CHALLENGES IN IMPLEMENTING ELECTRIC MOBILITY IN INDIA

03-11-2018

Road Map of Electric Mobility in India

2011 — Approval of National Mission on Electric Mobility

2013 — NEMMP (National Electric Mobility Mission Plan) 2020 unveiled

2015 — FAME-India (Faster Adoption and Manufacturing of (hybrid and) Electric Vehicles) directives launched

2018 — FAME India: Phase I completed Commencement of Phase II

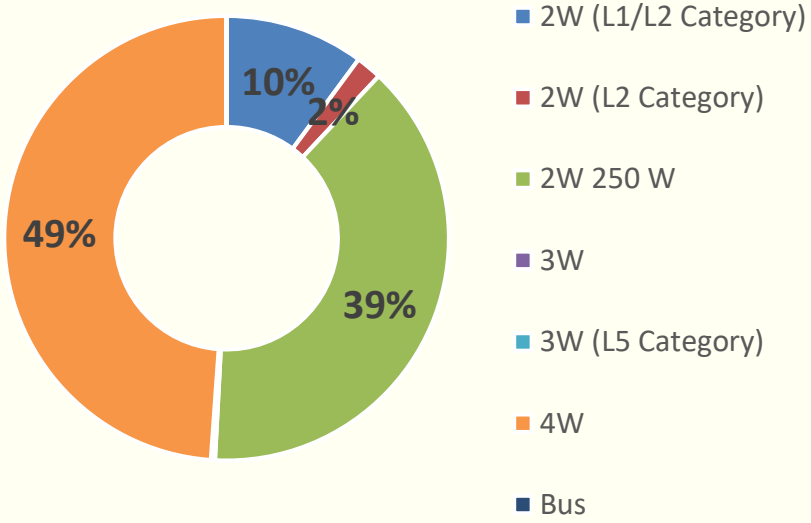
2020 — 6 million units of xEVs (hybrid and electric vehicles)

2-2.5 million tonnes of fuel savings

Outcomes of FAME-I

7% increase in EV Sales (2015-17)

Utilization of FAME



 # Data as on May 2018
Source: www.fame-india.gov.in

88% of the FAME subsidy utilized by Two Wheelers & Passenger Cars

The focus of FAME has been promoting electric and hybrid technology in the private vehicles domain:

Difficult to influence and control

Is this picture going to be different by changing the fuel to electric?

Space Required to Transport 48 People

Car

Electric Car

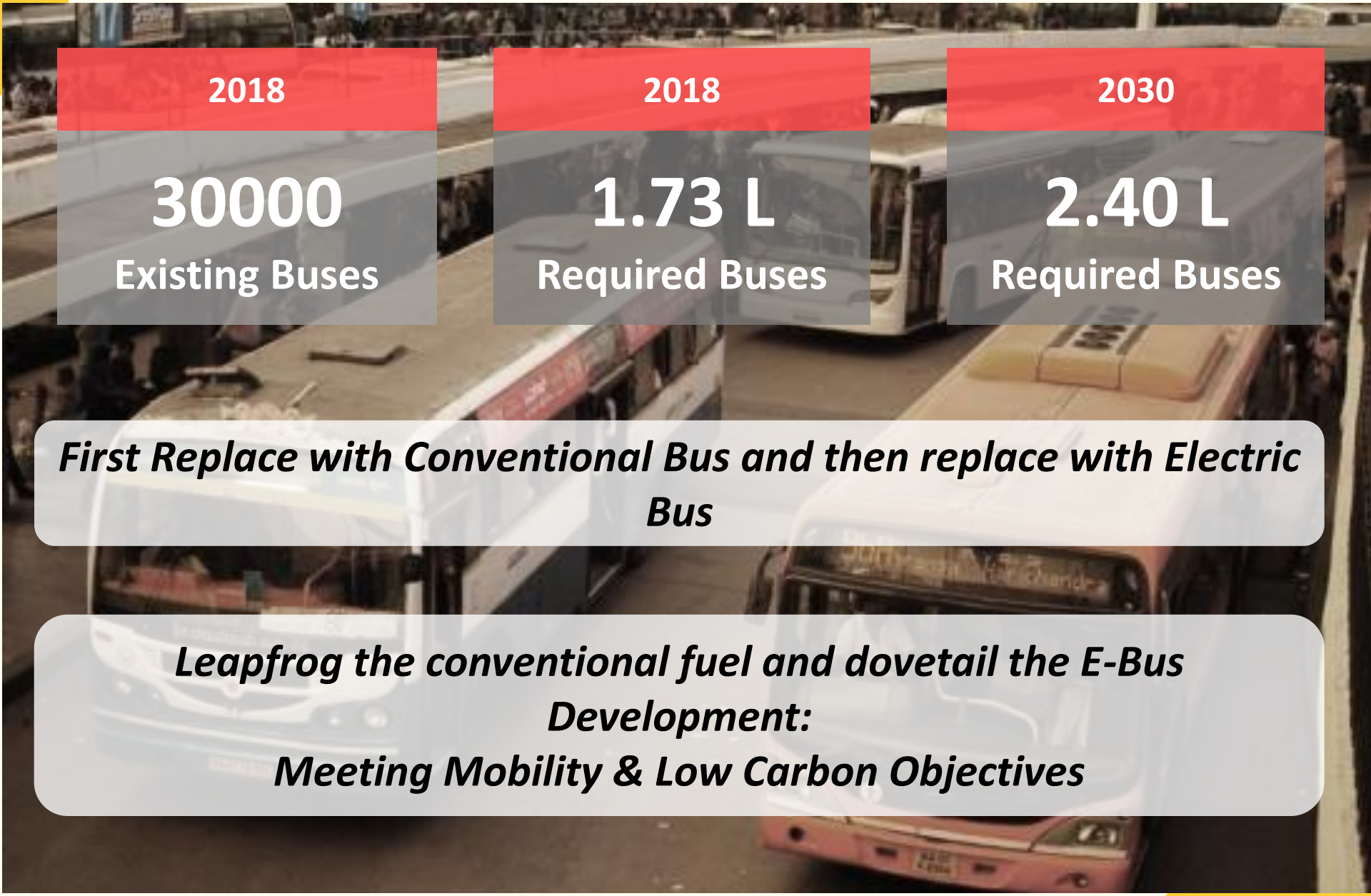
Bus

How is this picture going to be different?

Emission Savings

Mode Shift + Fuel Shift in Urban Areas: 42 Million ton CO2 (2019-2030)

Urban Mobility Requirement



2018	2018	2030
30000	1.73 L	2.40 L
Existing Buses	Required Buses	Required Buses

First Replace with Conventional Bus and then replace with Electric Bus

Leapfrog the conventional fuel and dovetail the E-Bus Development:
Meeting Mobility & Low Carbon Objectives

Parallel World of E-Rickshaw

1.5 million battery powered E-rickshaws in India

Passenger EV Cars in China: 1.35 Million *(Source: Bloomberg New Energy Finance Report)*

11000 E-rickshaws introduced every month

Development in the absence of subsidies, supporting policies and Government Support

E-Rickshaws: one of the best options for passengers for a quick, safe and cost effective last mile transport.

Market: Market identified the potential unconsolidated demand

Challenges for EVs in Public Transport

Absence of Road Map

No commitments from government
Reluctance from manufacturers

Clarity on E-Bus

No clarity on subsidy on electric buses
(only HEV buses mentioned)

Capital Intensive

Huge capital investments for STUs despite subsidy

Lack of Standardization

Varied offerings from OEMs

STU requirements different

Obstacles in procurement

Current Policy Perspective

Private Vehicle Oriented
Current Policy is more private vehicle oriented

Moving People & Goods
National Urban Transport Policy focusing on Movement of People and Goods

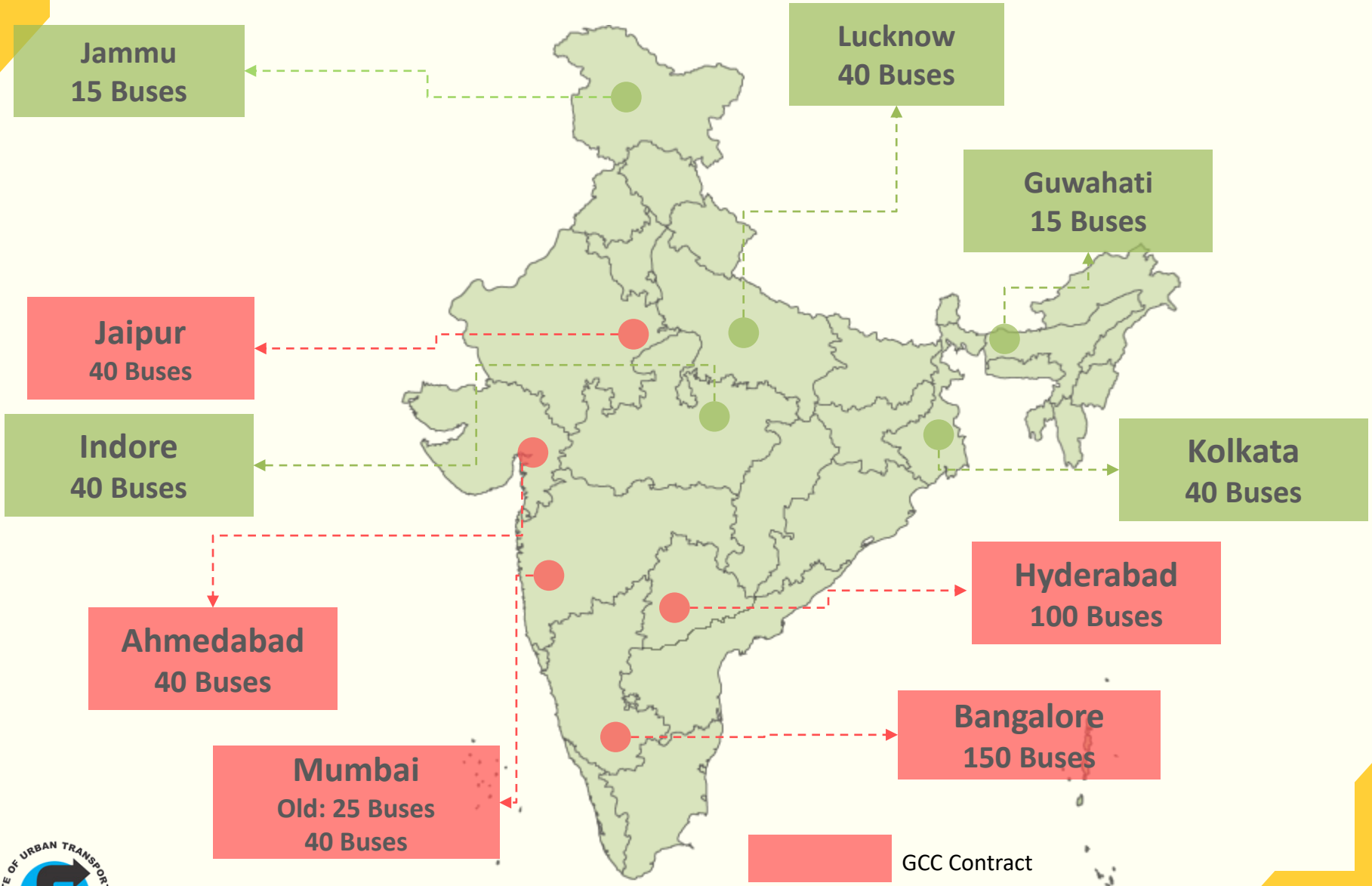
Policy Convergence
With Contradicting Principles at National Level

State Electric Vehicle Policies
Not translating to an effective Action Plan | 7 States with EV Policies

Funding
Initiatives driven by the funding availability from Government

Future Road Map
Need for PT Oriented EV Road Map

Electric Buses: FAME-I Experience



City Readiness for E-Mobility

Legacy of STUs
Operational Inefficiency and Loss Making character for majority of STUs

Institutions
DISCOMS | STUs | Local Bodies

Preparedness for Introduction of New Technology
Past Experience of JnNURM Procurement

Bidding Process Completed in One Month
Procuring or renting the buses without detailed operation plan

Technical Capacity and Knowledge
| Range of Electric Buses | Placing of Charging
| Operational Plan | Power Requirement

Resilient Planning for E-Mobility
Preparedness for Disaster | Infrastructure Resilience

Procurement process of E-Buses

- **The Right Model:** Outright Purchase or Gross Cost Contract
- **Sharing of Risks:** Technological Risks with OEM/STU
- **Roles & Responsibilities:** Role of Authority | Operator | OEM
- **Consolidated Purchase Vs Individual Purchase of E-Buses**
- **Model Agreement with Private Operator**

Shenzhen- A success story of E-Mobility

100%
Electrified Bus Fleet

Higher than combined E-Bus Fleet of New York, Los Angeles, New Jersey, Chicago and Toronto

Key Initiatives

National and Local Subsidies

Before 2016, more than 50% of vehicle price as subsidy
Life Cycle cost of e-bus almost same as diesel bus's life time cost

Lease to reduce Upfront Investment

Bus Operators in Shenzhen Lease Vehicles from Manufacturers
Reduced Upfront Investments and reduced the need for debt financing

Optimized Charging and Operation

Sustaining Full Day Operation | Charging Outlets to the number of e-buses is 1:3
Coordinated operation schedule and charging during off-peak hours

Lifetime Warranty of Batteries

Bus Manufacturers provided lifetime warranty for vehicles and batteries
Manufacturers took the financial risk of batteries

Thank You

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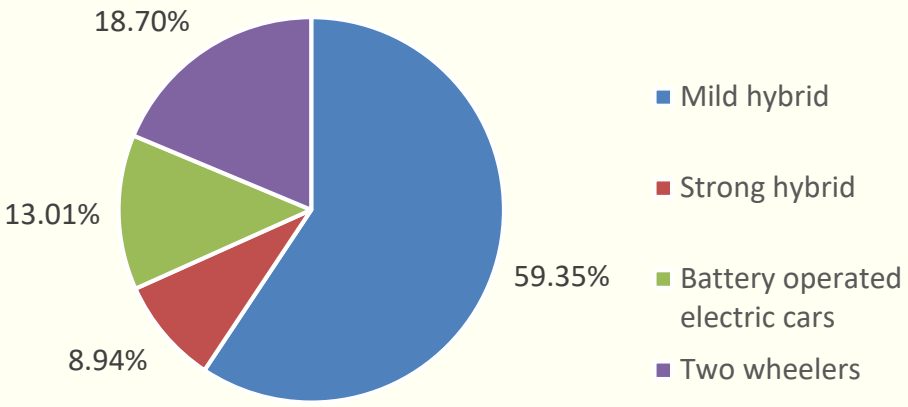
Fund Utilization (2015-16)

	Mild Hybrid vehicles (units sold)	Strong Hybrid vehicles (units sold)	Plugin Hybrid vehicles (units sold)	Battery operated electric vehicles (units sold)
Two Wheelers	N/A	N/A	N/A	17,836
Passenger Cars	33,394	911	N/A	790

N/A: Not Applicable

xEV units sold in 2015-16



Distribution of fund utilization by xEVs

47%

Utilization

INR 73.3 cr outflow of 155 cr allocated

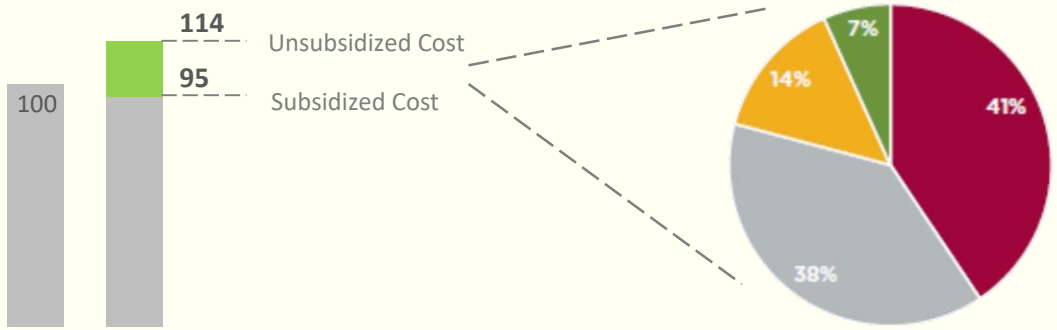
* Hybrid and Electric Vehicles in India, Rokadiya, Bandivadekar, Dec 2016

Impact of Incentives on Vehicle Costs: Passenger Cars

Excise Duty Incentive | Delhi VAT Incentive | Infrastructure Cess Incentive | FAME Subsidy | DPCC Subsidy

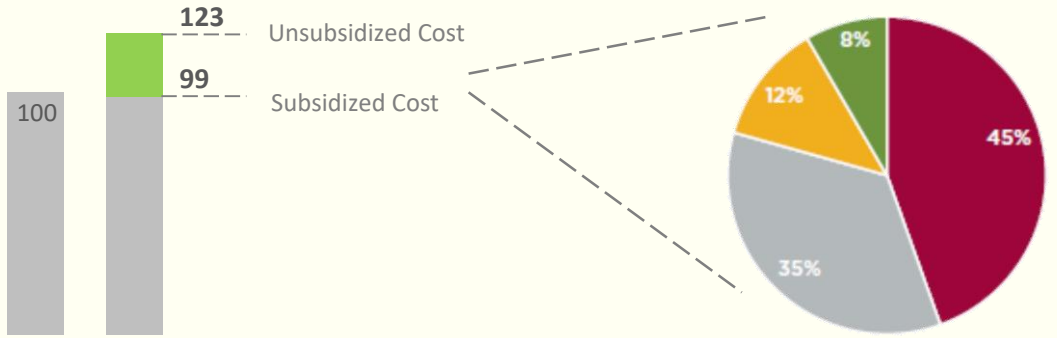
FAME incentive as overall cost of ownership **1.33%**

Mild Hybrid Vehicles



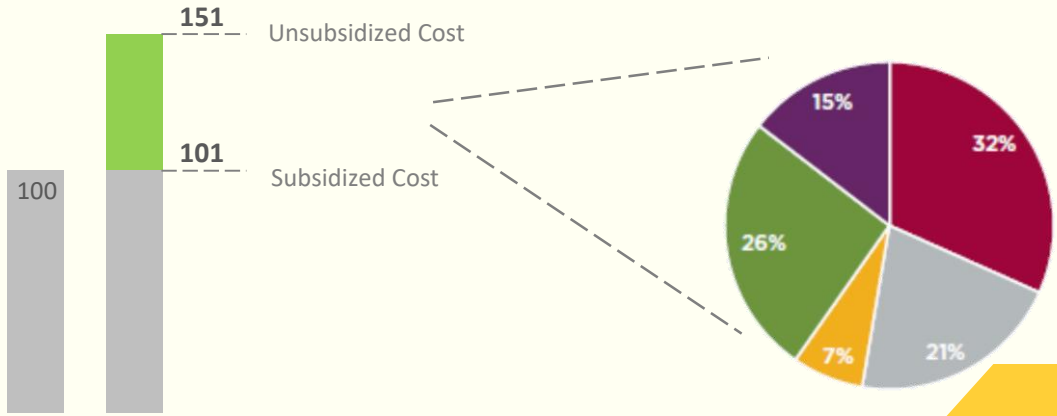
FAME incentive as overall cost of ownership **1.92%**

Strong Hybrid Vehicles



FAME incentive as overall cost of ownership **13%**

Battery Operated Vehicles



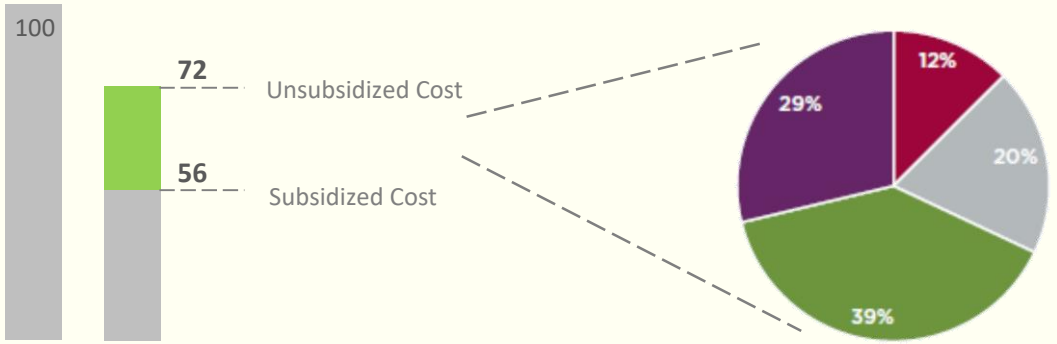
* Hybrid and Electric Vehicles in India, Rokadiya, Bandivadekar, Dec 2016

Impact of Incentives on Vehicle Costs: Two Wheelers

Excise Duty Incentive | Delhi VAT Incentive | Infrastructure Cess Incentive | FAME Subsidy | DPCC Subsidy

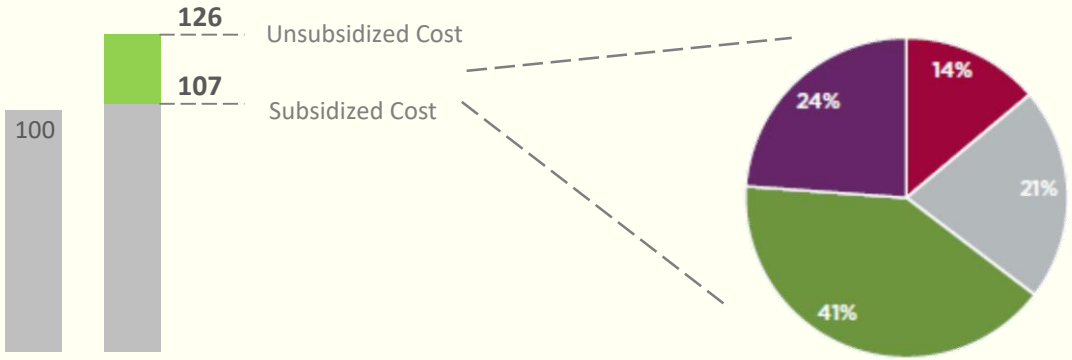
FAME incentive as overall cost of ownership **6.24%**

Low Speed Electric Scooters



FAME incentive as overall cost of ownership **7.79%**

High Speed Electric Scooters



Subsidy Component from FAME between 6-13% for Battery Operated Vehicles

Extent of subsidy dependent on State based incentives (Excise Duty, VAT etc)