



National Institute of Urban Affairs

# **Electric Vehicles in India Policies, Opportunities and Current Scenario**

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# Drivers for growth of electric vehicles in India

## Policy objectives

- Master plans for most cities in India target **60-80 per cent public transport** ridership by 2025-2030 (Center for Science and Environment)

## Market size

- India is the **2<sup>nd</sup>** largest two-wheeler market (**80 million** in 2010) in the world after China
- Two-wheelers will continue to remain mode of choice in 2035 (UNEP, DTU and IIM-A)

## Environmental

- **Thirteen** out of 20 cities in the world with **highest air pollution** are in India
- Low carbon scenario with 'highest' EV penetration shows 50 percent drop in PM 2.5 by 2035 (UNEP, DTU and IIM-A)

## Allied opportunities

- With the Government of India targeting **100 GW of solar by 2022**, electric vehicles can improve reliability and utilization of renewable by acting as storage

# Drivers for growth of electric vehicles in India

## However

- **Rollback** of previous subsidies with delay in implementing NMEMP highly detrimental to industry
- Number of electric two-wheeler makers has **fallen (75%)** from 28 in 2011-12 to seven in 2014-15
- Total electric vehicles sold in 2014-2015 has **decreased (84%)** from 100,000 in 2011-12 to approx 16,000 in 2014-15
- Infrastructure and market development cost for EVs (hybrid) vehicles estimated at **Rs 23,000 crore (\$3 Billion)** over 8 years

Source: Society of Manufacturers of Electric Vehicles India (2015)

# Electric vehicles in India – Opportunity Indicators



## Market size of auto rickshaws

(Source: WRI)

Tier I cities	50,000 +
Tier II cities	15,000 to 30,000

2012  
229 Million Trips → 2031  
482 Million Trips



## Number of buses (in thousands)

Source: data.gov.in

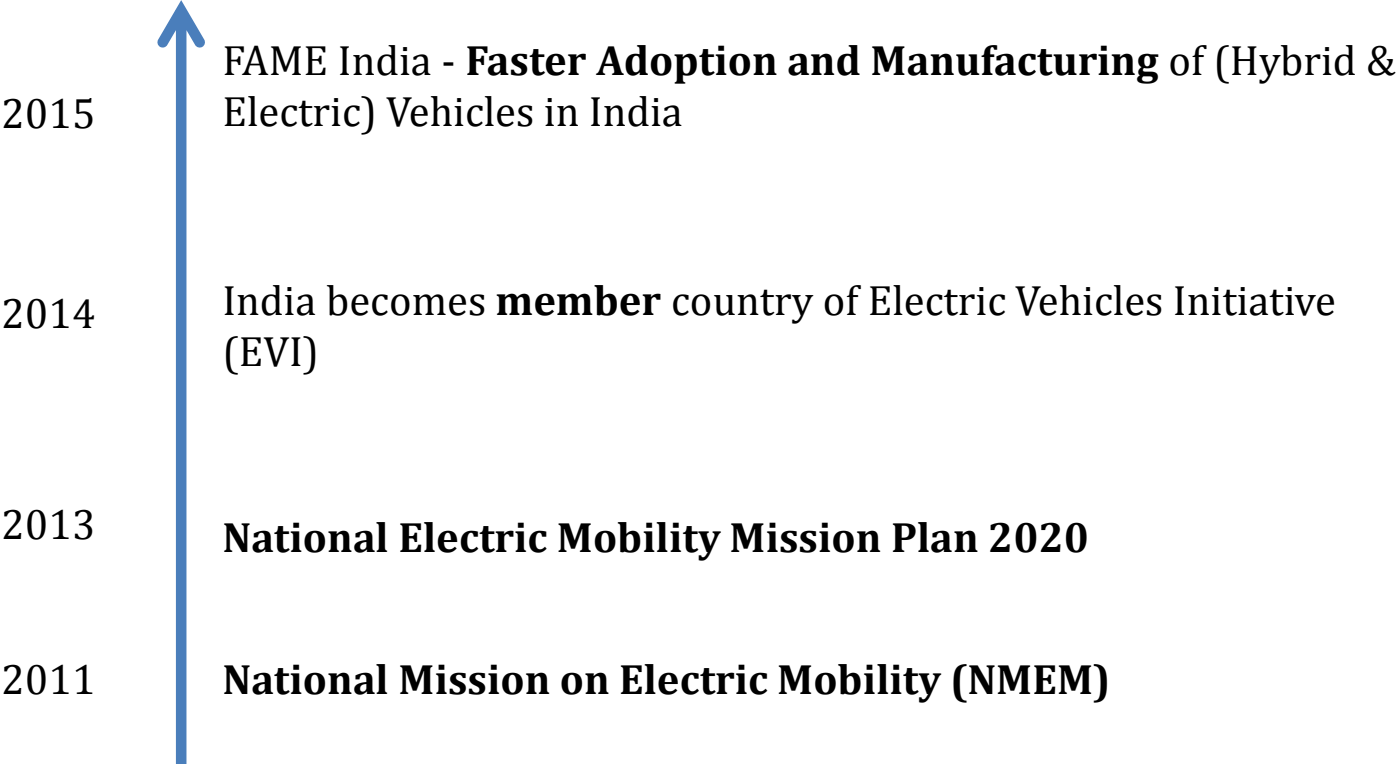
Year	Public sector	Private sector	Total
2012	131.8	1544.7	1676.5
2011	130.6	1473.2	1603.8



- **Total Market Size** – 80 Million (2010) , 10% growth every year
- Approx. **500,000 electric** two-wheelers (2012)
- Electric two-wheeler market in India < **1 percent** of two-wheeler market

Source: Society of India Automobile Manufacturers (2014)

# Electric vehicles in India – Policy Progression



## FAME India – Faster adoption and manufacturing of (Hybrid & Electric) vehicles in India

## National Electric Mobility Plan (NEMMP) 2020

Components of Scheme	2015 – 2016 INR Cr. (million USD)	2016 – 2017 INR Cr. (million USD)
Technology Platform (+ testing infra)	70 Cr (10.8)	120 Cr (18.6)
Demand Infrastructure	155 Cr (24)	340 Cr (52)
Charging Infrastructure	10 Cr (1.5)	20 Cr (3.1)
Pilot Projects	20 Cr (3.1)	50 Cr (7.7)
IEC / Operations	5 Cr (0.7)	5 Cr (0.7)
Total (INR)	260 Cr (40.3)	535 Cr (83.1)
<b>Grand Total (INR)</b>	<b>795 Cr (123 million USD)</b>	

- Target of deploying **5 to 7 million** electric vehicles in the country by 2020
- Emphasizes importance of government incentives and coordination between industry and academia
- Target of 400,000 passenger battery electric cars (BEVs) by 2020 ~ avoiding **120 million barrels of oil and 4 million tons of CO2**
- Lowering of vehicular emissions by **1.3 percent** by 2020
- Total investment required –INR 20,000 – 23,000 cr (approx 3 billion USD)

# Incentives for electric vehicles in India

## Demand side incentives announced under FAME India

Vehicle Segment	Minimum incentive (INR)	Maximum incentive (INR)
2 wheeler scooter	1800 (30 USD)	22,000
Motorcycle	3500	29,000
3 wheeler Auto-rickshaw	3300	61,000
4 wheeler cars	11,000	1,38,000
LCVs	17,000	1,87,000
Bus	30,00,000 (47,000 USD)	66,00,000
Retro Fitment Category	15 % or 30,000 if reduction in fuel consumption is 10-30%	30 % of Kit price or 90,000 if reduction in fuel consumption is more than 30 %

- Availed by buyers upfront at the point of purchase
- Manufacturers Reimbursed by Department of Heavy Industries

### Concessions in custom duties (up to 31/03/2015)

- Exemption of basic customs duty on lithium ion automotive battery
- Exemption of customs duty on parts of hybrid and electric vehicles
- Concessional excise duty of 6% to specified parts
- Excise duty reduced to 10% in latest interim budget of 2014

### State-level incentives

- Exemption of VAT
- VAT waiver for window
- Reduction in VAT

# Challenges and barriers to growth of Electric Vehicles in India

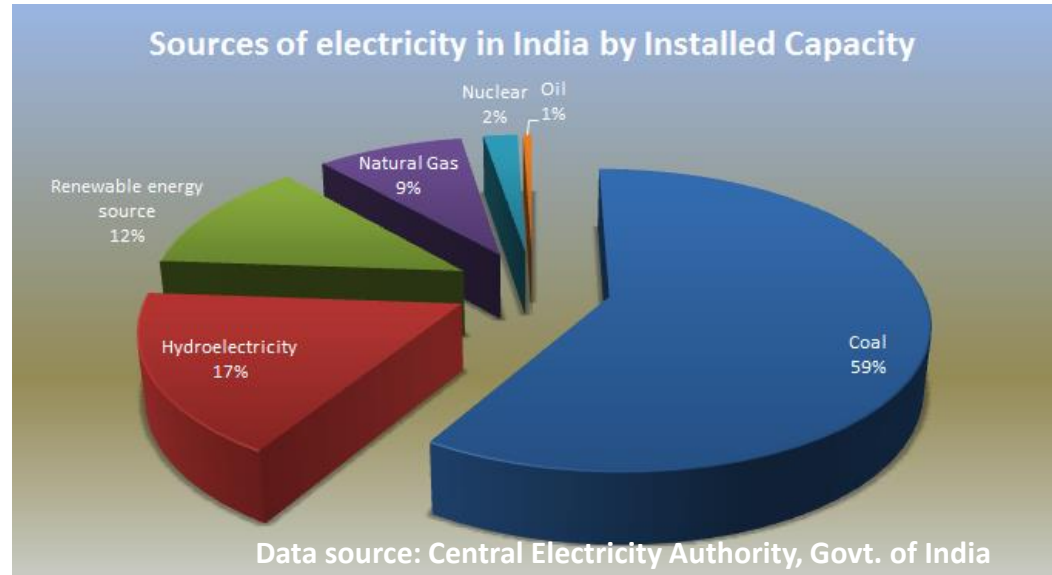
India **does not have Lithium ion** reserves to support a large domestic market for electric vehicles

**Lack of clear policies** for supporting the growth of supply, manufacturing and recycling of batteries

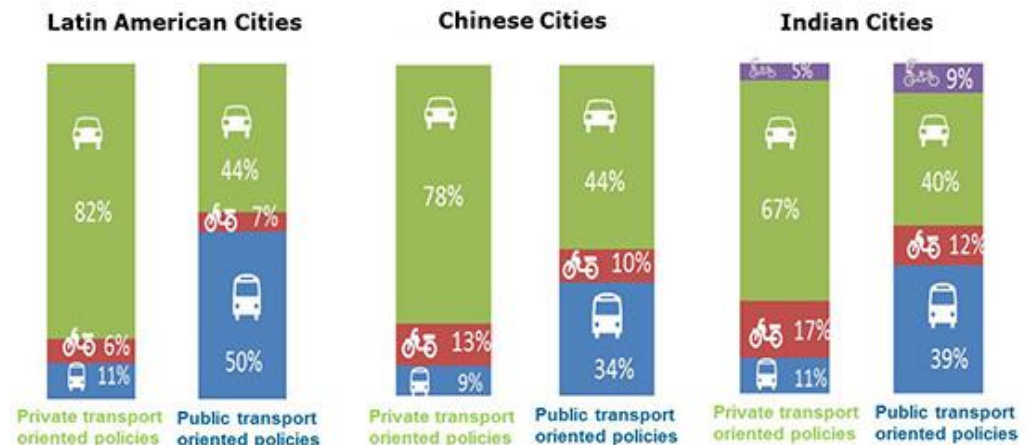
India's electricity mix is dominated by **fossil fuels** – low carbon benefits  
Need to be rationalized

**Safety concerns / perceptions** around electric vehicles

High local taxes and low prices of oil



VAT on EVs	State (Source: SMEV, India)
12-14 per cent	Uttar Pradesh, Punjab, Chandigarh and Goa
5 per cent	Maharashtra (+4.5 per cent Octroi)





# Business model for e-rickshaws in India

## OPPORTUNITIES

1. Existing presence of about **250,000** e-rickshaws operating in 6 states including Delhi-NCR, Bihar, West Bengal and Orissa
2. **Business model advantage**
  - Set of 4 batteries cost ~ 24,000 INR (375 USD) and last for 6 months
  - Scrap value of batteries 4,000 INR (63 USD)
  - Cap-ex every 6 months is 20,000 INR (311 USD) effectively 2 dollars per day
  - Earnings up to 16 dollars per day
3. One overnight recharge can run for **80 km**

Source: Interviews with EV battery manufacturers

- In March 2015 the Motor Vehicles (Amendment) Bill was cleared establishing battery-powered e-rickshaws as a valid form of commercial transport
- 3 wheeled vehicles run by battery power of no more than 4,000 Watts
- 4 passengers, luggage of 50 kg and with a single trip under 25 kilometers
- 22,000 licenses granted, insurance can be obtained for e-rickshaws, minimum 8<sup>th</sup> pass criteria removed

## CHALLENGES

1. Fragmented market
2. Lack of government support
  - No recognition
  - Regulations are not clear
  - No incentives for recycling batteries
3. Fragmented market of battery suppliers -6-7 organized vs 60 unorganized battery suppliers
4. Despite advantage e-ricks not used openly due to Delhi High Court ban
5. Problem of charging (using electricity) for commercial use at domestic rates



Image source: The Hindu

# Electric vehicle case studies from India

## Mahindra E20

1. India's first completely electric vehicle, manufactured in green facility
2. Offers innovative battery rental scheme - *Goodbye Fuel Hello Electric (GFHE)*
3. On road price of INR 4.79 lakh (approx. 7542 USD) and fixed energy fee of INR 3,000 (47 USD) per month for 5 years / 50,000 km
4. Sold only **1000** units in the past 15 months (target of **500 units per month**)
5. Plans to expand to Europe and South Asian countries where EV sales are picking up and government incentives are available

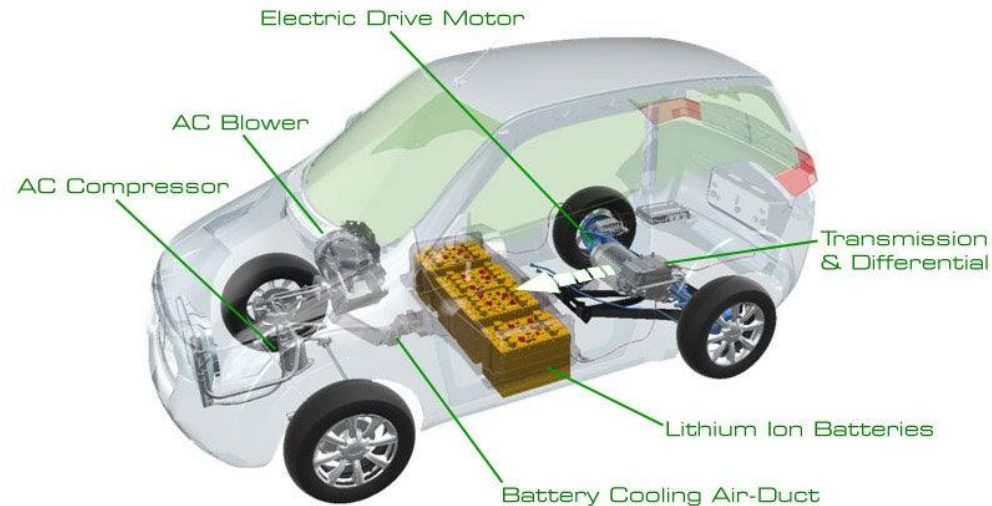


Image source: Mahindra and Team BHP

# Green shoots for EVs in India?



Image source: Times of India

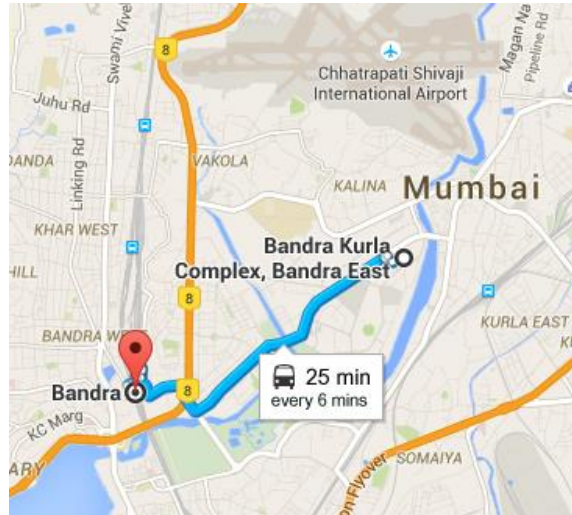


Image source: Athena Energy

## Bangalore Municipal Corporation

- First trial of electric bus in India in Mar 2014
- Bangalore Municipal Transport Corporation proposed exemption of road tax and VAT for electric vehicle
- Project shelved as corporation is cash strapped and cannot afford a 3 crore INR ( 472,106 USD) bus

## Mumbai Metropolitan Regional Authority (MMRDA)

- Apr 2015 – Floated RFP for 25 AC electric / hybrid buses from Bandra Kurla Complex to 3 railway stations

## New Delhi Municipal Corporation

- Proposes to operated three-wheeler electric vehicles from Metro stations

## Athena Energy (2016)

- IIT Madras based startup aiming to launch redefined electric scooter in 2016
- Lithium-ion battery with digital battery management targeting
  - 8 times faster charging
  - 10 times longer battery
  - 75 percent lighter battery

# Technology in Transport

## Intelligent Transportation Systems

### Mumbai FATC

- Fully Adaptive Traffic Control System
- **253 signal junctions**, Central Control room and a satellite information center
- Improvement in **8-10% in journey times** of peak time, peak direction journeys
- Reduction of stoppage delay on network of about **17%** and energy saving of **30-40%** due to LED shift.



### Bangalore B-TRAC

- Surveillance camera, variable message signs, network monitoring, incident reporting, signal coordination
- Traffic Management Center covering **333 signalized intersections**
- 18% reduction in crashes (2007-10)
- **Average time savings of 15%** for 80% of journeys
- Average peak hour speed improvement from **18 mph to 23 mph**

## Additional Sources

- <https://3wheeledcheese.wordpress.com/2012/02/10/launch-of-new-report-on-auto-rickshaws-in-india/>
- <http://thecityfix.com/blog/qa-with-akshay-mani-rajkots-new-auto-rickshaw-fleet/>
- <http://www.slideshare.net/EMBARQNetwork/2-akshay-mani>
- <http://pib.nic.in/newsite/PrintRelease.aspx?relid=118088>
- <http://www.thehindubusinessline.com/features/giving-electric-scooters-a-positive-charge/article6735755.ece>
- <http://atherenergy.com/>
- [http://www.idc.iitb.ac.in/munshi/Electric\\_Vehicle\\_Design\\_Initiatives\\_in\\_India.pdf](http://www.idc.iitb.ac.in/munshi/Electric_Vehicle_Design_Initiatives_in_India.pdf)
- <http://www.mid-day.com/articles/mmrda-plans-to-purchase-25-ac-hybrid-buses-for-bkc/16186196>
- <http://www.livemint.com/Industry/rGnTveNiF68E70vW2d0DGI/Subsidy-on-electric-vehicles-may-not-cheer-makers.html>
- [http://www.business-standard.com/article/companies/how-india-s-e-vehicle-dream-crashed-into-the-subsidy-wall-114082600021\\_1.html](http://www.business-standard.com/article/companies/how-india-s-e-vehicle-dream-crashed-into-the-subsidy-wall-114082600021_1.html)
- <http://timesofindia.indiatimes.com/business/india-business/Mahindra-slashes-electric-car-e2o-price-by-Rs-92000/articleshow/47083838.cms>
- <http://indianexpress.com/article/cities/delhi/parliament-consents-to-allow-e-rickshaw-in-delhi/>

# Image Sources

- <http://www.team-bhp.com/carpics/mahindra-e2o/m/electric/mahindra-reva-e2o-01.jpg>
- <http://www.thehindubusinessline.com/features/giving-electric-scooters-a-positive-charge/article6735755.ece>
- <http://www.internationaltransportforum.org/Updates/index.html>
- [http://www.thehindu.com/multimedia/dynamic/01588/DE18\\_BATTERY\\_OPERA\\_1588356f.jpg](http://www.thehindu.com/multimedia/dynamic/01588/DE18_BATTERY_OPERA_1588356f.jpg)
- <http://www.rushlane.com>
- <http://www.ibnlive.com>
- <http://www.web.worldbank.com>