Business Model & Financing E- Bus Mobility

Workshop on

Electrification of Public Transport

Ahmedabad

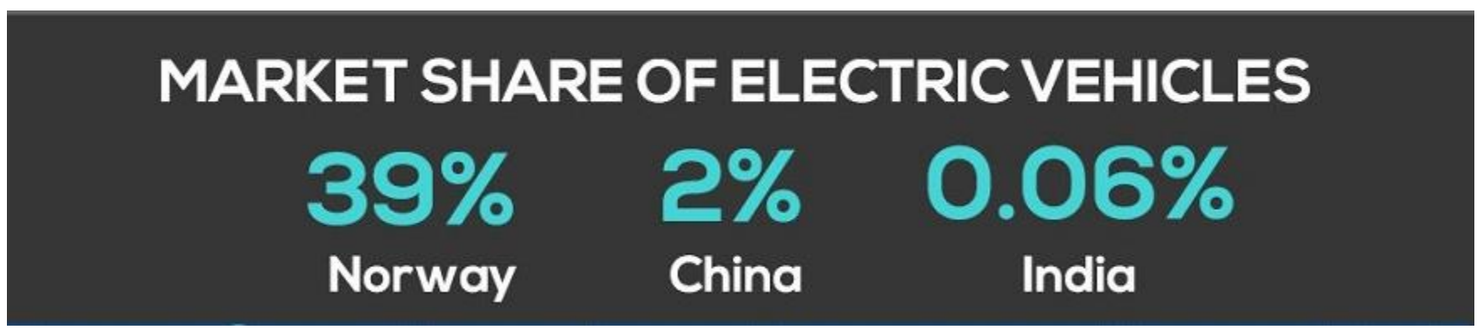
Gautam Patel

Principal Consultant, Coordinates, Ahmedabad

Visiting Faculty and Associate, CoE, CEPT University

Electric Vehicles in India emerging, backed by Policy Framework

1. **Indian automobile market** still largely **dominated by fossil fuelled vehicles**.
2. Announcement of National Electric Mobility Mission Plan in 2012 **aiming at 6 million electric/hybrid vehicles vehicles by 2020.**
3. Absence of charging infrastructure, high battery costs - main challenges
4. However, Policy Framework firming up
   - Faster Adoption and Manufacturing of Electric Vehicles (FAME) India, Phase I and II - **for market development and manufacturing eco-system.**
   - Fiscal Incentives for EVs (GST, Concessions, Registration charge waiver etc)
   - State Level Electric Vehicle (EV) policies
   - ERC – Concessional Tariffs



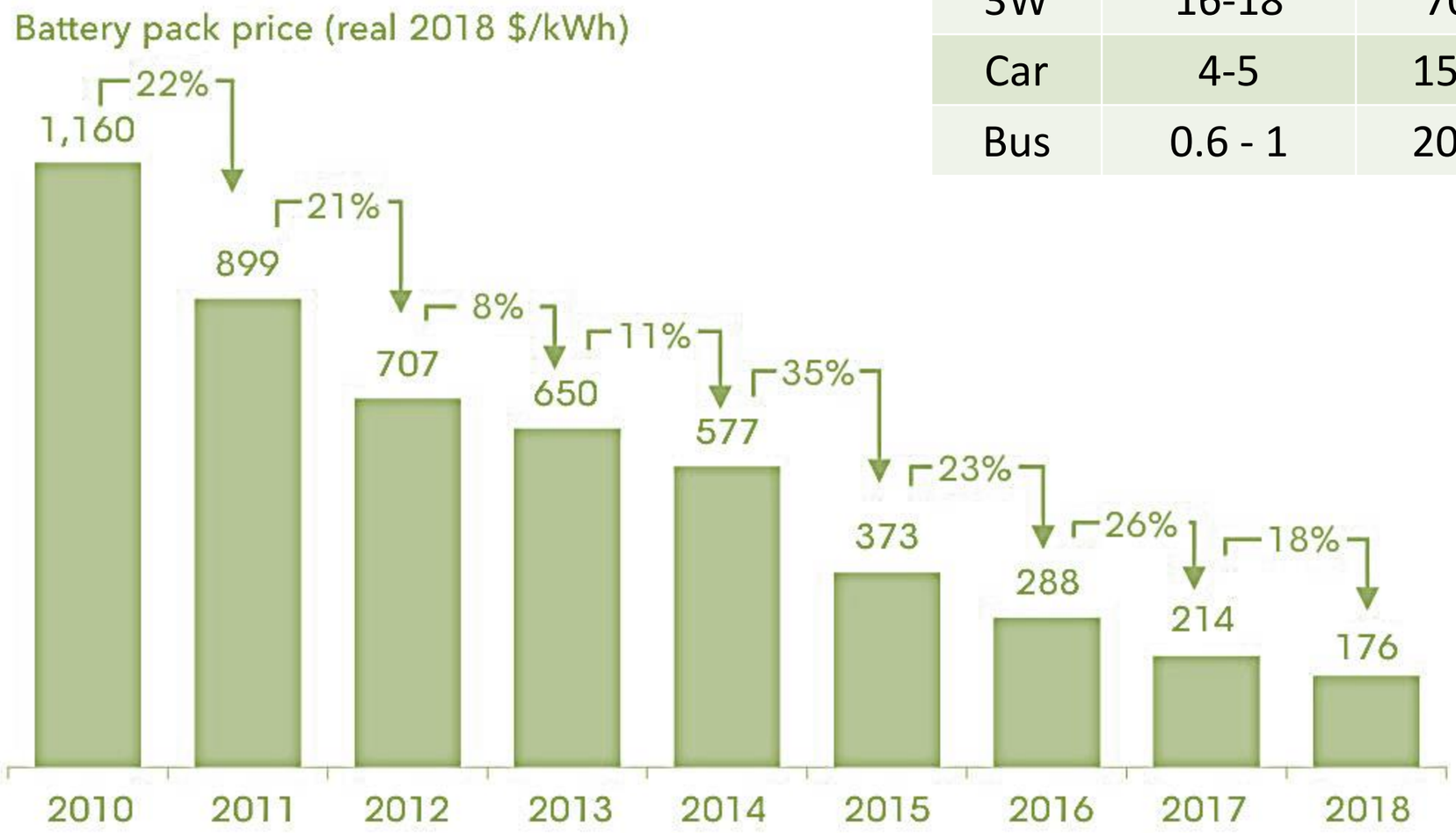
EV Charging Infrastructure Model

- **Guidelines and Standards** by Ministry of Power vide Notf. dated 14-12-18
- Private EV Charging at residences / offices permitted
- Public Charging Stations (PCS) – De-licensed Activity, can apply to Discom, Open Access permitted
- Charging Standards for PCS – CCS and ChadeMO (All charging specified models to be available)
- Tariff by appropriate Commission. Should not be more than average cost of supply plus 15%.
- State Nodal agency to fix ceiling of Service Charges for charging. Domestic Tarrif applicable for domestic charging
- Network Service Providers to allow slot booking for charging
- Charging Equipment to be Type tested by “reputed authority”
- OMO can set up PCS using “firewall,” Swap stations also permitted.
- At Least one Charging Station in 3 Km x 3 Km grid, one CS every 25 Km on highways. Land Use.

Regulation - Policy - Responsibility Matrix for EVs / Charging Infra

Activity	Key Provider	Regulator / Promoter Agencies
Power Generation esp renewable	Power GenCos	State and Central Power Min. ERCs, CEA State Nodal Agencies (GEDA)
Transmission /Trade	Transmission Companies	ERC (Wheeling & Licensing)
Distribution of Power for EV Charging	Discoms	ERC (Licensing, Tarrif and Regulation), GEDA
Grid Stability	Transcoms /Discoms	CEA, Power Grid Corp. , Transcos
Creation of Public Charging Stations	Aggregators (Pvt, PSUs, ULBs)	Central Ministry, CEA (standards) Discoms (Clearance) CEA (Nodal Agency, Database)
Power Sale to EVs.	Aggregators (Pvt, PSUs, ULBs) Network Service Providers (For booking slots**)**	Tarrif (ERC) Nodal Agency (for Service Charge)
Standards for Evs	-	ARAI, CIRT
EV Promotion	-	All

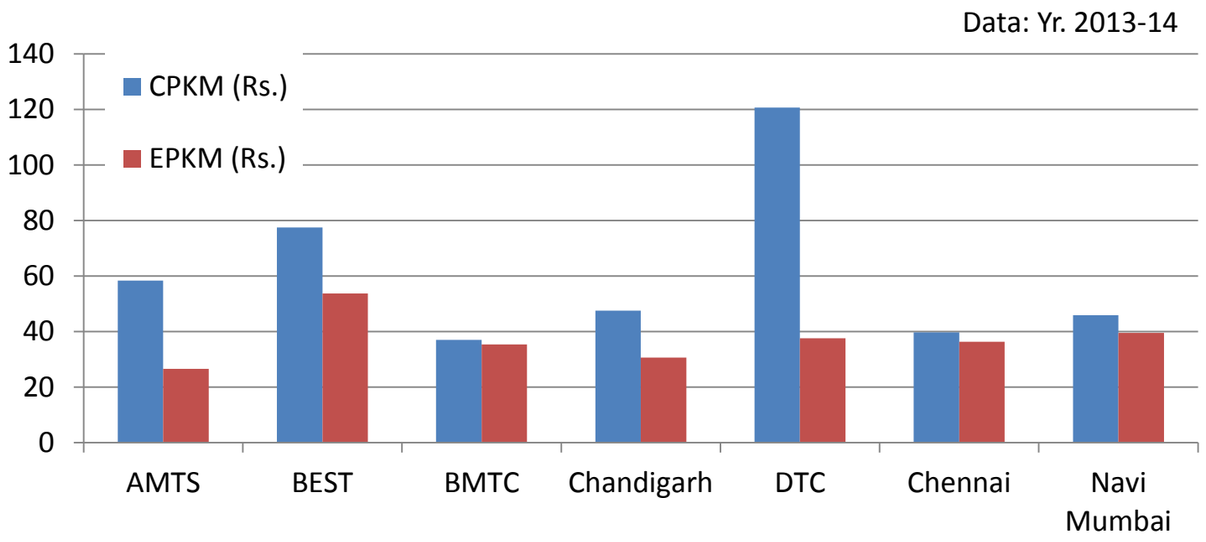
Prices of LI-Ion Batteries continue to drop, with landed fitted costs in India around USD 250/ Kwh presently.



Source: BloombergNEF

Vehicle	Fuel Econ. (Km/Kwh)	Range (km)	Battery (KWh)	Battery Cost (Rs. lakh)
2W	20-24	80	4	0.72
3W	16-18	70	4	0.72
Car	4-5	150	36	6.50
Bus	0.6 - 1	200	250	45.00

Most of our Bus based PT Systems run regular operating losses



- Outsourcing on GCC basis has reduced deficits, but not eliminated them.
- The situation is similar to State Electricity Boards in the late nineties and early 2000s when they were loaded with losses.
- Losses are inevitable in PT. We have to find a way to deal with it.

Revenues and Costs of Select SRTUs plying in Metropolitan Cities (2014-I5) (Rs Crore)

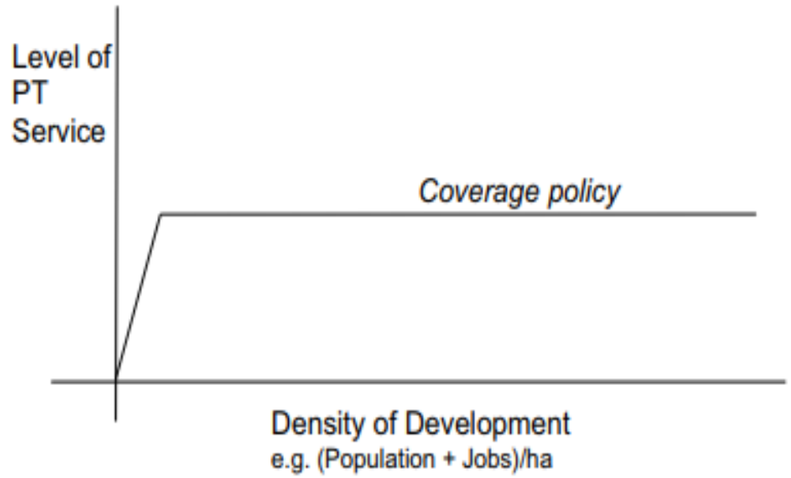
Sr. No.	Name of State Road Transport Undertaking (SRTU)	Total Revenue (Lakhs)	Total Cost (Lakhs)	**Surplus / Deficits**
I	Ahmedabad MTS	130	354	**-224**
2	BEST Undertakings	1508	2355	**-846**
3	Bangalore Metropolitan TC	2256	2321	**-64**
4	Calcutta STC	7,2	231	**-159**
5	Chandigarh TU	11,1	181	**-70**
6.	Delhi TC	1113	5104	**-3991**
7	Metro TC (Chennai) Limited	1376	1595	**-219**
8	Pune Mahamandal	707	875	**-167**
	Total (SRTUs plying in metropolitan cities)	7276	13019	**-5743**

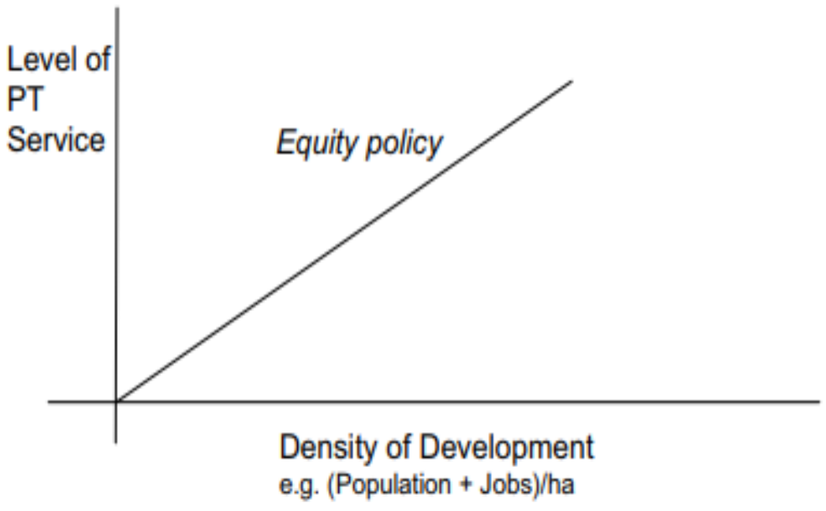
Source: ASRTU, Review of Performance of SRTUs, 2014-15

Losses are inevitable in Public Transport

- Systems can focus on either higher patronage or higher coverage as a Policy stance.
- Patronage focused systems respond mainly to busy routes with higher capacity. Coverage of sparsely populated areas at the peripheries suffer.
- Coverage focused systems tend to offer services to even low density areas without regard to ridership.
- Higher coverage leads to lower occupancies and lead to lower revenues vis-à-vis expenses.
- Balanced approach to both coverage and patronage required, accepting inevitability of some losses.

The Patronage v/s Coverage trade off





Source: Walker, Jarrett, Purpose-driven public transport: creating a clear conversation about public transport goals, Journal of Transport Geography 16 (2008)

Financing Electric Buses

1. FAME I : Capex based Subsidy
2. Chief Ministers Bus Scheme in Gujarat : Operations based subsidy
3. FAME II : Need to fund 7000 buses (Around 10,000 crore to a broken PT System)
    - Capex based subsidy, GCC mandatory
    - Model Concession Agreement by Niti Ayog
    - Road BOT Template
    - No heed paid to previous generations of MCAs
    - Nothing specific to Electric Buses
    - Termination payments similar to Power / Road sector

What next, beyond subsidies? Are we solving, or side stepping, the financially broke STU sector?

Financing Electric Buses

1. Key difference between E Buses and ICE Buses is higher capex need for E Buses
2. STUs need to be financially strengthened to create capacity to purchase buses through borrowing on their own strengths, rather than depending on ad hoc subsidies
3. The need is financing of Public Transport, not Electric Vehicles.

THANK YOU

The National Urban Transport Policy (NUTP), 2006

- One of the objectives stated in the NUTP is promoting the use of cleaner technologies.
- It further states that cleaner technologies need to be encouraged so that the problem of vehicular pollution can be more effectively dealt with. And hence, the Central Government would encourage the research, development and commercialization of cleaner technologies.
- It also talks about offering suitable concessions and benefits that would enable new auto fuel technologies to make an entry and compete with established technologies on more equitable terms.
- This will also encourage established technologies to improve their performance characteristics and compete with the emerging choices.
- It also further states about introducing measures to incentivize the use of fuel efficient (zero pollution) and small sized vehicles that use up little road space and also cause low pollution.

NUTP, 2006

EV scenario in in India

National Electric Mobility Mission Plan 2020

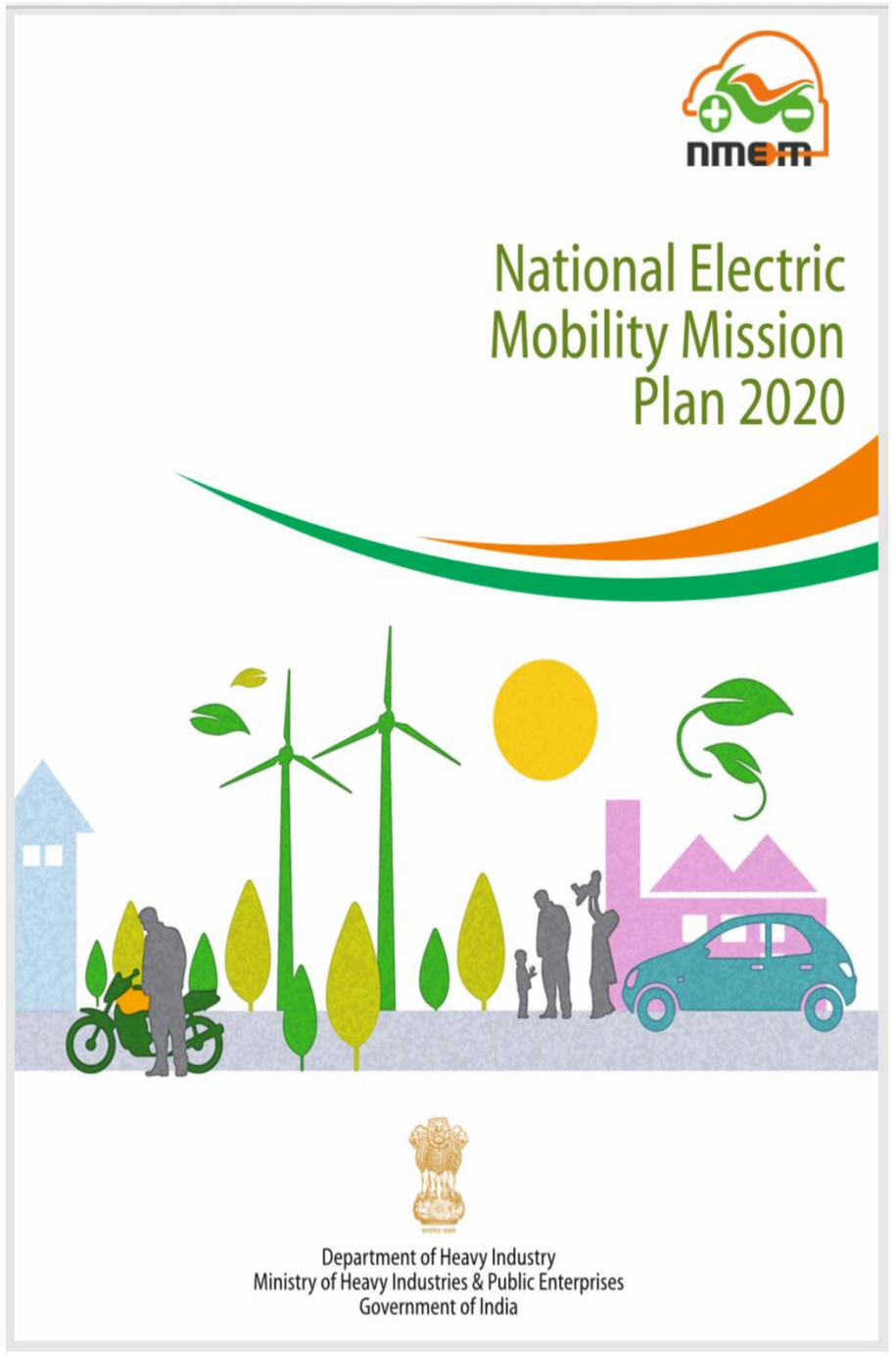
- In **2012,** the central government launched the **National Electric Mobility Mission Plan** to promote the use and manufacture of reliable, efficient and affordable EVs and xEVs. It is the **guiding document** that will form the basis for all the future initiatives, schemes, policies, and other interventions of the government for electric mobility.

- It aims to achieve national fuel security by promoting hybrid and electric vehicles in the country.

- One of its key takeaways is to achieve xEV sales of 6-7 million units by 2020 which in turn shall result in 2.2-2.5 million tonnes of liquid fuel savings and a decrease of 1.3 – 1.5% in carbon dioxide emissions.

- Under this mission, the **FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric vehicles) India scheme** is one such initiative undertaken by the government of India to promote EVs and xEVs.

- Under this scheme, **funding provisions** for four key areas namely technology development, demand creation, pilot projects, and charging infrastructure has been provided.



NMEMP, 2012
FAME India

EV scenario in in India

FAME (Faster Adoption and Manufacturing of (Hybrid &) Electric vehicles) India scheme

- This scheme has been framed **for a period of 6 years** till 2020.
- The objective of this scheme is to support the electric and hybrid vehicle market development and its manufacturing ecosystem to achieve self-sustenance at the end of the stipulated period
- The phase-1 of this scheme has been implemented from 1st April,2015 for a period of two years.

Component of the scheme	2015-2016	2016-2017
Technology Platform (Including testing infrastructure)	Rs. 70 Crore	Rs. 120 Crore
Demand Incentives	Rs. 155 Crore	Rs. 340 Crore
Charging Infrastructure	Rs. 10 Crore	Rs. 20 Crore
Pilot Projects	Rs. 20 Crore	Rs. 50 Crore
IEC/Operations	Rs. 5 Crore	Rs. 5 Crore
Total	**Rs. 260 Crore**	**Rs. 535 Crore**
Grand Total	**Rs. 795 Crore**	

Presently scheme is applicable in selected areas like as notified separately broadly covering following cities:

- Cities under "Smart Cities" initiatives
- Major metro agglomerations – Delhi NCR, Greater Mumbai, Kolkata, Chennai, Bengaluru, Hyderabad, Ahmedabad.
- All State Capitals and other Urban Agglomerations/Cities with 1 Million+ population (as per 2011 census)
- Cities of the North Eastern States

Note: Mild hybrids excluded from Fame in March 2017 extended for 6 month in march 2017

Vehicle Segment	Mild Hybrid Rs.	Strong hybrid Rs.	Plug-in Hybrid Rs.	Battery-Operated Electric Rs.
Two-Wheelers	1,800 – 6,200	-	13,000 – 18,000	7,500
Three-Wheelers	3,300 – 7,800	-	25,000 – 46,000	11,000 – 61,000
Passenger Cars	11,000 – 24,000	59,000 – 71,000	98,000 – 1,18,000	76,000 – 1,38,000
Light-Commercial Vehicles	17,000 – 23,000	52,000 – 62,000	73,000 – 1,25,000	1,02,000 – 1,87,000
Buses	30,00,000 – 41,00,000	51,00,000 – 66,00,000	-	-

FAME – DETAILED REVIEW

Department of Heavy Industry (DHI)

This department is responsible for planning, implementation and review of the scheme. It is also responsible for allocation of funds for the various components of the scheme, based on approval, allocation of funds by the Finance Ministry and implementation of pilot projects under the scheme. Addresses all the issues relating to the guidelines and for removal of difficulties in the implementation of the scheme.

National Board of Electric Mobility (NBEM) / Development Council for Auto and Allied Industries (DCAAI)

Oversees the progress under the scheme

National Automotive Board

Operating agency for the implementation for the scheme including the disbursement of funds for various components under the overall supervision and direction of Department of Heavy Industry (DHI).

Project Implementation and Sanctioning Committee

Approves specific projects under Pilot projects, R&D/Technology Development and Public Charging Infrastructure components

Source: FAME SCHEME, March 2015