumer preferences</u>, 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

Market Map for EVs

ENABLING ENVIRONMENT

- ELECTRICITY TARIFF POLICIES
- FOSSIL FUEL SUBSIDIES
- RENEWABLE POLICIES
- ENVIRONMENT POLICIES
- TAXES / TARIFF
- REGULATORY INSTITUTIONS
- CONSUMER TRENDS

CORE MARKET ACTORS

ELECTRIC CAR COMPANY

CAR CUSTOMERS ← CAR DEALERS ← CAR MARKETING ← ELECTRIC CAR ASSEMBLERS ← COMPONENT PRODUCERS

INPUT / SERVICE PROVISION

- FINANCIAL SERVICES
- TRANSPORT SERVICES
- ELECTRIC UTILITIES
- VEHICLE TESTING SERVICES
- R & D SERVICES
- STANDARDS & LABLELLING SERVICES
- RAW MATERIAL PROVIDERS
- SCRAP SERVICES
- BATTERY RECYCLING SERVICES

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 ♣

Only 7% of the consumers are aware of both EVs and Govt. incentives on EVs

Govt. Incentives (23%)   EVs (30%)

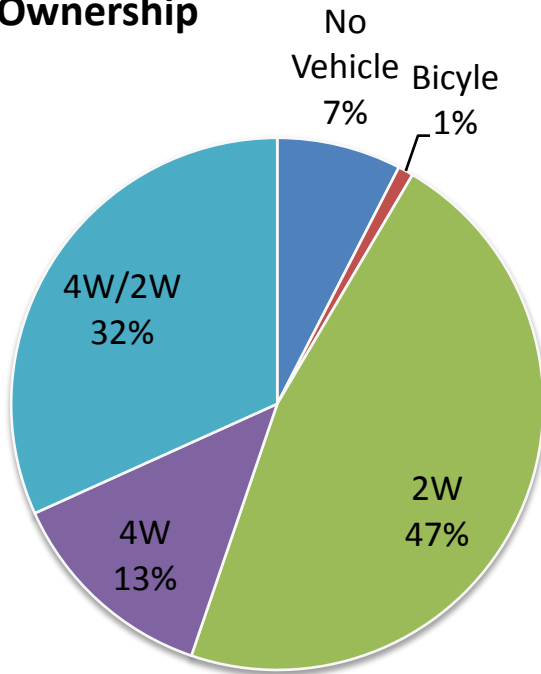54% consumers are neither aware of Govt. incentives nor EVs

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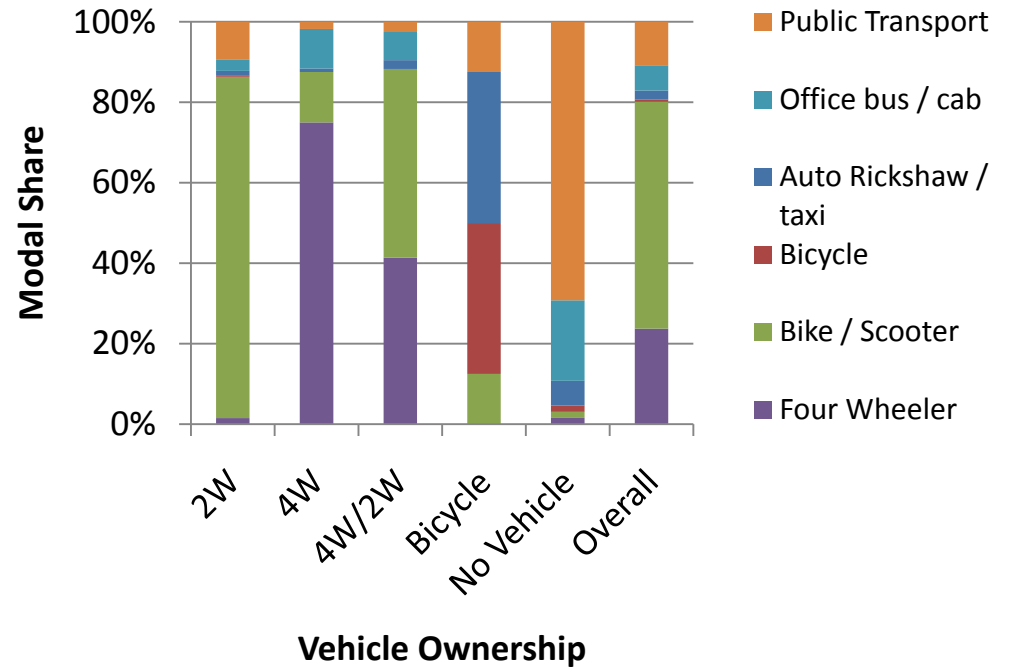♠ L. Philip, "How manufacturers are gearing up to seize the opportunity in electric vehicle space," Economic Times, 29 August 2017
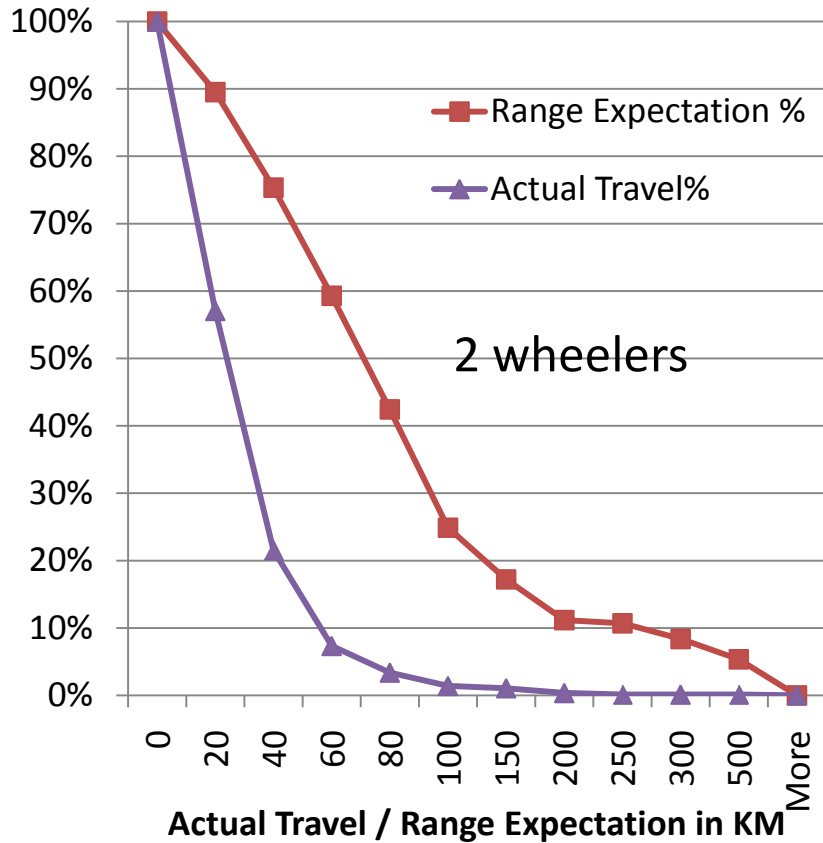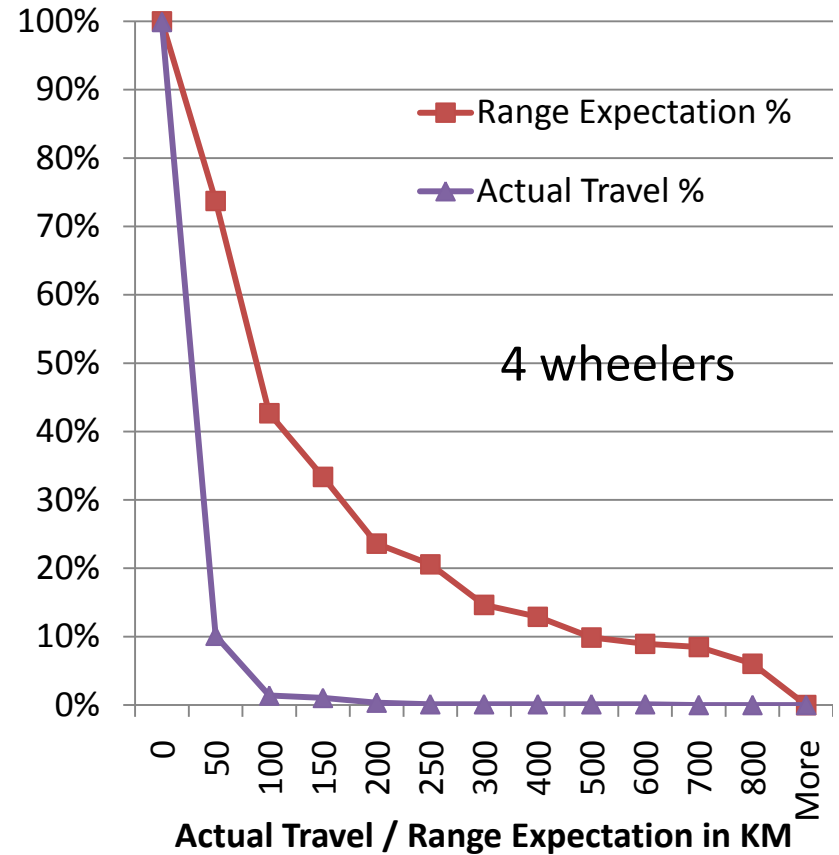
Travel Mode Preferences

Vehicle Ownership

Pie chart:
- No Vehicle 7%
- Bicycle 1%
- 4W/2W 32%
- 4W 13%
- 2W 47%

Ownership Vs Mode Choice

Stacked bar chart — Modal Share (0%–100%) vs Vehicle Ownership (2W, 4W, 4W/2W, Bicycle, No Vehicle, Overall)

Legend:
- Public Transport
- Office bus / cab
- Auto Rickshaw / taxi
- Bicycle
- Bike / Scooter
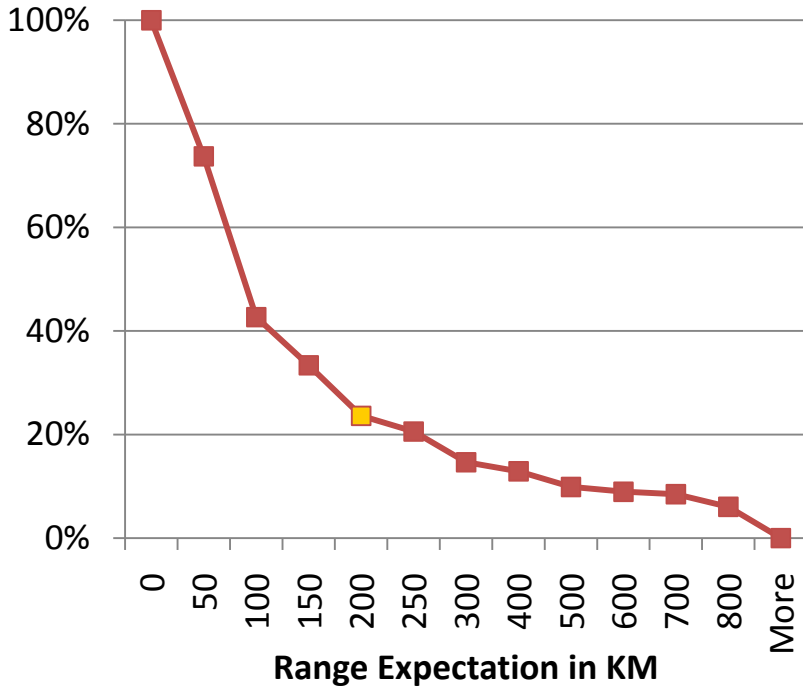- Four Wheeler

Results – Range Expectation

~ 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

Range Expectation in KM

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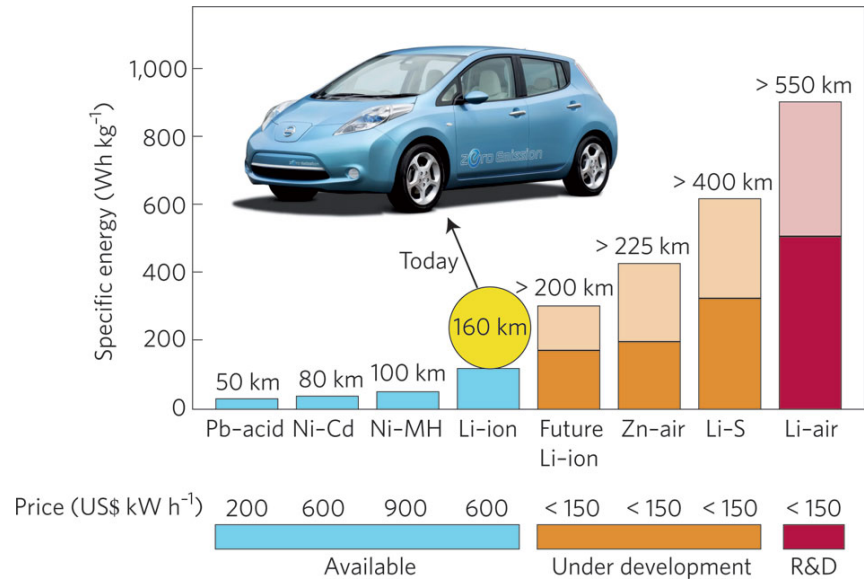

Source : Bruce PG, Freunberger SA, Hardwick LJ, Tarascon J-M (2012) Li-O2 and Li-S batteries with high energy storage. Nature Materials 11(1):19-29

Current battery designs can satisfy 75% of customers expectations
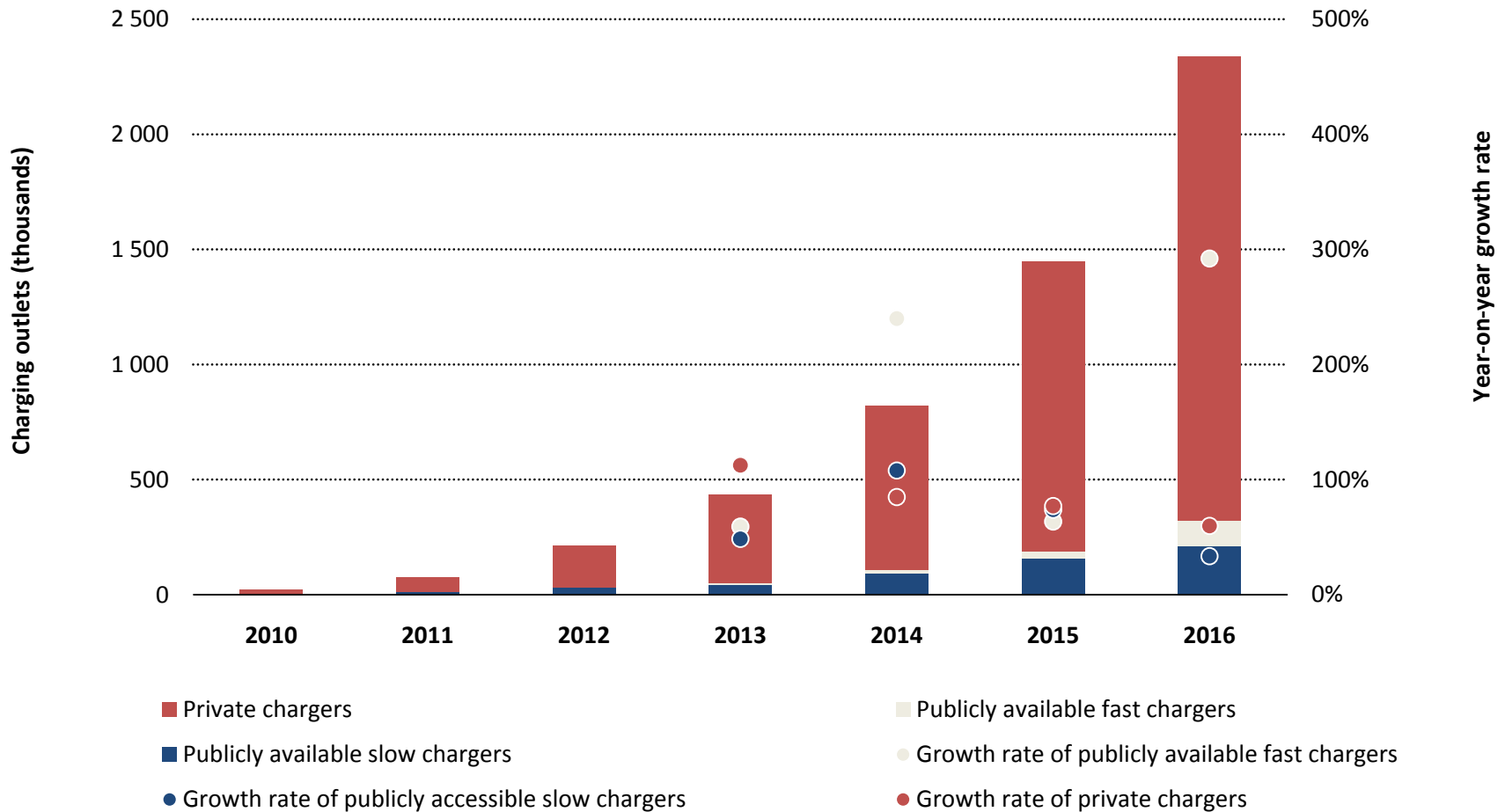
Results - Charging time

- 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

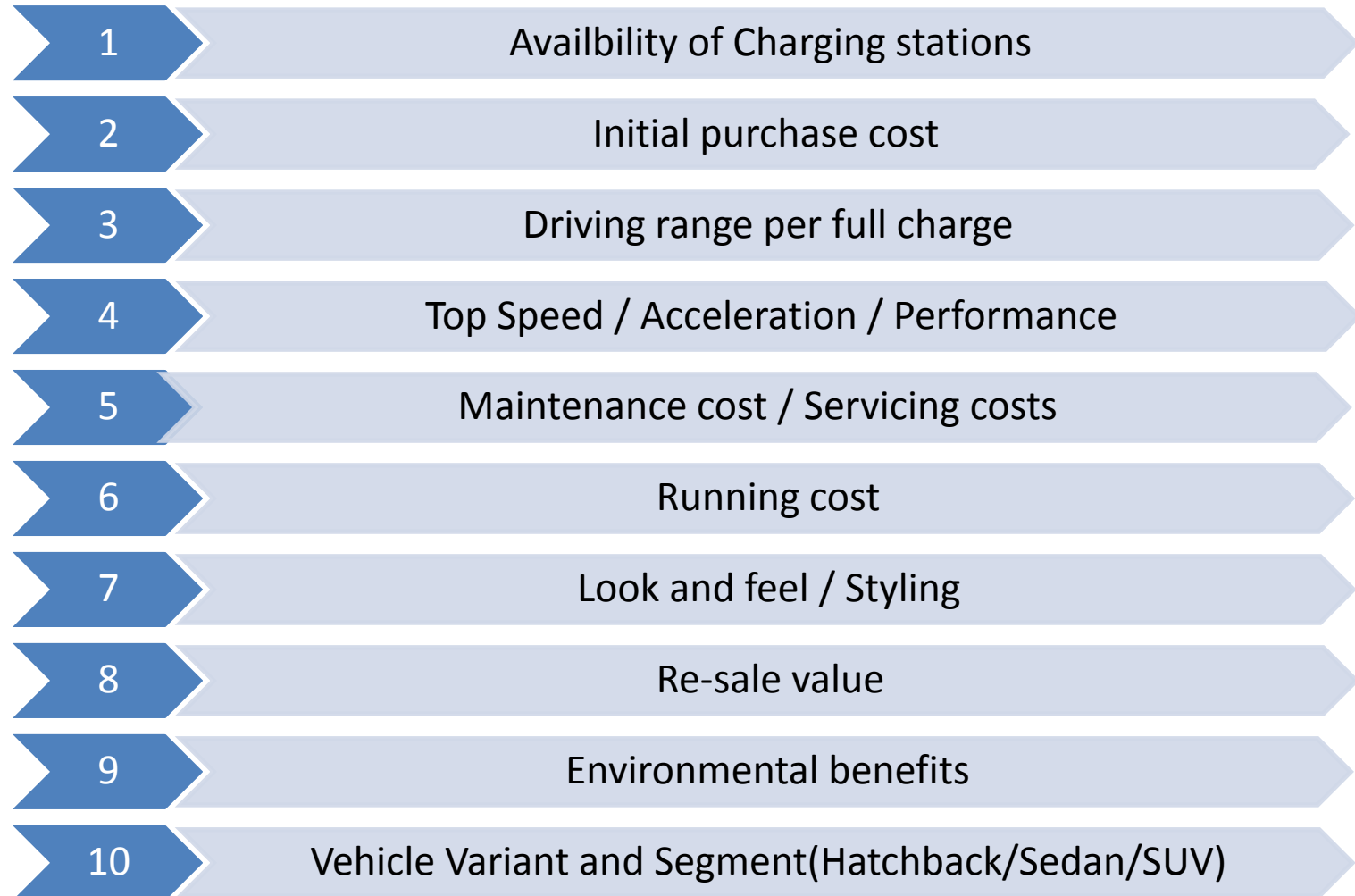Maximum agreeable waiting time for 40 km range extension
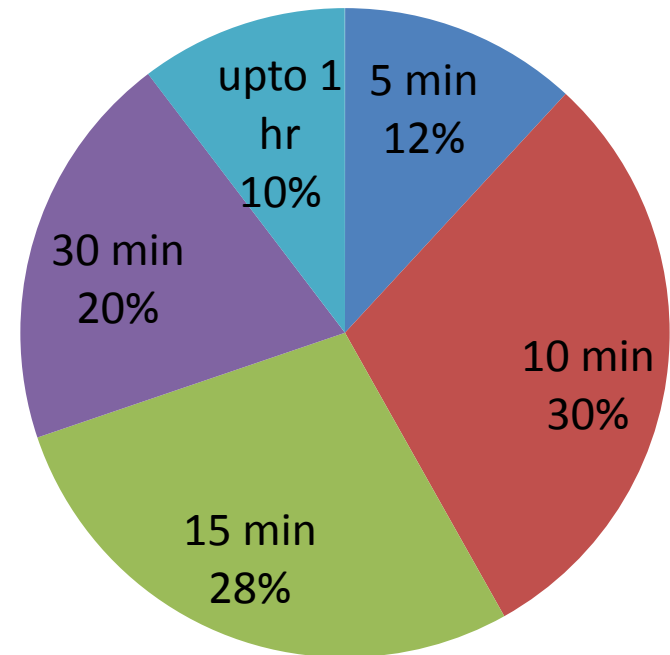
Source : Srinivas Cherla & Amit Garg, 2017, Study on Electric Mobility in India, UNEP DTU Partnership

Electric Vehicle Charging Outlets (Cars)

Charging outlets (thousands)

Year-on-year growth rate

- ■ Private chargers
- ■ Publicly available slow chargers
- ● Growth rate of publicly accessible slow chargers
- ■ Publicly available fast chargers
- ● Growth rate of publicly available fast chargers
- ● Growth rate of private chargers

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

Results – Purchase Criteria

1	Availbility 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:
  - First priority should be **EV 2 Wheelers** given the current modal shares
  - **Awareness** about EVs and government schemes/policies related to EVs needs to be improved
  - Reducing initial **cost**, and offering financial incentives will nudge the consumers to take technical and operational risks associated with emerging technologies like EVs
  - Adequate public charging **infrastructure (fast charging)** would give confidence to consumers that they won't be stranded

- 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
  - Need for a **stable** policy (e.g., Norway, China)

Thank You!

http://www.unepdtu.org/